Design Metaphysics of a Nature Conservatory

by

DONALD B. LIVINGSTONE

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Thanks:

to my parents

to Karen

to MIT, the institute and the community

and particularly

to Shun, Fernando, Roger, Augie, and

the squash courts.

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Abstract

The program for a proposed nature research and education center is developed and used to generate a 3000 sq. ft. wilderness complex. Issues of inhabitation, scale, and publicness in a natural landscape are presented. The experimental orientation of the facility is expressed in the functioning and character of spaces and details.

To establish the context of the design problem, the evolution of social attitudes towards nature is summarized. Ultimately the scope of architectural referencing, as determined by an objective view of the environment, is questioned. And, as a result, an effort has been made to produce an architectural presence not wholly controlled by use, but also as an "offering" to the environment.

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Thesis Supervisor: Shun Kanda
Title: Associate Professor of Architecture
Man and Nature

As a subject for architectural expression the relationship of man with nature seems too ephemeral and personal to be directly communicated. To get an idea of what this relationship may mean it is necessary to trace its historic evolution in terms of the mark we have made as the builders of "neonature." It is this mark on the world, this irreversible engagement which insists that we take care in finding the appropriate action. And ultimately the question will remain, whenever action is taken in defiance of an otherwise passive universe: what must we say?

Through the ages there has been a progressive abstraction in the way society interacts with the environment. This interaction has been characterized as going from an I-Thou to an I-It relationship.
As socialization intensified formal religions began to "break up the magical and taboo links" with the environment. "Religion was the great 'uniter' of medieval life" (2:20), giving purpose and form to the way society expressed itself. The attitude towards nature was more abstract but still based on a great respect. The god of the hearth had become a god of the heavens.

Beliefs and practices in magic rites had an important role in originating many of the archetypal forms and activities that we explain rationally today. At that time the man-environment relationship was more a mutual adaptation than a one-sided conquest.

Architectural history shows that man's primeval experience of everything as a "Thou" also determined his relationship to buildings and artifacts. Like natural elements, they were imbued with life, they had mana, or magical power.

(1:50)

Medieval landscape impressions.
With the scientific revolution and the flowering of industry, religious-man was replaced by economic-man. The transformation to an I-It relationship with the environment was completed. J.B. Jackson writes of this attitude in the U.S. after the Civil War:

Unlike their fathers (this new generation) saw themselves not merely as inhabitants but as owners, and with an owner's instinct they sought to find out the value of the patrimony. That is why, during the post-war years, the relationship between Americans and their environment began to change. The relationship had no less of love and pride but it had less emotion and more of calculation."

(3:19)

The Birth of the Forest Service

There has always existed a tension between cities and their hinterlands. Often during times of changing resources, social institutions have formed to mediate potentially deleterious effects of this tension. The forest service in the 18th century Swiss Alps is an early example of such an institution. At that time, expanding farm lots on the outskirts of some alpine villages removed the protection forested lands had provided against annual avalanches of melting spring snow.

From this simple beginning with its immediate purpose the Forest Service has grown to become one of the chief concerns on behalf of wilderness areas.
Environmental Schizophrenia

Urbanization in the 20th century has broken down our understanding of the environment as a whole. The fact that the environment expresses itself as either urban sprawl or as a kind of uninhabited wilderness is not necessarily bad. Cultural centers are the ultimate sources and means for human expression. But when the two realms fall out of touch with each other in our consciousness, the physical maladies we now see are a consequence.

At present, in an age of most rapid change, we inherit a sense of being inextricably a part of a mechanical system with an insatiable appetite for consuming the environment. And in turn a new attitude about the environment is forming. As scientific discoveries make leaps and bounds past our collective comprehension, we are developing an I-It relationship to technology. Buckminster Fuller's idea of a "conscious evolution" implies a distance from technology. As we evolve away from serving it as a "Thou" we will be able to have renewed respect for the environment.
The extent and variety of human encroachment on natural systems has made it necessary to reexamine our relationship to them. The fact that legislation has designated thousands of square miles in the United States as wilderness areas is a sign of the constant economic pressure for development. Based in part on scientific observation but mostly coming from a sense of moral obligation, a wilderness ethic has developed representing a collective attitude about nature. Ultimately this attitude must come to represent the whole environment both inhibited and wild.

Nature Centers
Nature centers in general have grown out of the need to address the communication between country and city. The idea of a nature center is not new. It can be traced to the great country villas of Greece and Rome where city dwellers
traveled to the edge of the frontier to be rejuvenated by nature as here at Epidaurus. The whole concept of garden cities and suburbia comes from trying to make each dwelling a nature center, however slight. As a new mandate today nature centers are based as well on research and education.

It is the task of the thesis to express architecturally the place making of one such proposed nature center. It is not based on the idea that there is some kind of pendulum which will swing back to the mysticism of primitive societies. But it does attempt to reestablish in some way the I-Thou respect for the environment which is needed today as absolutely as it once existed if we are to survive.
LA and the Wilderness

The proposed facility will be located on a 350 acre site at the southern edge of the Los Padres National Forest 70 miles north of Los Angeles. The forest contains 350,000 acres designated as wilderness areas and 33 plant and 6 animal species on the endangered list.

Fifteen miles east of Santa Barbara the land occupies a large bowl in the Santa Ana watershed where its various tributaries converge flowing out of the national forest land to Lake Casitas and then to the Pacific Ocean. In order to understand the scale of its vast, relatively uninhabited, surroundings it was instructive to make 7 mile sections through the land.
The east/west section being parallel to the mountains and the coast of this part of California became the AXIS OF PLACE. Several small towns as well as Santa

The north/south section shows the site to be located at the base of the mountains just inside the forest about 5 miles from
Barbara to the west and Los Angeles to the east are located along this line. The north star and the big dipper identify the sky.

The coast. This was called the AXIS OF RELATION. It is transected by highways, mountain ranges, and few buildings.
The area is typically chaparral country, hot most of the year with a short winter rainy season. Here looking north to the Santa Ynez Mountains the general basin form of the land can be seen. There are three distinct types of cover ranging from open grassy fields to wooded hollows and creek beds to the more rugged brushy slopes.
Looking south toward the Red Mountains with the ocean beyond, Lake Casitas can be seen from a minor rise in the middle of the site. This "artificial sea" reflects the sky at the base of the valley and completes a microcosm together with the headquarters site.

Portions of the lake, originally created for flood control, agriculture, and recreation, have been dedicated as a bird sanctuary.
Site Program

In addition to the use of a renovated bungalow, three new buildings are planned:

(A) The bungalow will be used as a guest house.

(B) The Headquarters which forms a gateway to the rest of the land. This building will be a museum and a school as well as a nature research facility.

(C) The conference area and private residence. Atop a small cliff on the western wall of the property specific local ecological problems as well as international issues will be discussed here.

(D) An amphitheatre for 100 people including a screened in barbeque area and a swimming pool.
At the southern end of the site the bowl narrows into a canyon with a thick cover of oaks. A renovated bungalow will serve as a guest house for visitors and classes that have weekend workshops, etc.
A large stone near the house forms a backdrop to the pool.

The ruins of an old homestead on the land will be used as a screened barbeque area and swimming pool to serve a large amphitheater at the edge of a field in the center of the property.
Santa Ana Creek near the convergence to the east of the headquarters will provide an alternative system of footpaths and nature trails.

The headquarters site is in the middle ground at the edge of the clearing with a view of the rock outcropping on the far side of the creek.

The carpath 100 feet to the west of the headquarters site leads through the land to the wilderness beyond following the shaded winding creeks.
The idealized concept of the client for the nature center was this symmetrical form composed of a central two story octagon flanked by two equal wings.

Design Issues

To regain an understanding of the environment as a totality it will be necessary to reintroduce nature in the city and to civilize the wilderness. As a mediator between the man made and the natural realms the nature conservatory must act as a gateway to each.

From the start, the scale of the project—a few thousand square feet of interior space virtually invisible in the vast wilderness surrounding it—was a factor influencing the form. A way had to be found to incorporate the larger landscape into the buildings. At the same time, visual and functional relationships between buildings (from the headquarters to the guest house, from the headquarters to the conference area, and from the conference area to the amphitheatre) had to be established to give a sense of urban belonging to the land in general.
The range of landscapes, from scrubby rock outcroppings to open grassy meadows, to the tree lined creek beds influenced building types as well. The classical landscape of the surrounding foothills, where the conference area and private residence are planned, suggested the terraced and broken forms of Italian hilltowns. The flowing field landscape with its cosmic orientation towards the sky suggested a strong singular form for the amphitheater which will be located there. Finally the headquarters, located in the romantic earth bound landscape of a wooded canyon, responded formally with the verticality of a forest of columns as its structural motif.

Another concern was for producing the public character of a nature museum/school/research headquarters. After the access road has turned off the main highway, bounded and weaved its way between low hills and over creeks for a mile and a half it has become a one lane gravel carpath with a necessarily private flavor.

<table>
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<th>Program space requirements for the headquarters:</th>
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<tr>
<td>800 sq. ft.</td>
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<td>200  &quot;</td>
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<tr>
<td>100  &quot;</td>
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<td>3,000 sq. ft.</td>
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<th>Exterior uses:</th>
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<tr>
<td>Guest Parking</td>
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<tr>
<td>Research Garden</td>
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<tr>
<td>Courtyard</td>
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<tr>
<td>Nature Trails</td>
</tr>
<tr>
<td>Screened in Sleeping Porch</td>
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<td>Entry Trellis</td>
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The headquarters serves as a terminus to the journey from the city. In order that it be viewed not as a house beyond the suburbs but as a public building, it was developed as two tightly situated buildings around a clearing in the woods forming a public yard.

The objective of the exhibition space, which is the heart of the complex, was to produce an interior while viewing the whole landscape as the building. The entry trellis, research wing, and nature trail form wrappings about the exhibition space, intensifying its meaning. It is an interior not merely in the physical sense but in terms of the relationship of man and nature. While the walls of this room focus in its floor represents the earth and its ceiling the sky.
Sky Dome

The headquarters site is on the western side of the canyon near a sudden rise which shades it from the afternoon sun. Consequently the buildings are rotated 10 east of south to maximize their solar potential.

On the floor of the exhibition space is a square representing the earth. With its four corners on axis with the cardinal points of the compass, it is not simply a symbol for the earth, but a reading of the terrain at this point in the landscape and could be expected to rotate if the building moved up or down the canyon.
1. Parking is set off from the rest of the facility by an earth berm. It is handled informally by spreading gravel at the end of the road under the trees.

2. An Entry trellis forms a line of columns which can be seen on the approach projecting through the wooded canyon. Each column represents a place. Together decorated with abstract figures they make a record of events both social and natural as an explanation of the place.

3. The Research Wing is comprised of a laboratory, a video workshop, and a greenhouse. The lab will be used for the classification of local fauna and flora, studying their feeding and breeding habits, and developing strategies to ensure species diversity. The facility will also be used in teaching classes on ecological methods. The video workshop will produce documentaries on the activities on the center and the ecology of the region.

4. The Archive storage loft will hold artifacts of nature, documentations of research, stock collections, and field study equipment.

5. The Yard is the most public space and a support of outdoor activities. It is a grassed court formed by the colonaded buildings and the grove of trees.

6. The Main building houses a 10,000 volume library, four work spaces, a kitchen, a screened sleeping porch on the roof, and an octagonal exhibition space which is the focal point of the whole complex.

7. A Nature trail leads away from the exhibition space following an artificial spring to Santa Ana creek and out onto the rest of the land.
A model was made to study volume relations of the building and trees, and to develop local contours. The pioneering aspect of building on open land is reflected in phased construction of the complex. The first inhabitation includes the main building, the entry trellis, and the foundation walls and column bases for the research wing. The buried leach field drainage tiles are represented radiating from the side of the entry trellis in the site photo.

Building material succeed from low stone foundations to 12"-16" thick adobe walls to a wood and glass panel system. Roofs are either standing seam gables or tiled terraces. The columns of the entry trellis and archive loft are reinforced concrete inlaid with small stones.
The second construction phase involves the completion of the archive/research wing. The strong directionality and simplicity in the roof planes of this building serve to unify its varied foundation walls.
Main Building

The main building, like the entire complex, was generated as an extension from the exhibition space. At the entrance in the final version is a double system of independently sliding wooden screens for light control and glass doors for breezes which produce a 10' clear opening onto the yard. A passive system refrigerator in the kitchen is an integral part of the cooling system for the whole building. The library is presented here expanded into a secondary space but this area may also be used as a small conference room.
The Sweep of Floors in an Otherwise Rugged Landscape
A Perch above the Exhibition
Camping on the roof developed out of the idea that buildings should offer a topological experience of the landscape. Flowing easily up the broad west stairs the ground opens onto a terrace with two light wells to the reading room below. Then it rises to a screened-in sleeping porch with a fixed barbeque. Finally the space moves indoors to the exhibition balcony and down the spiral stairs.
42 Taos's Geronimo Day showing north building and Taos Mountain in the distance, early 20th century

A grandstand for the public use of the roof.
The spacing of columns grows out and around two central 12' square bays. A plywood box beam truss supports the roof above the large room. Also shown is the ductwork of the natural cooling system.
Hierarchy of Place

Variations in the thickness of adobe walls is produced by using blocks of two different dimensions. Forces expressed in the form of the walls attempt to relate it to the larger landscape.
"the diffuser"

"the rain gutter"

"summer angle/winter angle"

"the light dipper"
The Light Dipper

The idea of reflecting light onto the ceiling of the exhibition space came from the need to represent the sky there. After several attempts, a satisfactory and fully rational form was generated by passing the sun's direct light past the raised southern eave of the exhibition space onto a curved, shiny surface giving a constant angle of reflection parallel to the gabled ceiling, even though the angle of incidence changes from 32° in winter to 80° in summer.

In this way the light dipper in its 3 foot width forms a diagram of the sun's seasonal variation at the latitude of the building. As a sculptural element it has a similar relation to the entrance of the business as some classical sculptors.

However, rather than honoring the mythology of human origins as in the temple to Asklepios, god of healing, in Epidaurus Greece, the conservatory honors the dynamic physical properties of nature herself.
Bibliography / Photo Credits


