

Sustainable Guest House of the Museo del Desierto, Saltillo, Mexico

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ABSTRACT: The Museo del Desierto of Saltillo (the Desert Museum or MUDE) was inaugurated in 1999 and studies different cultures of the desert and the biodiversity. The museum is a cutting edge natural history museum on the front of the national museum panorama. The «Sustainable Guest House» will reinforce environmental consciousness programs. This new wing of the museum works without municipal electric power supply, gas or water. The guest house terrace promotes the use of green roofs, solar energy collection, recycling of wastewater and an artificial lake that collects rainwater. The project brings greater diversity to the MUDE public, generates resources and has incidence in the states of Coahuila, Nuevo Leon and Texas.

Keywords: sustainable architecture, landscape architecture, social and cultural contexts, museum studies

1. INTRODUCTION

The Sustainable Guest House serves as a new wing of the museum which reinforces environmental consciousness programs. This project presents viable energy production solutions which are imperative in Mexico. 90% of the power consumed in the country is generated from non-renewable resources (mainly hydrocarbons), even though Mexico enjoys privileged sun exposure. Less fortunate countries in terms of solar exposure, such as Germany or Austria, receive one third of the sun's radiation available in Mexico; however in such countries it is exploited 50 times more [1].

Mexico faces growing conditions of hydric stress, soil erosion, deforestation, water shortage, air pollution and

diminished ground water tables, depletion of fossil fuel, changes of land use and desertification. The quantity of water per inhabitant in México is almost half that of the United States, a sixth of what is available in Argentina; a ninth of that in Brazil and almost a twentieth of water in Canada. The scarcity of water in some regions of Mexico may be compared to that of Israel or Egypt; however, urban rainfall drainage is usually the same as that of sewage and soapy waters [2]. The network of water conduits and distributors or treatment plants implies that better attention should be given to the disposal of used waters and converted in to residual waters; the great challenge is centered on its correct purification and reutilization.

The sustainable hostel project of Museo del Desierto (The Desert Museum)

proposes to exhibit environmental friendly-options to be diffused in Mexico.

2. SALTILLO

The Mexican state of Coahuila counts on significant wealth of resources in its protected natural areas (PNA): Maderas del Carmen and Cuatro Ciénagas; the dams of La Amistad and Venustiano Carranza; the *Zona del Silencio* that shares with Durango. Parras has been declared a “magic town” by the Secretariat of Tourism. Coahuila has more than one hundred useful species and 530 ranches (Units of Management and Development of Wild Life). Hair and feather fauna is outstanding: berrendo (*Antilocapra americana mexicanis*), cimarron lamb (*Ovis canadensis mexicanis*), Texan white tail reindeer (*Odocoileus virginianus*), red deer mule (*Odocoileus hemionus crooki*), black bear (*Ursus americanus*), puma (*Puma concolor*), wild turkey (*Meleagris gallopavo*), in addition to diverse birds and small mammals [3].

Cuatro Ciénagas is considered an “aquarium in the desert”: the region possess the greatest biodiversity in North America, counting on at least a hundred endemic species. Cuatro Ciénagas is a PNA of 200 square kilometers endowed with valleys, mountain ranges of the Sierra Madre Oriental, calcareous layers, gypsum dunes and more than two hundred wells of turquoise waters: the coloration is due to the presence of microscopic algae called stromatolites (coral species that supply oxygen to the water and that have disappeared from almost the whole planet). The biotechnological potential has attracted the research interest of NASA and the National Autonomous University of Mexico (UNAM, the Spanish acronym), among other institutions that consider Cuatro Ciénagas a living laboratory, a source on the origin of diverse species. There are thermal wells, where visitors can

swim and engage in recreation activities [4].

Saltillo (725,000 inhabitants) is the capital of Coahuila. The city is located 400 km to the south of the border with Texas and 90 km to the west of Monterrey, at 1,790 meters above sea level, on parallel 25° N. The climate is dry and semi-warm. Mean average rainfall ranges from 300 to 500 mm (April to October). Maximum temperatures vary from -10° to 35° C. These conditions are relatively mild in the context of the semi-barren area in which the city is located, on the border of the Chihuahua desert [5].

3. THE MUSEO DEL DESIERTO

The Museo del Desierto de Saltillo (MUDE) was inaugurated in 1999 and studies different cultures of the desert and the biodiversity. It has mixed financing: admission fees, private sponsors, and the government of Coahuila. The MUDE (www.museodeldesierto.org) is a cutting edge natural history museum on the front of the national museum panorama: it has live plant and animal specimens cared for in reptile houses, aquariums, a Living Desert (zoo with endangered species) and biodomes. Architect Francisco López-Guerra designed the buildings over a 3.2 hectare property: the outstanding design integrates into the landscape.

The main vocation of the museum is related to natural history. The main exhibition halls are dedicated to the origin of life, to the evolution of mammal species in North America and to the study of the desert as a living ecosystem. The majority of the rooms exhibit fossil remains (or their reproduction), displayed with attractive and contemporary museographic symbols.

In this manner, pavilion 3 has a ramp of 8 meters of incline in order to exhibit montages of dinosaurs and flying reptiles of the Mesozoic era-- here is exhibited the only example of a tyrannosaur in Mexico.

A window located halfway up the ramp communicates with the laboratory where a team of paleontologists at work, who establish contact with visitors, clear up doubts and answer questions in an attitude of humane treatment, prevalent in all areas of the MUDE.

Other permanent exhibits integrate the attractiveness of living ecosystems. The biodome provides a tropical climate in a glass-roofed ceiling and a circular layout of 30 meters in diameter: a “reconstruction” of Coahuila 70 million years ago when the territory was covered by the sea. Turtles, caimans and perennipholic trees show that some species have changed little in their exterior aspect.

The MUDE includes functions that are traditionally part of botanical gardens and zoos. This museum discourse is based on living fauna and flora and their conservation. The permanent exhibits maintain species of herpetaria, aquaria, a biodome and a cacti greenhouse. The MUDE thus assumes an attitude of ecological responsibility in the desert of the north of Mexico; animals such as the little prairie dog (*Cynomys mexicanus merrian*) are shown as local species that must co exist with economic human activities.

The MUDE is a non-lucrative civil association. This legal status favors transparency, which is reinforced by the Museum Advisor Board (15 directors of large industries). The financial investment is from the government of Coahuila, the MUDE surplus and the Board of Directors. The interdisciplinary museum team makes decisions concerning biological, museographic and operational aspects.

4. THE SUSTAINABLE GUEST HOUSE

The sustainable hostel is integrated to the museum as a new pavilion that reinforces the programs of environmental awareness. The guest house works without

municipal electric power supply, gas or water. The property is located on a slope: earth movements are minimal. Building orientations are intended for the maximum exploitation of solar exposure and crosswinds. Materials from the area are used which offer optima thermal and acoustic insulation. The project offers absolute stability for persons of all levels of motor capacities.

The Sustainable Guest House has 20 rooms for researchers associated with the museum as well as tourists. Its strategic importance shall permit the museum to offer guided tours of Cuatro Ciénagas. The guest house also links the MUDE to the so called magical village of Parras and with Rincón Colorado (an area rich in dinosaur fossils).

The architectonic project of the “sustainable hostel” provides public areas, so that MUDE visitors can co-exist harmonically with the environment, through systems of retention of rain water, treatment of contaminated waters or sewage, use of eolic and solar energy, green roofs, construction with vernacular materials and bioclimatic design.

The terrain selected to build the hostel is located on the upper area of a hill: the city of Saltillo can be sighted from three separate slopes; a ring circles and isolates this land. The relative autonomy of the land was important in that it respects the rest of the complex; it is located within a few meters of the main entrance and its strategic position will place it as an independent facility close to the private parking lot that services the MUDE. The sustainable hostel will be located a few meters away from the public library that the Museum of the Desert placed at the disposal of the municipality at the beginning of 2008 as a free service. The “sustainable hostel” will take advantage of the cycling ring (already built), that will invite guests to exercise in it. The educational vocation of the space will be put in practice in hydroponic workshops and cultural activities that make

evident the harmonic possibilities of coexistence with the desert.

The inclined slope of the terrain allows for the use of the pronounced unevenness (an incline of up to 45% in a length of nine meters) that are integrated to the game of volumes already in existence. In this manner, the architectonic project takes advantage of the panoramic position to link the ecological benefits of the building to the beauty of the site. A relatively small initial investment facilitates the installation of a cafeteria and observatories that are integrated to the game of volumes proposed in the actual buildings. The facade of the guest house folds softly into the level curves and is set in harmony with the landscape and the existing buildings. A desert garden which exists on the slope will be conserved intact. The uneven land favors the landscape design and the operation of the water collection system.

Another advantage of the location of the site makes it possible to think of the sustainable hostel as the last of the pavilions of the MUDE: the final verification that it is possible to maintain conditions of comfort without recurring to energetic waste. This didactic intention will be fundamental to the spirit of the project upon maintaining a positive relation with the rest of the museum plan. It is also pertinent to consider that the sustainable hostel be the sole activity for some visitors who will only visit the ecological home as if it were a permanent exhibit.

The strategic position of the site is important due to the adjoining nearness of the public Parque de las Maravillas ("Marvel Park"), administered by the municipality of Saltillo. The park's beauty is related to impeccable maintenance based on artificial irrigation. Among the trees available, poplars are dominant. There are diverse fire places for grilling distributed throughout the park which attract Saltillo families on weekends. Sunsets are especially beautiful in Saltillo.

The central theme revolves around the imaginary concept of an oasis that increases the proportion of green areas against constructed areas; the cactus harmonizes the building with the environment. The stored rainwater is treated with ozone and flows by gravity to the green roof of the guest house. Other solutions confirm the potential power saving in Mexico: solar power collection, thermal energy regulated from the building's shell, recycling of wastewater.

The vegetation layer of Coahuila is dominated by xerophile brushwood. Although, there prevail some common species such as (*Euphorbia antisiphylitica*) which are short and branchy shrubs. The presence of species admired by the people of Coahuila is very abundant such as the (*Echinocactus visnaga*) cacti in the shape of a barrel. There are diverse types of maguey or the *samandoca palm* (*Yucca carnerosana*), used as a source of hard fibers. In addition to its practical usefulness, the inhabitants of Saltillo find an identity value in these plants [6].

Furthermore it is proposed to devote a sector of the oasis, especially to xerophytes of great size from the desert of Chihuahua, the largest of the four desert systems of North America: a third of the desert surface of the subcontinent. The Chihuahua desert offers the most easterly and southerly location of these ecosystems, registering temperatures more moderate than those of the desert of Sonora: it gathers in addition, the greatest diversity of cacti in the planet. This biological wealth is taken advantage of to plan a collection of giant cacti: column-shaped species such as the *Neobuxbaunia mezcalensis*, candlestick-shaped of the *Cephalocereus* gender, among a sort of others, in the redesigned entrance to the museum, in which the masonry floor will be replaced to lodge the most spectacular botanical collection of the museum.

The oasis combines vernacular elements with exotic species. A collection

of giant North American cactus welcomes visitors from the central courtyard of the museum, and later occupies the guest house roof by way of the bridge. An artificial lake collects rainwater and leads it to the guest house's green roof, offering thermal and acoustic insulation. The oasis enriches the sensory experience of visitors and constitutes a community area with grills, telescopes and arts and crafts workshops to foment the local identity, environmental consciousness and the respect for biodiversity. The view over Saltillo and its sunsets are considered a fixed asset of the project.

The architectonic solution is global upon converting the sustainable hostel as a center of encounter for the people of Saltillo. In this manner, private uses are provided for the rooms of the hostel and other zones of restricted use, next to public zones that could be used without entering the museum. The main objective is to impact on the customs of the population of Saltillo to promote a concept of sustainability, not only possible, but desirable.

It is possible that in the middle term the hostel receive guests that could depart from the Museo del Desierto to engage in recreation or cultural activities related to the paleontological reserve of Rincón Colorado and educational programs in Cuatro Ciénegas, in a global three day period plan of museum diffusion that visitors could engage in.

5. CONCLUSION

The Sustainable Guest House presents the desert as a place full of life and touristic, economic, scientific and aesthetic possibilities. The guest house promotes a comfortable lifestyle with reduced ecological imprint. The environment of the public areas radiates with local social life, identity and pride. The guest house is autonomous in its power supply and

includes the cafeteria, museum shop and sale of cactus. The oasis dominates the Saltillo view; the guest house terrace promotes the use of green roofs and solar energy collection as accessible options for housing in Mexico. The existing infrastructure will be used: parking lot, public park, "Living Desert" and cycle path. The successful activities of the MUDE and its presence in the media will promote the benefits of sustainable architecture throughout the north of Mexico. The structural and building solutions suggest technological possibilities available with reduced investment: small conceptual adjustments radically improve the quality of life.

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