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AN EVOLUTIONARY VISIONARY IN FUTURE ENVIRONMENTAL ARCHITECTURE IN DESERT OF DUBAI

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Abstract- Desertification is certainly a problem in many desert regions that humans and their developments have participated to reversing this process. The ways of creation of favorable areas for living in deserts are worked out using new technological methods of soils solidification, thus solving dual problems-making steady the ground excluding sand storms in the deserts, transforming sand into sandstone for construction usage. In this paper is presented a new approach to desertification and sustainable development in the functional architecture of the Dubai deserts.

Keywords: Bio-Architectural Landscape, Air Pollution by Artificial Rain, Green Energy, Environmental Sustainability Design, Sand Storms, Solidified Dunes.

I. INTRODUCTION

In now days urban sprawl when lack of lands good for construction increases daily the usage of any opportunity for unfavorable lands transformation into favorable becomes urgent thus protecting developed landscapes from overloading and providing sustainable development keeping the ecological balance for the total areas favorable for living environment arrangement. This measurement will reduce population high density thus protecting natural landscapes from pressure. Sustainable development places a premium on conservation off natural resources, wildlife and habitat protection. It also assumes high degrees of self-sufficiency at all levels off Settlement structure [1].

Accordingly, in this paper, after the introduction, the literature is expressed in generalities about one of the most important previous studies that conducted about this subject. In section 3, recommended suggestion for Dubai desert. Finally, in the last section, conclusions are stated. The study included costs of sand storms and air pollution for areas that are adjacent desert caused are drought can be summarized into the following sections and calculated:
- Health care costs and mortality
- The cost of damage of buildings and urban facilities (clean and repair costs)
- Smog and haze caused by Sand Storm (reduce the amount of sunlight received by plants to carry out photosynthesis and leads to the production of troposphere ozone which damages plants)
- The opportunity for reducing cost of fuel (gasoline and other fossil fuels)

In addition, the summertime when the wind storms are frequent, a problem of sand storms becomes urgent-causing the below mentioned inconveniences:
- Air pollution with sand, clouds (sometimes making impossible to stay outdoors)
- Coverage of sand on roads (accident danger)
- Inner houses, windows-filled with sand are linked to health hazards such as heart disease, [3] altered lung function and lung cancer
- Pollution can also be the consequence of a natural disaster. For example, hurricanes often involve water
- Landscapes changes

It is a resold the huge amount of sand a movement the landscape is fixed and new method desertification causing future transformation of landscapes.

II. LITERATURE REVIEW

Some experience in this direction had already been done so some of these examples introduced below; Magnus Larsson's experience (A student at London's Architectural Association) is stated in follow steps:

A. Landscape Improvement for Habitation

Clarifying the biochemical process through which his project could be realized. Larsson explained that his structure is made straight from the dun escape by flushing, a particular bacteria through the loose sand, which causes a biological reaction whereby the sand turns into sandstone, initial reactions are finished within 24 hours, though it would take about a week to saturate the sand enough to make the structure habitable [2].

The project, a kind of bio-architectural test-landscape, would thus, go from a balloon-like pneumatic structure filled with bacillus pasteurizing, which would then be released into the sand and allowed to solidify same into a perm cultural architecture. However, in spite of above mentioned advantages some problem exists, the problem of thermal comfort in buildings is perceived as one of the more characteristic and difficult problems that desert architecture must address, even though this is not the only problem or necessarily the most difficult one. A typical way of addressing the thermal comfort issue in buildings is by intensive use of expendable energies.

However, this of course, is not an ideal approach, it leads to waste of energy, it is expensive, and not everyone is comfortable with the thermal conditions it creates (witness the number of people who do not like air-conditioning). Below in the pictures, the Larson's method application with another experience of planting a shelterbelt of trees in Sahara desert (Africa) is shown. In any case, Larsson's "solidified dunes" would also support the existing Green Wall Sahara initiative, 24 African countries coming together to plant a shelterbelt of trees right across the continent, from Mauritania in the west to Djibouti in the east, in order to mitigate against the encroaching desert (Figure 1).

Figure 1. Magnus Larsson's dune, erinaceous anti-desertification architecture

Clearly having thought the project in extraordinary detail, Larsson then points out that the structure itself would generate a temperature difference between the interior of the solidified dunes and the exterior dune surface. This then makes it possible to start building a perm cultural network, the nodal points of which would support water harvesting and thermal comfort zones that can be inhabited [2]. Eventually, then, a 6000 km-long wall of perm culturally active, inhabited architecture will span the Sahara. Larsson goes on to contrast his method with existing vernacular techniques of anti-desertification, which include the planting of trees and cacti, the cultivation of grasses and shrubs, and the construction of sand-catching fences and walls.

More projects that are ambitious have ventured into the development of agriculture and livestock, water Conservation, soil management, forestry, sustainable energy, improved land use, wildlife protection, poverty alleviation, and so on. This project, apart from utilizing a completely new way of turning sand into sandstone, incorporates all of the above (Figure 2). Inside the dunes, we can take care of our plants and animals, find water and shade, and help the soil remain fertile, care for the trees, and so on. In this way, an environmental project that provides hopefully an innovation for other architects/builders to use and copy repeatedly.

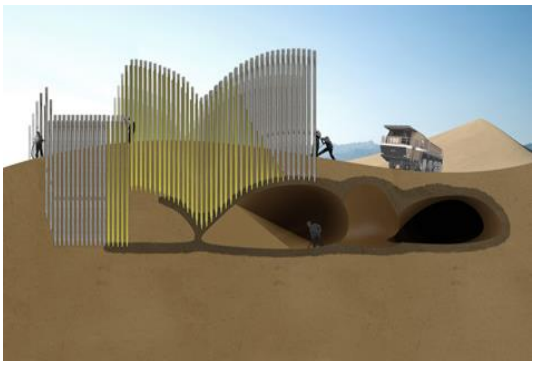

Figure 2. Soil solidification biological method

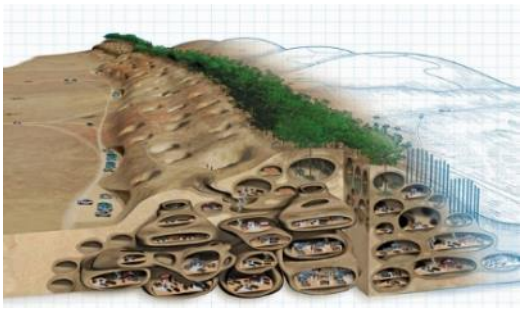

Figure 3. Soil solidification biological method Africans from the relentless advance of the Sahara desert

B. Sand Dwellings

Borrowing from an experimental solution for firming up building foundations in earthquake-prone areas, Swedish architect Magnus Larsson, 34, has proposed solidifying the sand dunes at the leading edge of the Sahara to create a habitable 3,728 mile-long desert blocking wall. In the lab, it can solidify 32 square feet of soil in a matter of hours, although they estimate that it would take up to a few weeks for large-scale solidification. Larsson's proposal, roughly on scale with the Green Wall of the Sahara, contains the spreading desert with a nine-mile thick barrier of trees extending along the same stretch supporting the Green Wall, literally. His Hardened sand wall, up to 1,000 feet deep in some places, would provide a more stable base for the trees, with full-scale homes carved out of the dunes. In his drawings, the dwellings look like millions of row houses with green roofs keeping desert at bay (Figure 3). Solidification would pose few risks to the environment or human health, since it relies on harmless microbes naturally present in marshes and wetlands.

The problems of desertification have been discussed for long time, in former times just as science fiction novel sounded (Frank Herbert's famous 1965 novel Dune forecasts a dystopian world without water remaining inhabitants have secluded themselves from their harsh environment in what could be called subterranean oasis's known as Sietch, are essentially underground water storage banks). The concept of a water-poor world is quickly becoming a reality, especially in the American Southwest. Colorado River has been desiccated by both heavy agricultural use and global warming to point that it now ends in an intermittent trickle in Baja California.

Towns that once relied on the river for water have increasingly begun to create underground water banks for use in emergency drought conditions. However, as droughts are becoming more frequent and severe, these water banks will become more than simply emergency precautions. Sietch Nevada projects water banking as the fundamental factor in future urban infrastructure in the American Southwest. Sietch Nevada is an urban prototype that makes the storage, use, and collection of water essential to the form and performance of urban life. The Sietch is a dense, underground community. A network of storage canals is covered with undulating residential and commercial structures. These canals connect the city with vast aquifers deep underground and provide transportation as well as agricultural irrigation. The caverns brim with dense, urban life, an underground Venice. Cellular in form, these structures constitute a new neighborhood typology that mediates between the subterranean urban networks and the surface level activities of water harvesting, energy generation, and urban agriculture and aquaculture (Figure 4).

However, the Sietch is also a bunker-like fortress preparing for the inevitable wars over water in the region. Above-mentioned examples introduce the opportunities and ways of protecting areas from desertification, protecting water resources and using deserts for urban usages unloading landscapes from pressure. According to the example given, this article is designed to express this model in Dubai's deserts. Dubai deserts located in the arid tropical zone extending across Asia and northern Africa, the UAE's major terrestrial habitat is sandy desert that supports varying amounts of sparse seasonal vegetation. Abu Dhabi Emirate includes the northwestern part of the Earth's largest sand desert, the 'Empty Quarter' or 'Rub-al Khali'. Massive forestry operations are underway to green UAE's deserts. Farms are also being developed to provide subsidized income to local populations.

III. SUGGESTION FOR DUBAI DESERTS

Reasons for making this intervention in Dubai desert, urgency:

A. Sustainability Provision

Sustainably managed landscapes, can provide us with economic wealth, distinctiveness, health, biodiversity, competitive, advantages and a strong sense of identity, sustainable development, encourage economic development [4].

B. Winds Hot

Make changes in natural landscapes causing the following negative impact, Transfer of great masses of sand from are space to another.

C. Solar Energy

These deserts have enough sun radiation, which is not used up to now solar energy is the emerging economies and the cheaper cost of power generation cheaper than fossil, fuel power stations.

Solar technologies have advanced to the point where the production cost for solar power is on a similar level to coal or natural gas production. Humans have harnessed solar energy, radiant light, and heat from the sun, since ancient using a range of ever evolving technologies. Solar energy technologies include solar heating, solar photo voltaic, solar thermal electricity, and solar architecture, which can make considerable contributions to solving some of most urgent problems that world now faces [5].

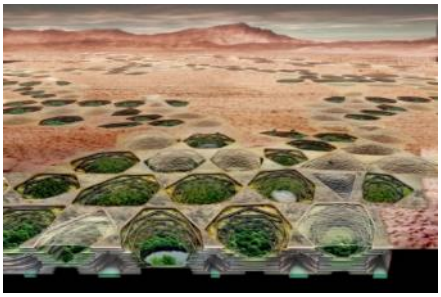

Figure 4. Soil solidification biological method

D. Aesthetic Aspect

Have high an esthetic value as natural landscape so the most valued parts (dunes) role to be separated as protected natural landscape parts reservation, with the corresponding measurements provision to keep them in their Preliminary shape, (Protecting green zones or screens usage on main wind directions, special touristic paths proposal, etc.).

The climate of the UAE generally is hot and dry, Dubai weather is generally hot and humid with a high daily average of sun hours. The Dubai weather is of course determined by its climate. In addition, the Dubai climate is an arid subtropical climate due to Dubai being located within the northern desert belt. The skies over Dubai are generally completely blue with little cloud cover. Due to the Dubai weather and its blue skies, Dubai has become a popular destination for astronomers. Therefore, Al-Maha desert as one of the Dubai desert, as the proposal will be evaluated and selected. Al-Maha desert is a part of the Dubai desert conservation reserve, which is country's first national park.

This desert region takes pride in being the home to an impressive herd of rare Oryx. This rare species were becoming extinct around 50 years ago, and the Dubai desert conservation reserve took into its hand to save these gazelle-like creatures, the natives of UAE. Now, breeding is done and they are reintroduced into the wild. Today, Al-Maha charm attracts number of tourists, for a unique experience with nature. It is one of those destinations, which leaves one spellbound. The reserve is spread out on 225 square kilometers area of pristine desert landscape, and makes for a holiday to remember. One cannot but overlook the panoramic views of Hazar mountains and charm pervading throughout the place [6].

Provide the sustainable development keeping the ecological balance the total areas favorable for living environment arrangement are to be used this measurement will reduce population high density thus protecting natural landscapes from overloading pressure.

Figure 5. Desert location (proposal area location)

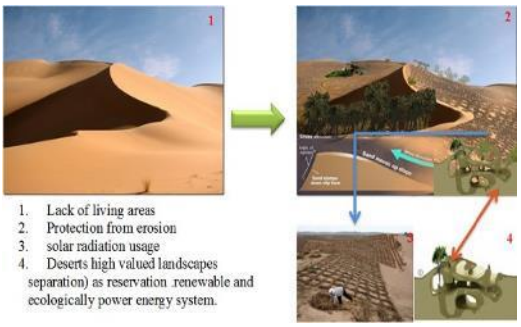

Figure 6. Soil solidification biological levels and green belt in Maha desert

Table 1. Good types for further humidity protection

Common names	Images	Description	Environmental impacts
Ghaf (Arabic), Sangri (Rajasthan), Jand (Punjabi), Kandi (Sindh), Banni (Kannada),Vanni (Tamil), Chaunkra Jant/Janti, Khar, Khejri/Khejra Sami, Shami (Hindi), Sumri (Gujarat) [7]		P. Cineraria is a small tree, ranging in height from 3-5 m. Leaves are bi-pinnate, with 7-14 leaflets on each of 1-3 pinnae. Branches are thronged along the internodes. Flowers are small and creamy-yellow, and followed by seeds in pods. The tree is found in extremely arid conditions, with rainfall as low as 150 mm annually, but is indicative of the presence of a deep water table. As with some other Prosopis spp., P. Cineraria has demonstrated a tolerance of highly alkaline and saline environments [8]	Rural communities encourage the growth of this plant in their pastures because the extensive root system stabilizes shifting sand dunes, and is also useful as a windbreak and for shade
(Africans): Haak-en-Steek, (Arabic): Samar, Sammar, Samor, Samra, Sayyal, Seyal, Seyyal, (English): Karamoja, Umbrella Thorn, (Hebrew): Shitat Ha'sochech, (Hindi), Israeli Babool, (Ndebele): Isanqawe, Umsasane, Umshishene, Umtshatshatsha [9]		Acacia tortillas is a small to medium-sized evergreen tree or shrub that grows up to 21 m tall, well-developed multiple boles support a flat-topped or rounded, spreading crown, bark grey to black or dark brown, rough, fissured or smooth, young branchless densely pubescent or glabrous to sub glabrous and red to brown, spines paired, 2 types-long, straight and white, or short, brownish and hooked, they range from 1.2 to 8 cm in length [10]	The plant is known to tolerate high alkalinity, drought, high temperatures, sandy and stony soils, strongly sloped rooting surfaces and sand blasting which makes it perfect for Sir Bani Yas Island's arid environment [11]
Arabic (Ubal, Tarfa, Athl, Bigm, Fareq), Bengali (Raktajhav), English (Athel tree, Tamarisk, Salt Cedar, Eshel, Leafless Tamarisk), German (Blattlose Tamariske), Hindi (Laljhav, Erraerusaru, Farash, Asreli, Kharlei, Narbi, Raktajhav), Tigrigna (Ubul, Obel, Ubel), Trade Name (Farash, Tamarisk), Urdu (Farash) [12]		Tamarix Aphylla grows as a tree to 18 meters (60 ft.) high. The tiny leaves are alternately arranged along the branches, and exude salt, which can form a crusted layer on the surface, and drip onto the ground beneath. The species can reproduce by seed or by suckering [13]	The tree grows in disturbed soil and is good for dune stabilization, is used also in ornamental trees in gardens and parks [14]

In section IV, dark green shows that shake the bacterial solution. In Table 1 are introduced three tree good types for further humidity protection in rowel-developed areas.

IV. CONCLUSIONS

Benefits of this project in Al-Maha desert in Dubai are:

1. Preventing the spread of deserts
2. Maintain the agricultural environment
3. Prevent the migration of people who live in these areas
4. Increased agricultural production & reducing food crisis
5. Creation of tourist places
6. Create the beautiful weather, entertainment, and relaxation caused by emotional and intellectual
7. Construction and deployment of resources and facilities in order to allow life and welfare of residents
8. Targeted and efficient use of their time unemployed residents with practical and cultural center
9. The climate of the UAE is subtropical-arid with hot summers and warm winters

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BIOGRAPHY

Yashar Hosseinzadeh Naghadeh was born in Naghadeh, Iran, 1980. He received the B.Sc. and M.Sc. degrees from Yerevan State University of Architecture and Construction, Yerevan, Armenia. Currently, he is a full time Ph.D. student of the National Academy of Sciences, Armenia. His research interests are in the area of anti-desertification architecture, environmental architecture, sustainable energy in architecture, green energy and green architecture.