Ecologically Responsive & Responsible Architecture

Immersed in the Environment: An Education Center

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Introduction

During the month of July I participated in the Glenn Murcutt Master Class in Australia. The class dealt with issues including understanding, appreciating, and considering the environment, its relationship to buildings, and the building's impact on the site. We also discussed what appropriate design should accomplish and what the role of current and future architects should be, considering the fragile state of our environment.

Architect and tutor, Richard LePlastrier, worked closely with my group and told us of his travels through Africa. There are a particular people who are somewhat nomadic, only moving two to three times a year following their food sources. Their camps consist of three to four huts made primarily of branches, animal skins, and blankets. Every component is easily removable which allows them to compact and protect their belongings when they need to move each year. The camp of three or four huts simply becomes small bundles tied with twine, sitting in the landscape.

This romantic vision inspired my group's project, but more importantly raised important questions such as: building appropriateness in the environment, extent of intrusion on the land, and ecologically responsive design. The project investigated in Australia was sited on a remote area in the foothills of the Great Dividing Range. This type of remote site is important because it results in the most extreme difference between the built and the natural.

After traveling in Australia, I found that the level of environmental education and awareness that the typical Australian possessed was far superior to that of the U.S., not only in the architectural field but in life in general as well. This knowledge results in higher environmental and ecological awareness, a stronger value system, and more informed decisions in all aspects of life.

I would like to acknowledge and thank for their help with this thesis the following people: professor Bob Fisher, professor Rod Underwood, Dr. Amy Sheaffer, professor Sonny Palmer, systems consultant Jeff Culp, Ball State University and the College of Architecture and Planning, the rangers of the Hoosier National Forest, and my classmates.
Background

Environmental Education in the United States is, unfortunately, not a priority in most situations. This lack of education results in poor decisions dealing with our environment, a misunderstanding of it, and many missed opportunities to coexist with it. Generally, it is safe to say that the mostly urban population of this country is concerned with their immediate environment: the 10-15 square miles that they work, shop, and live in each day. The majority of their contact with the natural environment is driving through the countryside or the main road of a national park; and this probably only happens a few days each year. As a result it is safe to say that the majority see the natural environment as something “out there” and so far removed from their daily lives that it is not of concern to them.

Architecturally, this project deals with what appropriate design should accomplish and what the role of current and future architects should be, considering the fragile state of our environment. The project incorporates numerous environmentally acceptable design strategies which not only preserve the environment, but also offer education to the visitors by showing them what is possible in sustainable architectural technology. It also is a response to questions of man’s role and responsibility toward the environment. These questions include:

- How (ethically, theoretically…) should building in pristine wilderness be approached?
- What is appropriate to build in pristine wilderness?
- How should design respond to the environment?
- What is ecologically responsible design?
This project is intended to strengthen the connection between the public and the natural environment. The Education Center will include accommodations, a multipurpose space, kitchen, communal bathrooms, arrival dock, boat house, work shop, and a constructed wetland. The intention is for groups, students of all ages, or professionals, to stay onsite for a period of time learning about the environment in terms of its fragility, importance, and its relationship to their personal, educational, or professional lives. The education will also include issues of architectural sustainability, studied through the design of the various components of the facility. Education through immersion and participation with the complex and environment is the intended mode of learning.

A substantial range of environmental design criterion will be explored with the expected result being a very responsive, responsible, and ecologically respectful design. Water collection, solar collection, waste disposal, water treatment, minimal/appropriate building footprint, natural ventilation, and solar orientation will be utilized.

Social issues are important to consider for the users to reach a full understanding of themselves, their communities, and the environment. Issues explored include: public/private relationships, individual/community associations, personal comfort zone challenges, and cooperative relationships for various tasks.

The operational objectives of the facility will be:

- To educate visitors about the environment in terms of its fragility, importance, and its relationship to their personal, educational, or professional lives.

- To demonstrate sustainable design ideals, and how they might be utilized in daily life.

- To raise, and possibly answer, questions dealing with the current state of design in this country in terms of what is appropriate, ethical, and suitable to the environment.
Background

Cultural Context
Culturally, this project is intended to raise and possibly answer questions dealing with the current state of design in this country. The early inhabitants of this country relied on their natural environment for everything in their lives including food harvests, travel seasons, and shelter design responses. They did not have the luxury of "limitless" energy to run air conditioners and fuel inefficient automobiles. The majority of design today ignores many basic environmental issues, and in return, exploits and destroys our shared assets by being careless and irresponsible with design decisions. The few designers that call themselves "green" are at least trying to respond to this problem; however, it takes more than a couple of "green" strategies to fix the problem. It is a responsible and respectful attitude that needs to take grip of the design world. We need the buzzword to become the norm.

Physical Context
The Charles C. Deam Wilderness, part of the Hoosier National Forest, in Monroe County, Indiana will be the location for this project. The area is very diverse in flora and fauna, as well as topography. A peninsula on the southern side of Lake Monroe was chosen for the facility because of its remote setting, access to the lake, and proximity to many horse and hiking trails in the wilderness. Access to the peninsula is provided by means of lake transportation or a five-mile hike or horse ride. The existing peninsula trail was once a backcountry road until the 1930's which provides the possibility of limited four wheel drive access.

Organization
The Charles C. Deam Wilderness is operated and supervised through the Hoosier National Forest office in Bedford Indiana. It is assumed that this office would also manage the education center. A park ranger would be in charge of the center and coordinate visits with each individual group organizer. The group coordinator would then be in charge of the education center, its’ visitors, and their activities. This allows the Hoosier National Forest office to run the center without an administrator on site everyday.
View looking west, from the natural wetland.
Background

Design Concepts

The site has three natural divisions or physical elements, which will organize the facility: the water, land, and forest. Each component will contain a piece of the program, which will facilitate a clear understanding of the organization of the educational center and of each physical feature. It will also provide opportunities to demonstrate which sustainable design ideas are best suited to the differing physical areas. The building will also act as a transitional hub between the lake and the land. This will facilitate access to the building and the surrounding wilderness. Additionally the facility will fully demonstrate its ecologically appropriate systems and encourage the visitor to understand how they work and why they were used. Finally, a variety of sub-spaces will be arranged to encourage smaller group interactions and attention to the variety of existing site conditions.

The facility will be primarily seasonal, closing for the coldest winter months. Primarily seasonal is important because visitors could come at any time of the year, with the understanding that the facility will not be heated or air conditioned. It will be cold in the winter, and the water services will not be operational.

The main mode of arrival is assumed to be by water, from the Cutwright Recreation Area, approximately 3/4 mile west of the site. The water constituent will include a dock for arrival to the complex and access to the lake, a boat house, and a work shop. These areas will demonstrate sustainable design through material choice and connection with the water. The architectural vocabulary will demonstrate their function and will be “of the water”.

The land component will consist of the multipurpose space, kitchen, bathrooms, water collection system, and constructed wetland. These spaces make up the heart of the facility and therefore are well suited to be connected with the land. They will be centrally located and take advantage of solar orientation, solar collection, water collection, composting toilets, and natural ventilation. The architectural vocabulary will demonstrate their importance as the core of the facility and be “of the land”.

Being more private in character, the forest will house the accommodations. These rooms are principally used for sleeping and will fit well into the protective forest. They will be elevated off the ground and will encourage interaction among the guests in various scale sub-spaces throughout. The architecture will not dominate the landscape and will be “of the forest”.
Research

Personal Experience  One main source of research for this topic has been wilderness experiences in such places as Alaska, Italy, the Appalachian Trail, Australia, and locally in the Hoosier National Forest, the Charles C. Deam Wilderness, and the Adventure Hiking Trail. Also readings by Backpacker Magazine, the Sierra Club, National Geographic, National Geographic Adventure, Outside Magazine, Peter Jenkins, and Jon Krakauer have been a source of appreciation and understanding of our natural environment. Studying under such architects as Glenn Murcutt, Peter Stutchbury, and Richard LePlastrier have relevance in ecologically responsible architecture.

James Cutler  James Cutler is an ecologist who practices architecture. He protects our environment through a wilderness preserve, which he started, consisting of more that 1,000 acres and through his sensitive and responsible architecture. Minimal foot print, minimal ecosystem disturbance, and material selection are just a few of the tools he uses everyday to produce wonderful architecture. His work has been described as “a narrative of our relationship to our environment.” The philosophy and approaches seen in his Bridge House, Parker Residence, and Houdek/Pope Residence were invaluable to me.

Glenn Murcutt  Pritzker Prize recipient Glenn Murcutt is deeply engrained in the Australian environment and reveals this in his outstanding vernacular architecture. Regionalism, environmental respect and admiration, and material sensibility have given his work a very rich character. Buildings such as the Arthur and Yvonne Boyd Education Center, the Simpson-Lee House, and the Marika-Alderton House taught me of natural ventilation, lighting, connection to the landscape, water collection, and environmental responsibility.

Peter Stutchbury  Peter Stutchbury is an Australian with great cares about the environment of the world. Ocean currents, wind cycles, sun patterns, and local climates and characters concern him. The beauty and splendor on our natural world can be seen in his wonderfully crafted and articulate work. His passion for the environment and architecture blend together to produce pure beauty. Friend and architect Richard LePlastrier describes him well; “So quite simply here we have it – an architecture at once beautiful and local. It understands absolutely where it is and what it needs to be.”
Process & Methods

The design process for this project entailed numerous site visits to familiarize myself with the existing site conditions. Site analysis was the first major step and continued throughout the process. I continually questioned what impact my design ideas had on the environment. Contour study models became a way to quickly understand form and the impact on a very steep site. The understanding of the terrain and the site conditions drove the entire design process. I also obtained programs from a college professor of natural resources, a sixth grade science teacher, and a second grade elementary teacher. These programs, for three to six days, described what each of these age groups might want to do on the site. This information helped me program the complex and gave me a better understanding of the attitudes of the probable users.
## Results

<table>
<thead>
<tr>
<th>Program</th>
<th>Space</th>
<th>Size (s.f.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work Shop</td>
<td>250</td>
<td></td>
</tr>
<tr>
<td>Boat House</td>
<td>400</td>
<td></td>
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<tr>
<td>Multipurpose Space</td>
<td>1,500</td>
<td></td>
</tr>
<tr>
<td>Kitchen</td>
<td>350</td>
<td></td>
</tr>
<tr>
<td>Bathrooms</td>
<td>500</td>
<td></td>
</tr>
<tr>
<td>Accommodations</td>
<td>250 each (1,500 total)</td>
<td></td>
</tr>
<tr>
<td>Constructed Wetland</td>
<td>1,500</td>
<td></td>
</tr>
<tr>
<td>Dock</td>
<td>150</td>
<td></td>
</tr>
<tr>
<td>Fire Pit</td>
<td>350</td>
<td></td>
</tr>
<tr>
<td><strong>Net Area (enclosed)</strong></td>
<td>4,500</td>
<td></td>
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<tr>
<td><strong>Grossage (50%)</strong></td>
<td>2,250</td>
<td></td>
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<tr>
<td><strong>Total Area</strong></td>
<td>6,750</td>
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<tr>
<td><strong>Net Area (exterior)</strong></td>
<td>2,000</td>
<td></td>
</tr>
<tr>
<td><strong>Total Area</strong></td>
<td>8,750 s.f.</td>
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Immersed in the Environment: An Education Center
The terrain of the area was a major concern in regard to the ease of access for all visitors to the complex. When walking on steep terrain, the easiest way to maneuver is to follow the same elevation line or contour. This idea guided the linear layout of the plan, which not only allowed easy access but also the three major zones and programmatic spaces to cohesively fit together. With two main floor levels and a broken building mass, the building fits easily into the landscape, while not dominating it.
Results

Partial Southern Elevation

The footprint of the building and the extent to which it disrupts the ecology of the landscape were important factors in this project. The solution was to raise the majority of the project above the land to minimally disturb the land, allow natural light through, and encourage natural ventilation. The majority of this portion of the project, the boathouse, work shop, all major circulation, and the accommodations,
are constructed of wood, with glass and copper details. The heart of the project, the multi-purpose space, kitchen, water tower, and restrooms are rooted to the land physically, while keeping in mind a minimal footprint, which results in the sharp foundation with many cantilevers. This portion of the complex consists of board formed concrete and glass, with wood and copper details. The majority of the roofs are corrugated metal or corrugated plastic, with the exception being the boathouse where photovoltaic panels generate power for the complex.
Results
Results

Work Shop Section

Boat House Section
The boathouse and workshop were designed around collecting solar energy through the photovoltaic roof panels with the battery storage in the workshop. The resulting roof angle is best suited for the location of the project. The roof on the north side of the workshop was lowered to save materials and lessen visual mass as well as take advantage of northern light and natural ventilation through a clerestory screen. The multipurpose space is intended to serve as the main public gathering space and is therefore oriented towards the public lake. Its angled roof and wall, along with the main and small terraces, reinforce this idea. The kitchen faces the north forest to take advantage of the north light and to provide a more intimate feel. Water collected in this roof system is drained through a main downspout near the main entrance.
Results

Water Tower Section

The water tower collects rainwater and distributes it to the restrooms and kitchen. The roofs of the aforementioned spaces serve as a solar hot water collector, while the cold water remains in the tank. Its height ensures appropriate pressure to the fixtures. The materials coincide with those of "heart" of the complex, except for the tank, which is clad in flat seam copper. The copper's angled orientation and patina is attended to coexist better with the tree canopy. The accommodations serve as space for relaxation and rest, which correlate with the private nature of the forest. Their orientation, rooflines, openings, and entrances reinforce this notion. Each room can be subdivided by means of a sliding wall, which enables the occupants more privacy if desired. The grouping of the accommodations provides subspaces for gathering on either the more private or public side of the circulation spine.
Results

Constructed Wetland & Water Use Diagram

free water surface flow system through terraces
Copper Light Fixture  boat house, work shop, r.r., acco.

Accommodation Door

Glass Light Fixture  m.p. space  1/2 0

Louvered Sliding Door  boathouse, workshop, m.p. space, acco.
Reflection

The thesis process was filled with questions and frustrations, but ultimately ended with a sense of achievement and fulfillment. I developed a greater understanding and respect for the issues that this project allowed me to explore. My passion for the environment and the protection of it was increased as well. The natural world that we live in and are a part of is too valuable a resource to squander. The Native American notion of man and nature, not man versus nature must be strengthened in this country. We must learn to coexist harmoniously or face a world without retreat from the industrial and consumerist society in which we live. It should be obvious that we can learn from architects such as, James Cutler, Glenn Murcutt, and Peter Stutchbury. Perhaps the education of the masses could develop through an ecologically responsive and responsible architecture.

This type of project may serve as a starting point for an education of this magnitude. If we can begin with those who already appreciate our environment, these noble ideals my spread by themselves. I look forward to exploring similar ideas, which directly impact more of the general public. Buildings such as libraries, schools, single and multi-family housing lend themselves to such an impact. If environmental awareness and respect could become popular, America would quickly jump on the bandwagon and we just may be able to leave our grandchildren with some natural splendor.

"A thing is right when it tends to preserve the integrity, stability and beauty of the biotic community. It is wrong when it tends otherwise."

~ Aldo Leopold
Bibliography
Pertinent Readings


