

Bioclimatic Lessons from Luis Barragan's Architecture

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ABSTRACT: Luis Barragan's Architecture has been recognised by its aesthetical and philosophical values. However, his proposals have a deeply rooted regional and traditional knowledge. For Barragan, the existence of an international or even national architecture was absurd, because every region had to generate its architecture rooted on its time, culture, traditions, climate and materials. Barragan's approach to design comprehends all levels from the urban planning to interior details. A strong emphasis was given to the natural environment and the cultural context. There are several relevant issues related to passive design that we can identify in his work

Keywords: Luis Barragan, regional design, natural environment, regional context, passive design Mexico, outdoor space.

1. INTRODUCTION

Luis Barragan said in 1965: "Before the machine age, even in the center of cities, nature was a trusted companion, partner of the baker, the ironsmith, the carpenter... Now a days, this situation has been turned around: man can not find nature, not even when he leaves the city to enjoy it. Locked in his shiny automobile, man is within nature a foreign body. A billboard is enough to erase the call of nature. Then nature becomes a fragment of nature and man a fragment of man. The promised dialogue between man and nature becomes a hysterical, monotonous human monologue." [1]

First of all, Barragan proposed a development of architectural and urban designs based on traditional elements. The re-valorization of the so called "vernacular" architecture is a fundamental element of his projects (Figure 1). This is particularly important in our "modern" and lately "global" society, which has constantly undervalued traditional solutions proposing a standardized and technologically "advanced" design to be used worldwide.

Secondly Barragan's architectural designs consider the sensual perception as a key element of the spatial experience. Therefore his proposals pay particular attention to sun patterns, day lighting, noise control and ventilation. He did not agree with the general coding that establishes minimum levels of comfort for all this parameters. Instead, he used his personal intuition and perception to manipulate the physical factors and achieve a carefully balanced equilibrium between physical conditions and built environment.

Barragan developed a school of thought that Kenneth Frampton [2] defined as "critical regionalism" that was based on the idea of a regional attitude towards design. For Barragan, a design must take into account its physical and climatic conditions as well as its cultural background.

How to differentiate design criteria for a specific region is a fundamental issue of an energy conscious design. Barragan's architectural masterpieces are brilliant examples of this principle.

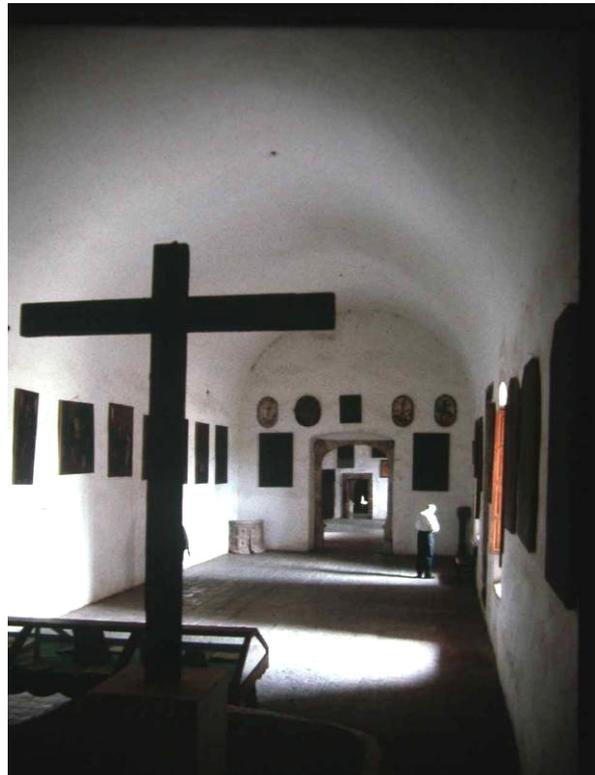


Figure 1. At Yuriria's Monastery, (XVI and XVII centuries) Barragan's interpretation of space, proportion, light, sound and materials is easily recognizable

However, his approach to traditional design is based on the ability of the architect to identify the essential building elements and then to “convent” them into a contemporary image. It is far away from the “picturesque” or the historic conservationist approach. In Barragan’s words “all historic architecture was revolutionary and contemporary on its days”[3]. Therefore we need a contemporary expression that uses and revitalizes the knowledge from previous generations.

His designs recover ancient constructive methods and finishing materials, making emphasis in the optical and thermal qualities of them



Figure 2. At one of his earliest designs (Casa Gonzalez Luna, 1928), traditional elements are combined into contemporary design.

2. LIGHT AND SUN

2.1 Natural Light

Barragan’s design pays a large amount of attention to daylighting. According to his ideas, natural light give spaces a different character thought the day and in various times of the year. Therefore, he planned to control not only the amount, but the quality (colour temperature) of natural light. This was done through the extensive use of large scale models that were professionally photographed. This stage was always preliminary, allowing for options to be evaluated and new ideas tested. As the building was constructed, he will supervise construction daily and modify “on site” many of the openings, including its proportion, size and location. [4]

Natural light –direct and indirect- was a much sought source for impressive effects. The character of a space is given by the amount of natural light. At times, dimly lit spaces are intentionally produced as a transition from the outside to the interior. At other occasions, darkened spaces are provided as places to rest or meditate.

2.2 Colour Temperature

In Barragan’s buildings, the selection of colour was always left for the end. Most of the interior walls were painted white. It was for special areas of the building that intense colours were used such as pink, yellow or orange. Even those colours were first tested on large one by one meter paper boards. Once some choices were done a “full scale” test was carried by painting all the walls and –if necessary- repainting them as many times as needed.



Figure 3. Las Capuchinas Convent (1955) is a good example of colour temperature. The yellow grid produces an effect of sunshine even on cloudy days.

Barragan found out an effect that can be described as “coloured light”. It is clear that coloured glass has been used for centuries, particularly as stained glass windows for decoration. However, Barragan used the same principle in a completely different way. He usually hidden the light source and then painted the glass, mixing “warm” light with planes lit by “cold” light. The result was a mixture that changed the indoor quality of space and our perception of colour. He achieved spectacular effects by the use of simple devises as painted or stained glass, reflective grids, trellises, etc. that ranged from a warm yellow and orange -generally used for its association to sunshine- to cold purple-blue openings.

2.3 Lighting levels

Barragan insisted that not all activities or individuals required the same amount of light. Although, the codes indicated minimum lighting levels, he often sought lower than standard levels either by using small openings or attaching wooden pieces to windows so that they could be darkened totally or in a controlled way.

"The day is luminous and the night is dark, we must allow spaces to be that way. Each time of the day has its own beauty in light or in its absence. It is a mistake to try to turn the night into day". [5]

2.4 Artificial Lighting

Artificial lighting is perceived as a complement to natural light and a medium to produce a completely different perception of the space at night. In Barragan's architecture there is an absolute absence of ceiling lamps. Most electric light departs from low lamps laying on the floor or from furniture. In this way, walls and their texture are strongly perceived and ceilings receive a soft and even indirect lighting.

Other lighting devices used were drawing table lamps located in most spaces of the house because of the ability to be directed, using them as accent light.

By reducing artificial lighting to a minimum, Barragan made an efficient and selective use of electric devices. He derived this principle from a philosophical attitude where artificial light was not to substitute daylighting, but convey spaces a sense of mystery, intimacy, enclosure and relaxation. Those emotions were accomplished by lowering and controlling the direction of light sources.

2.5 Sun Patterns

Sun movements are carefully considered in all projects as they cast shadows or allow direct beam through windows. This can be easily observed at the Gilardi House (1976), where the swimming pool-dining space is the culmination of a long promenade.



Figure 4. The pool and dining room area of the Casa Gilardi (1976) is a sun path experiment: reflecting, diffracting and casting its light.

There, a "slice" of sun is allowed into a corner of the room. Its window source is hidden, so that we become surprised by a moving light that reflects, diffracts and illuminates the water surface and the space. Any wave on the surface of the pool produces a dynamic sun pattern on the walls and ceiling (Figure 4).

3. DIALOGUE MAN-NATURE

3.1 Climatic Conditions

In the mild and temperate climatic conditions of central Mexico, Barragan was one of the very few contemporary architects to use terraces, porticoes and roof areas as important spaces in a house design. These "passive" spaces produced comfortable areas with minimum use of materials and energy. He was one of the first architects in the XX Century to understand that for a temperate climate dominant in Mexico's High Plateau the use of the outdoors and semi-open space was most desirable.

In contrast with the compact and indoor oriented models dominant in the European and American architecture of the XXth. Century, Barragan's houses spread into the outdoors through windows and porticoes. They usually have a semi-covered terrace as the most privileged space in the house. It is used to eat, relax or play. At the same time, this space is an observation deck for weather and nature.

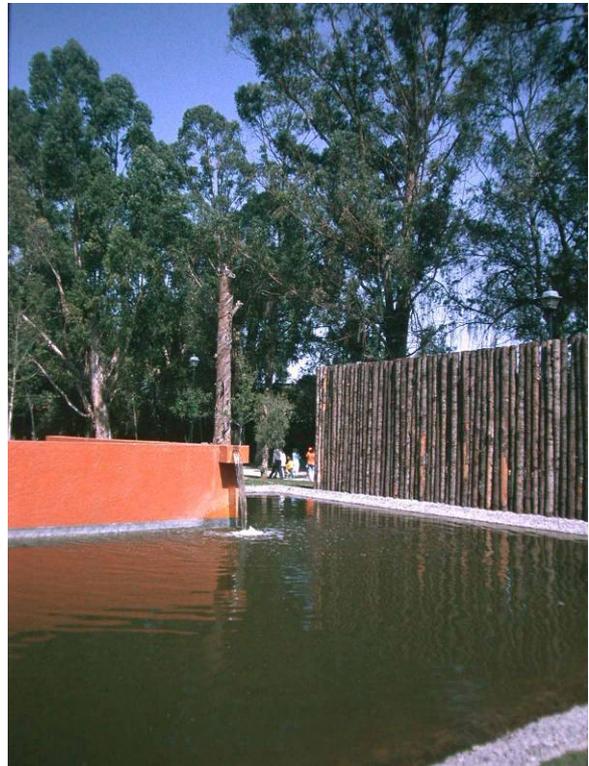


Figure 5. El Campanario Fountain (1964) shows how Barragan controls the environmental qualities of outdoor space through trees, walls and water effects

3.2 The Outdoor Space

In part due to Barragan, the exterior space, patio or garden, had a new connotation and use on Mexican contemporary architecture. His concepts about green space, terraces, porticoes, fountains and many other outdoor elements had become a major contribution to a more "natural" approach to architecture. His influence can be recognized in a large number of buildings in Mexico and in other places as distant as Europe or Japan.

3.3 Gardens

Barragan developed a different approach to gardens and green areas. On his projects, the outdoor space is manipulated in a "natural" way to generate a micro-climate and a distinctive ambience for every space. Plants and lawns are not manicured, but let grow in a natural way. The garden is never seen at once, but slowly controlled into the indoor space.

Maybe the extreme concept of a garden space exists on his house's walled roof terrace. It is a large, empty space where the sun cast shadows and the view is directed towards the sky that forms "a garden for the clouds".[6]

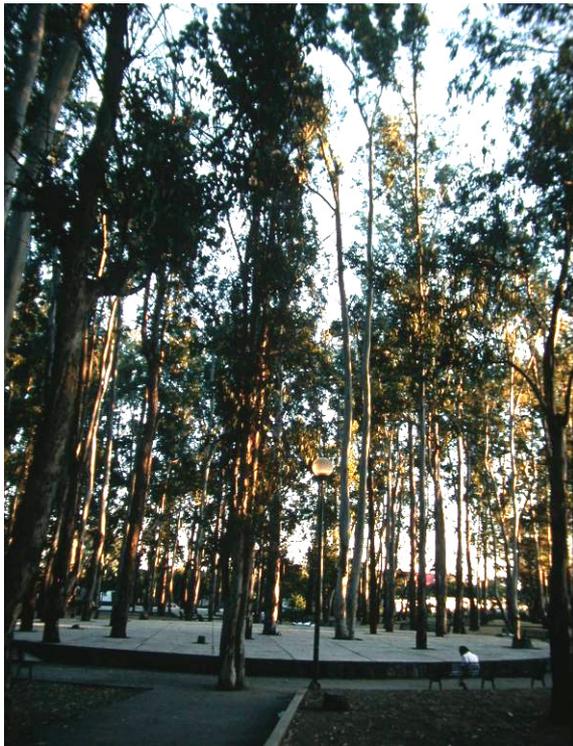


Figure 6. Jardines del Bosque subdivision (1955-61), here nature and urban planning get combined.

3.4 Urban Concepts

Barragan's urban concepts generated a different attitude in land development in the XX century. Instead of destroying and imposing urban and landscape concepts, his designs departed from what was on site: contours, native trees, crevices, etc.

From those elements he developed the urban idea that always used the natural elements as major actors of the urban scene.

His urban concepts also recovered some of the most important and forgotten principles of energy and environmentally conscious design: plazas, promenades, hidden fountains and parks. In all of them, he used vegetation and water as their main design elements. Existing trees and contours defined the final shape of a design. Water was always present to refresh people and animals and cool down the dry air of Mexico's central plateau.

On his developments, urban pavements were defined precisely to provide textures and created a comfortable surface in terms of heat and light reflection.

4. NATURAL VENTILATION AND NOISE CONTROL

All of his designs considered natural ventilation and solar exposure as the only means to acclimatize indoor spaces. None of his houses had air conditioning or electrical heating. Careful attention was given to window orientation (particularly east, south-east and south). Most of the glazing surfaces were oriented towards the east and south. They were always recessed or protected by trellises with plants or flowers like bugambilea.



Figure 7. Chimneys ventilate or heat the large public area in Luis Barragan's house in Tacubaya (1945).

Chimneys fulfil a double function: they are used for natural ventilation in warm days and as a heating devise in cold weather. The stack effect produces a constant air movement that ventilates effectively the main spaces.

On his designs, silence and noise control are a primary element. Therefore walls and windows follow patterns to reduce to a minimum outside noises, keeping at the same time a direct link with the controlled outdoors of the houses. Several windows are fixed; ventilation is given through chimneys, a few operable openings (with wooden shutters) and some small electrical fans.

As a result of this strategy, he built remarkable silent and intense spaces. Louis Kahn said in relation to Luis Barragan's house that "silence, like a music fills house"[7]

Silence is a luxury in large cities.

5. CONCLUSION

It is most important to learn from Barragan that a good architectural, interior, landscape or urban concept will always take into account the passive and low energy aspects.

An approach rooted on tradition can be contemporary. If set apart from fashion, architecture most aim to be time less.

A well done passive and low energy design must attend all senses and response to enrich our perception of nature and environment.

It is relevant to study Luis Barragan's architecture from these points of view, because they demonstrate that passive architecture can be very pleasant and should have greater value and more virtues than an ordinary building.

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[1] "Antes de la era de las máquinas, incluso en el centro de la ciudades, la naturaleza era la compañera en la que todos confiaban, socia del panadero, del herrero, del carpintero... Hoy en día la situación se ha invertido: el hombre ya no se encuentra con la naturaleza, incluso cuando deja la ciudad para comulgar con ella. Encerrado en su brillante automóvil, es dentro de la naturaleza, un cuerpo extraño. Una cartelera cinematográfica es suficiente para borrar el llamado de la naturaleza. La naturaleza se vuelve entonces un fragmento de naturaleza, y el

hombre un fragmento de hombre. El prometido diálogo entre el hombre y la naturaleza se convierte en un histórico, monótono, monólogo humano." C. Smith, Builders in the Sun: Five Mexican Architects. Architectural Press, New York, (1967). 76

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