HARMONY WITH NATURE: ZOOLOGICAL AND BOTANICAL GARDEN

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Abstract
Natural wealth is the primary source of human nutrition, so it has to be preserved, as the loss will lead to an imbalance in the life cycle. Therefore, it is important to inspire the citizens and visitors to the zoological park to know the value of wildlife on earth and to help safeguard existing species through preservation. The proposed project is a park that designed to be a place that combined between entertainment and education. The aim of this project is to increase the awareness and knowledge of people to respect the nature and deal with the animals and protect their environment. In this park people can see an interaction and connection between entertainment and education, which include research center and museum of flora and fauna. This project covered several similar cases studies and proposed the space program. The selected site is located at Al-Baha city which has several advantages in term of accessibility, topography, noise, views and well knows street.

Keywords– Zoological, Botanical Garden, Wildlife, Preservation, Entertainment, Education

INTRODUCTION
The characteristics and functions of botanical garden include participation in scientific research, which are aimed to protect endangered species in free state, education for the protection of plant species, including the conservation of biological diversity, growing of endangered species of plants, for the purpose of ex situ conservation, and an introduction to the natural environment under programmes aimed at protecting these species [1]. The roles of botanical garden include keeping plants in conditions appropriate to their biological needs and keeping growing records [1].

The characteristics and functions of zoological garden are participating in scientific research aimed at protecting wild species at risk of extinction, educating in respect of the protection of animal species, including the protection of biodiversity, rearing animal species at risk of extinction in order to protect them ex situ, and then introducing them into the natural environment as part of protection [1]. The zoological garden may provide programmes for those species, keeping animals in conditions appropriate for their biological needs and also maintaining breeding documentation [1].

Along many years different studies happened about natural resource, and it shows that natural resources are getting neglected from people although it has to be preserved. In 1752, Vienna introduced its first park it was called Tiergarten Schönbrunn [2, 3].

This park was a combination of botanic and zoological park. The aim of this park was to create a place that saves the life of panda because pandas are one of the animals that disappear from our life because of the hunting. In few years ago another projects are introduced in order to serve the same thing, which is the natural resource one of these examples is a project that is located in Montreal, this project shows the ability for human in creating suitable places that satisfy the need of large number of species in order to protect their life’s [4, 5]. Therefore, the proposed project emphasize the harmony of the nature by integrate the zoological and botanical garden to serve as entertainment and education park in Saudi Arabia.

CASE STUDIES
This study considered three case studies, which are applied in different places around the world. Each one of these case studies has its own designed which makes it different than the other, but all of them are looking for the same purpose which preserves the natural wild life. They are:

a. Research Center ICTA-ICP, Spain
b. National museum of natural history, USA
c. M&T bank rainforest falls, USA

Research Center ICTA-ICP, Spain
Research Center ICTA-ICP is designed by H Arquitectes, DATAAE, located in Cerdanyola, Barcelona, Spain (Figure 1). This project focuses in ecological sciences and fossil science. The building, a secluded volume of five stories of 40x40m2 and two cellars. On the ground floor the corridor, bar, classrooms, meeting rooms and the organization region; the following 3 stories hold the workplaces and research centers; on the rooftop there are vegetable fixes together with the resting territories. The semi cellar holds the stopping and the motor rooms while the storm cellar contains the distribution centers and different research facilities [6, 7].

The building has been designed to host three types of climates associated with different intensities of use: Climate A: in-between spaces that are exclusively aclimatized/heated by passive and biodimatic systems; Climate B: offices that combine natural ventilation with radiant and semi-passive systems; Climate C: laboratories and classrooms. The building optimizes the whole water cycle by reducing the demand and consumption through the reuse of rainwater, greywater, yellow and wastewater [7].

National museum of natural history, USA
The National Museum of Natural History is a natural history museum administered by the Smithsonian Institution, located in Washington, D.C., United States (Figure 2). There are 126 million specimens of plants, animals, fossils, minerals, rocks, meteorites, human remains, and human cultural artefacts [8].
The National Gem and Mineral Collection is one of the most significant collections of its kind in the world. The collection includes some of the most famous pieces of gems and minerals including the Hope Diamond and the Star of Asia Sapphire. The David H. Koch Hall of Human Origins opened on March 17, 2010, The Hall is "dedicated to the discovery and understanding of human origins," and occupies 15,000 square feet (1,400 m²) of exhibit space. The design of Hall of Mammals is innovative and welcoming. The mammal specimens are presented as works of modern art within strikingly minimal environmental. This exhibit in Hall of Bones displays a variety of vertebrate skeletons. They add this hall within the museum, because it’s important to show the people how each animal has different kind of skeleton [8].

M&T Bank Rainforest Falls, USA

M&T Bank’s Rainforest Falls is designed by Foit Albert Associates, located in Buffalo, NY United States of America (Figure 3). This place is a park that takes care about different kind of animals. Different species are providing with spaces according to their size and their need, and also they provide different environmental design according to the climate of each species. The idea of this park is to create edutainment park which mean it teach the people how they taking care of some specific kind of animals, at the same time there some activity that people use it to enjoy their life [9, 10].

**Table 1. Space Program**

| Zones                     | Section            | Total Net Area (m²) |
|---------------------------|--------------------|---------------------|
| **Zone 1**                |                    |                     |
| Research center           |                    | 2998                |
| Veterinarian              |                    | 960                 |
| Kennel                    |                    | 966                 |
| **Zone 2**                |                    |                     |
| Natural museum            |                    | 3703                |
| Administration            |                    | 964                 |
| **Zone 3**                |                    |                     |
| zoological and botanical  |                    | 4830                |
| park                      |                    |                     |
| **Total**                 |                    | 14321               |

**SITE SELECTION AND ANALYSIS**

There are three sites from Al-Baha city were proposed for the project site location. Al Baha is a city that has much natural recourse like, Al-Aqiq. Al-Baha has more than one forest including Raghdan forest, which covers an area of 600,000 square meters just five kilometres from Al-Baha city. The Amdan forest is another forest, which is located in the north side of Al-Baha. WadiFeig forest is 8 kilometers from Al Baha. It is encircled by a green valley littered with apricot, pomegranate and grape orchards. The Wadi Al Ageeg forest is 40 kilometres from Al-Baha and abounds in various fruit trees and tall lotus trees. Besides that, Al-Baha has many mountains that have animals living on it one of these mountains is Shada Mountains it is one of the well-known in Al-Baha that is surrounded by park and there are some animals live there like the Arabian leopard.

Figure 4 shows the location of site 1 with total site area of 2000000 sqm. There is a park next to it that can be included within the site. It is surrounded by different kind of services such as Al-Taiyebat Restaurant, Al-Rajhi Bank and Al Helali Station. It is located in a suitable area for zoological park. Figure 5 shows the location of site2 with total site area of 269469 sqm. It is surrounded by agriculture society such as Al-Baha agriculture society and faculty of applied medical science. Also there is General court and Al-Seiari station near to it. Although the place is suitable, but there aren’t any kind of services near it. Figure 5 shows the location of site 2 with total site area of 2240000 sqm. It is near to a forest and there are many services nearby which are King Fahad Hospital, Al-Nahdi Pharmacy, Al-Zahwa Mosque and Al-Bustan Restaurant.
The site evaluation criteria that considered are accessibility, topography, noise, views and well knows street. Each criterion will be rated from 1 (Poor) to 10 (excellent). The site with highest score will be chosen as the project site location. Based on the site evaluation result shown in Table 2, the highest score is site 1. Thus, site 1 is considered as the site location for the project. Site 1 with total site area of 200000 sqm and not located in a very crowded area, so it is easy for the visitors to reach the please. Also, the selected site can be accessed through local street and the main streets namely King Abdulaziz Road as shown in Figure 7. The climate analysis is illustrated in Figure 8 where the cool wind is from north-west and hot-dry wind is from south-east. Also, the site temperature is between 12°C to 23°C, which mean the climate is not very hot compared to Jeddah and Riyadh.

Table 2. Site evaluation

| Criteria       | Site 1 | Site 2 | Site 3 |
|----------------|--------|--------|--------|
| Accessibility  | 9      | 5      | 6      |
| Topography     | 6      | 6      | 9      |
| Noise          | 6      | 8      | 7      |
| Views          | 8      | 8      | 9      |
| Well knows street | 7  | 4      | 3      |
| **Total**      | **36** | **31** | **34** |

Figure 7. Accessibility

Figure 8. Climate analysis

ZONING AND PROJECT DESIGN

Figure 9 shows the final site zoning of the project. Zone 1 is situated near to the main street, which consists of research center, veterinarian and kennel. The Zone 2 is beside Zone 1, which consists of natural museum and administration. Both Zone 1 and Zone 2 are directly connected to zone 3 which is the zoological and botanical park. The main perspective of the project is shown in Figure 10. In addition, Figure 11 and Figure 12 display the view of the butterfly dome and exhibition area of the project.
CONCLUSION
The goal of this project is to be the first preservation center with scientific bases that lead to major growth in science and research fields in Saudi Arabia, also to spread the message of kindness and compassion with animals, and protect the greatest number of species. The proposed project consists of three main zones for research center, veterinarian, kennel, natural museum, administration as well as zoological and Botanical Park. Site 1 is chosen as the project site location based on the evaluation criteria of accessibility, topography, noise, view and well known street. This project envisions a world in which humankind values, protects and preserves the diversity of species on Earth.

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