

# Integrated Bioclimatic Architecture

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In the last few years there has been much talk concerning “sustainable” or “ecologically responsible” architecture, that is, architecture respectful of the earth’s resources and its natural beauty.

Unfortunately, many of the architects and designers who profess interest in the concept of sustainable architecture do not practice it in their own work for whatever reason, be it their client’s lack of interest or their own lack of conviction. In fact, most other architects ignore the issue altogether, preferring to regard architecture as fashion. This is, in my opinion, a terribly irresponsible view, because in terms of energy use and visual pollution, buildings have had an increasingly severe and damaging impact on the environment. For me, this makes the issue of sustainable architecture not only an important consideration but also a necessary one. As for a building philosophy for national parks, which were created to conserve nature for future generations, it seems to me that sustainable architecture, or what I refer to as “integrated bioclimatic architecture,” is the only logical and responsible approach. I say this speaking from experience. Unfortunately, I have seen some of the natural treasures of my own country—the

once splendid and untrammelled Costa Brava and the Costa del Sol—ravaged by indiscriminate and unimaginative development.

What is integrated bioclimatic architecture? It is architecture that arises out of the landscape, with the site determining the orientation and construction of a building, not just aesthetically, but also mechanically, determining its heating, cooling, and lighting too. Thus, it is an architecture that respects nature and its resources and provides its occupants with the most comfortable and pleasing environment possible. However, this architectural approach need not be a restrictive one for imaginative practitioners, as integrated bioclimatic architecture encompasses examples of vernacular architecture, like the typical white stucco Mediterranean fishing village, as well as mimetic architecture, which draws on the materials, textures, even the plants of the surrounding landscape for its inspiration. Indeed, good integrated bioclimatic architecture should exist in harmony

with the site and be visually dramatic because architecture that does not provoke emotion is not good architecture.

### Earth-sheltered house

My own first integrated bioclimatic project was a commission to design a weekend house just north of Barcelona, not far from the sea (Figure 1). The site for the house was a steep slope, off a much-frequented road that snakes round the hilly, pine-covered countryside, with a splendid view of the sea. It was the sort of site that gives some architects nightmares, but I saw it as the fulfillment of a dream. I realized the best solution for this difficult spot was an earth-sheltered house, a construction type I had longed to design, but one I had yet to find a client willing to try. Apart from dealing with the problem of the steep slope, I also wanted to avoid cluttering the beautiful, still unspoiled landscape with one of the white stucco Mediter-

anean villas that stuck out like sore thumbs on the neighboring hills, for by this time I had already come to the conclusion that nature has the right to priority and it is we who must adapt ourselves to it.

To get a sense of the spirit of the place, as well as to understand such mundane matters as the site's drainage, I visited the property for several months before finishing my designs, observing it in different seasons and weather. I wanted to create an entrance that would be dramatic and exciting, but which would not interfere with the landscape. I accomplished this by making a cavernous entrance for the house. You literally have to descend deep into a hole in the earth, and then, when you enter the house, you find yourself in an ample, bright, white-walled living room with an extraordinary and unexpected view of pine-covered hills and, in the far distance, the sea.

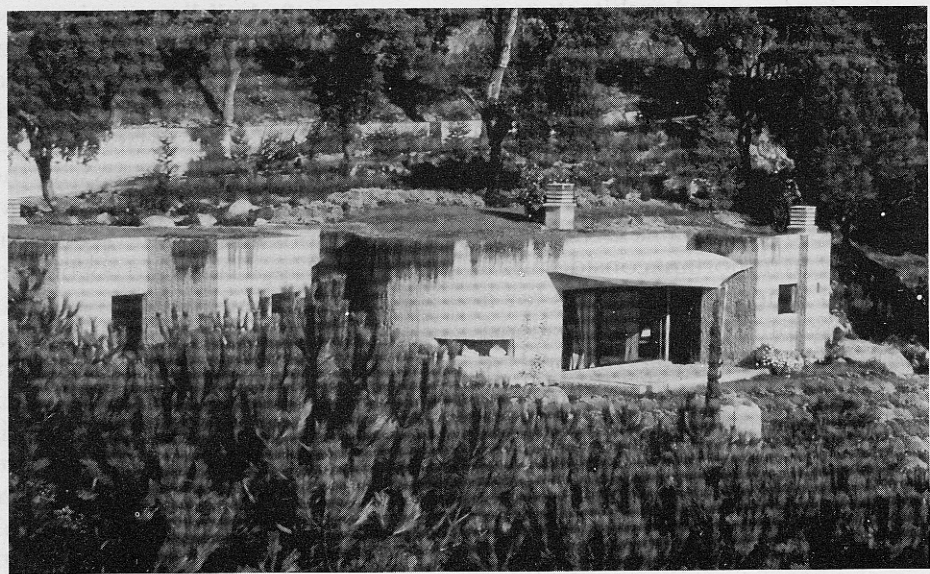


Figure 1. Earth-sheltered House near Barcelona

I chose to make the south-facing walls of the house, which are the only ones visible, out of concrete mixed with quartz, mica, feldspar, and granite from the area. To give the exposed walls a softer, more organic feel, I had the concrete poured into serrated molds to produce a triangulated surface, and then had the edges chipped away. With the aid of an earth mover, I arranged huge boulders around the center of the house and its cave-like entrance, blending the textures of stone and concrete and further erasing the distinctions between house and landscape. The integration was complete when creepers and flowers native to the region were planted amidst the rocks and the earth-covered roof.

By burying the house I had made a striking residence for the client and solved the problems of the site. Its earth covering insulated the house from the noise of the road and from temperature changes. Its south-facing windows allow generous sunlight, adding warmth in winter and providing views of the distant sea. In summer, canvas awnings outside on the terrace protect the windows from the strong sun. The terraced land below the house provide the perfect plateau for a pool, and the property has become inviting for strolling and gardening.

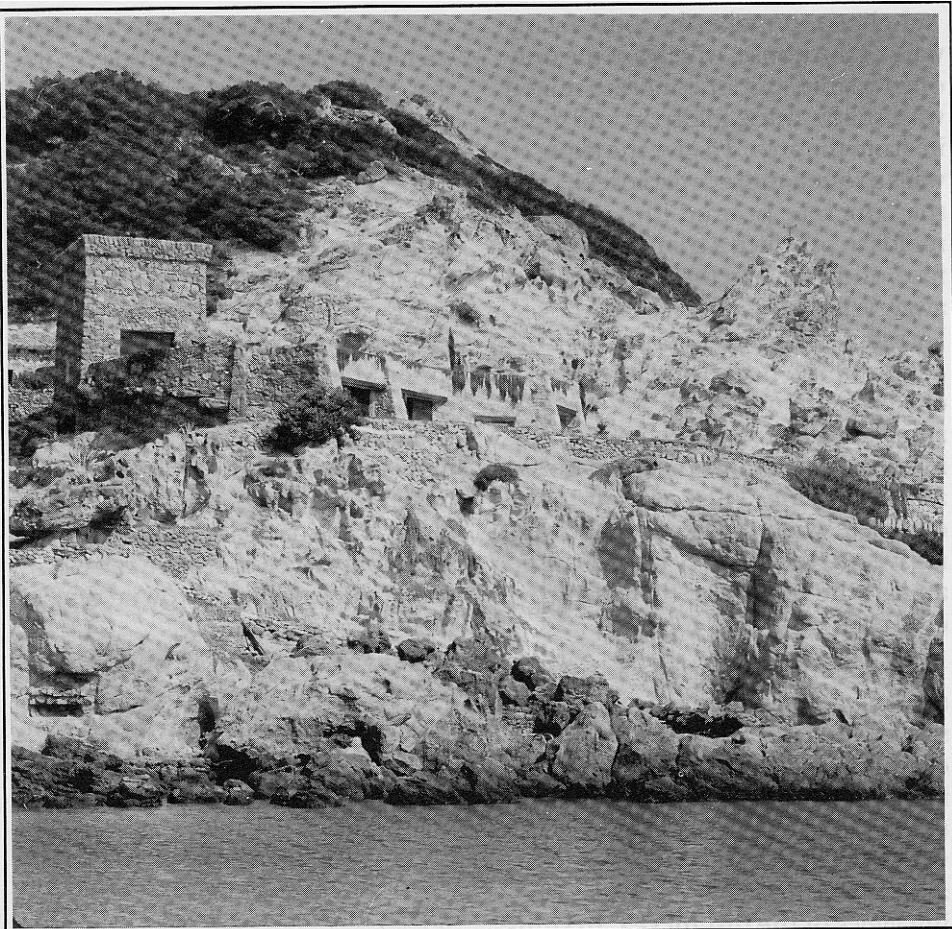
### **Menorca house**

An equally challenging project was a vacation house on the Balearic island of Menorca, off the northeast coast of Spain (Figure 2). The site is a marvelous rocky hillside that descends into the sea, truly one of the most spectacular spots on the Mediter-

anean, and one that many environmental groups were anxious to protect. In Menorca, the vernacular architecture is mostly white-washed structures, which look handsome when clustered together in a fishing village, but to place such a building there would have been disastrous as it would have been utterly out of harmony with the striking landscape. However, it happens that there is another Menorcan vernacular, an ancient one. For this island was settled in prehistoric times by a people who lived in the island's many caves and built numerous stone megaliths. It was from this vernacular that I drew my inspiration, as well as from a rather severe, square-shaped tower that already existed on the site.

I envisioned a stone building connected to the stone tower that up close would have a powerful, primordial shape—in this case, several stone walls slanting outward—and which would be able to hold its own against the drama of the landscape. However, at a distance, the building would disappear into the craggy hillside.

My first concern, however, was to excavate a rather tacky white balustraded viewing platform that had been built adjacent to the tower years earlier. The stones that I dug up were saved to cover the walls of the block concrete structure as an economical use of materials and energy. My efforts toward energy conservation also extended to the design of the house, as I wanted it to be as bioclimatic as possible. Heating was not a concern because the house is only used during the summer, but cooling was a very real one as Menorca is very hot and humid in summer. By orienting the



**Figure 2. Menorca House**

house toward the east, I was able to maximize the views and ensure that the sun hit the house at an angle at which its heat rays were least intense. I also placed an atrium deep within the interior of the house. This enclosed court brings in natural light so that the interior is not dark and provides cross-ventilation. Finally, to further integrate the house into the landscape, I inserted planters around the perimeter of the roof, which are one meter wide and planted with indigenous veg-

etation that thrives in the hot, windy, salty climate.

### **Borobudur Resort**

However, the project that may best correspond to the problems inherent in building sustainable architecture in a national park is the luxury resort I am currently designing in central Java, Indonesia, not far from Borobudur, the sacred Buddhist temple. The area has protected status through Unesco, and it is illegal to construct anything



there that might be considered visually polluting to the natural beauty of the place, which is beautiful, indeed. The surrounding countryside is tropical with many palm and mango trees, verdant valleys, terraced hills of rice paddies, jungly mountains, and distant volcanoes. There is no question that this place has a special energy which should be respected and preserved.

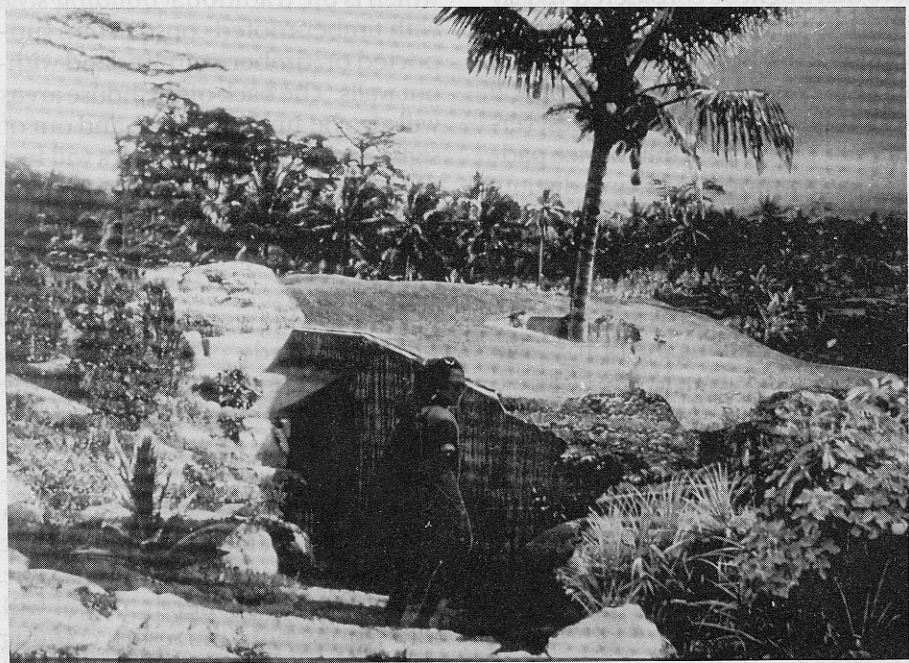
The resort itself is to be located on a hillside overlooking the Borobodur temple in an area currently occupied by rice paddies. Two streams run along each side of the land, with another smaller creek running down the center. There are also some interesting formations of black volcanic rock scattered among the paddies. After spending a good deal of time at the site, it was obvious to me that a mimetic architecture was called for. However, I also knew that mimetic architecture alone would not meet the demands of this project as it was to be a tourist hotel, albeit a luxury one, and visitors would want to have more of a feel of the native architecture and culture, so I would have to incorporate vernacular architecture into the design. It was not difficult to find examples of this architecture as there is a village just a short distance away, peopled by the farmers who cultivate the rice paddies and many of whom will work in the hotel when it is completed.

My idea is to place the 50 bungalows, which are the most extensive part of the project, underground, so that the impact of building in this unique site will be minimized (Figure 3). Almost all the other structures—the entry, the common rooms, the bars, and dining room—will be “Pendopos,”

which is the traditional building style with timber-roofed construction supported on timber columns and without walls. The back-of-the-house areas will also be underground, and out of sight. In this way, the visitors will feel directly related to their surroundings and the local villagers will feel we have been respectful of their land and culture.

Guests will pass through a patio with walls made of the local black stone—the same stone used for the Borobodur—which will be lavishly planted. Before them will be the entry lobby in the form of a Pendopo, surrounded by a reflecting pool, which will be illuminated at night to reflect the Pendopo, as if it were a jewel. The water from the reflecting pool will travel throughout the resort, creating different pools and waterfalls, which will acoustically and visually enrich the communal areas. The entry lobby will have dramatic views of the Borobodur and the surrounding valleys, but the rest of the constructions—the bungalows—will not be visible, as they will be nestled into the contours of the land. Each bungalow will have its own unobscured view of the Borobodur, its own garden, swimming pool, and outdoor sleeping area. Because of the way the land will be terraced and planted, however, each bungalow will be sheltered from the views of the others. In this way, all of the guests will have an extraordinary sense of privacy and peace.

I am very excited by this project because I consider it unique. I hope that, when it is completed, its unusual mix of vernacular and mimetic architecture, its extraordinary view of the seventh wonder of the world, and its rare



**Figure 3. Artist's Conception of Borobudur Resort Bungalow**

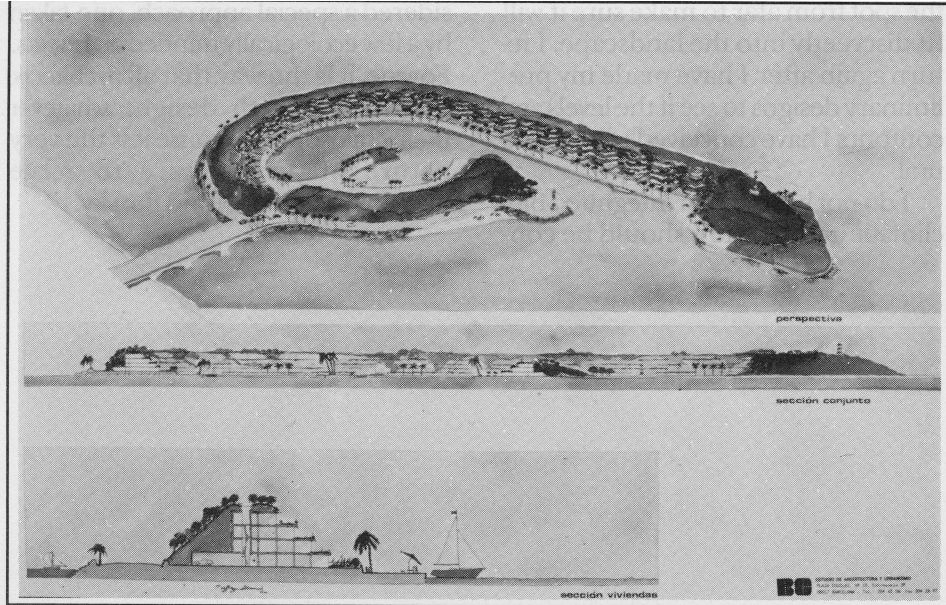
sense of privacy and tranquillity will give impetus to other architects, designers and hotel companies to conceive holiday resorts in a new way that is at once architecturally sophisticated and culturally and ecologically respectful.

### **Barcelona waterfront island**

My final example, a proposal to build an island off Barcelona's coast, is a very different one indeed, for here I am suggesting a way to improve upon nature. The recent redevelopment of Barcelona's waterfront has provided its citizens with a wonderful view of the sea. However, as attractive as it is with its sandy beaches, blue waters, sailboat-filled harbors, and myriad of wind surfers, it is still somewhat boring. Because it borders the city, it has a rather urban feel. Recently, I

began thinking how wonderful it would be to live on an island and still be in Barcelona, and I got the idea of bringing the best of the Costa Brava, with its beautiful rocks, trees, and mountains, to Barcelona. My idea is to build an island of two mountain knolls that would be connected to the mainland by a bridge about 40 meters out in the sea (Figure 4). From the waterfront all you would be able to see is a wild, green mountainside covered with scraggly oaks and pines. I think this new sense of perspective when looking out at the sea would add greatly to the view, making it more beautiful and exotic.

But perhaps the most interesting part of the project will be what you do not see. The two mountains will fit inside each other like half rings, creating



**Figure 4. Perspective and Section Drawings of Barcelona Waterfront Island**

a protected harbor that will be obscured from view, even when approached from the sea. In this harbor will be a marina and the interior mountainsides will be terraced with earth-sheltered apartments for couples and small families. The bottom rim of structures, those nearest the harbor, will house restaurants, bars, and shops. Inside the mountain there will be a parking garage.

### **Conclusion**

As you can see from these examples, integrated bioclimatic architecture is not so much a style as it is an approach. Key to its successful practice is that, once you understand the building program, you let the site's landscape determine the shape and form of the building. When I take on a new project, I spend a great deal of time visiting the site and getting to know it. It is not enough that you understand its dimensions, its spatial

characteristics, and its drainage; you must feel its energy. Thus it is important to visit the site early in the morning, at midday, and in the evening. You need to know how the wind blows over it and how the sun strikes it. You need to become familiar with its views, the morphology of its stones, its dominant colors, its different textures and even its smells, as well as the type, color, and fragrance of the various plants that inhabit it. I take numerous pictures so that I will remember not only the strongest elements of the site but also the sweetest, such as a place where mushrooms grow year after year that should not be disturbed, since as a mushroom hunter I know how difficult good mushrooms are to find. I also like to bring a portable drafting table so that I can sketch what comes when the land first speaks to me.

After I have sited the project, I view

the spot from afar to make sure it will fit discreetly into the landscape. I return again after I have made my preliminary designs to see if the levels and contours I have conceived will be natural.

I do not believe that integrated bioclimatic architecture should be con-

sidered a special approach, one taken by a few ecologically minded architects. For me, it is the way that all architects should approach design, whatever their philosophy, because it is the very nature of architecture to relate humans to the earth and the sky.

