Ecotourism

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eco TOURISM costa rica

GRANT RONCHI

a terminal project presented to the faculty of the college of architecture at the university of nebraska in partial fulfilment of requirements for the degree of master of architecture

major: architecture
under the supervision of professor TOM LAGING
lincoln, nebraska
may, 2012
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**THE EXPERIENCE’ CHRONICLE**

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**PROJECT ORIGIN**

The idea to design a fully functioning ecotourism lodge was conceived as a result of two projects, the first being an academically organized team assignment and the second, an actual venture of one of my relatives. The challenges that arise in designing solutions for an environmentally-conscious uniform facility are especially stimulating when they are to be executed abroad. The marketability of such a facility needs to be contemplated carefully, respecting a well established culture. Deliberate attention to a triangle of three components will drive this design as a thesis project: the natives and their culture, construction methods and materials, and sustainable design strategies within the given climate.

In one of my graduate courses, I was part of a team who was asked to construct a fictional firm which marketed a specific product in the design/construction field. Our team, Global Technologies, specialized in the developing of eco-lodge resorts. One of our main tasks was to prepare a response to an RFQ, and therefore, the bulk of our efforts revolved around researching examples of eco-lodge projects which were already completed. Specifically, we looked at a number of examples in Belize. Before this course, I was unfamiliar with this marketing strategy as it relates to tourism, and found it extremely intriguing. Global Technologies was comprised of an Architect, Landscape Architect, Planner, and Interior Designer, so our research was cross-disciplinary, evaluating everything from mammoth passive solar systems to interior finishes from local sources.
The spark of enthusiasm may have ended there if I hadn’t had a conversation with my second cousin over a family holiday dinner. He is currently in the process of developing plans to fabricate a 6–8 unit eco-lodge in Costa Rica. We engaged in a quite lengthy conversation about our views on the topic and found some merit in proceeding with this idea as a thesis design project. We would both benefit greatly from this collaboration. The notion of having someone as accessible as my cousin Thomas to help execute a design problem in a foreign country with traditions unlike most I’ve grown familiar with seems too good to be true.

The weight of my interest in the subject as a design challenge lies in the fabrication of the structure. I possess a strong desire for construction methods and the detail with which they need be applied. Researching these methods along with the materials that accompany them is very appealing to me. Successful design of this project must integrate self-supporting technical features with appropriate local materials and provide a legitimate response to the surrounding culture, while being mindful of the environment. This project is feasible because of the proposed size and considering the resources I have at hand. Challenges reside in its unique ethnic context, unfamiliar pallet of materials and climatic tendencies. At my disposal are a number of precedents located in similar areas of the world, and a well-educated relative on the verge of constructing a development similar in size and scope.
In order for the benefits of an entirely self-sustaining eco-lodge to be fully appreciated by the user, it needs to be designed to the human scale. Users shall become engaged, visually, with the structure’s sustainable components while not having to sacrifice serenity. A successful eco-lodge is one which is designed to mirror the size of its small neighboring community not impose on existing local ecologies.

The southwest shore of Costa Rica is typically less crowded from a tourism standpoint when compared to its counterpart on the northeast Caribbean Sea. The coastline is much more rugged and rocky with a number of gulfs and peninsulas. However, the southwest shoreline of Costa Rica has also been called the hidden jewel of the central Pacific.

Between Playa Palo Seco and Esterillos Oeste lies Parrita, which includes a partially developed offshore island that runs parallel to the shore. It is an accessible site with many ecological opportunities. This proposal is very site specific, and will prove to be everything but a modular design. Located within a short distance of the bustling towns of Jaco and Quepos, Parrita boasts 6 different beaches from Esterillos Oeste to Playa Palo Seco and also has a mountain chain with stunning ocean views, and the famous Palo Seco Estuary. Four National Parks are located within an hours drive.
Every angle of this project will be scrutinized under a self-sustainability lens with acute attention to the potential for this eco-lodge to generate its entire own power supply. Sustainable components successfully integrated with a compelling design with prove attractive for users worldwide. The most prevalent basic architectural design theme will be the combining of traditional and contemporary techniques to maximize natural lighting and shading of all the spaces.

**PRIMARY GOAL:**
Through the use of specific materials, renewable energy strategies and local vegetation, develop a project which is 100% self-sustaining.

**PRIMARY FOCUS:**
Grasp local construction methods & use daylight to naturally and efficiently enhance the space.

**DELIVERABLES:**
Architectural renderings of the facility that include ample context, accompanied by scale model(s) and a video documentary.

**DESired PROGRAM:**
8 unit eco-lodge complete with typical lodge amenities.
In addition to the predetermined ‘focus areas’ of the National Architectural Accrediting Board that we are required to apply throughout the thesis study, I have personally selected a few criteria which apply directly to my thesis topic.

CRITICAL THINKING & REPRESENTATION:
A9 Integrating techniques used in various examples of indigenous, vernacular and regional architecture will help allow the building to be accepted by surrounding communities as well as the environment. Socioeconomic and public health issues will also need to be addressed.

A10 Understanding of the diverse needs, values, behavioural norms, physical abilities, and social and spatial patterns which characterize the people from the pacific coast will help me develop a design which doesn’t impose on the local way of life.

INTEGRATED BUILDING PRACTICES, TECHNICAL SKILLS & KNOWLEDGE:
B3 The success of this eco-lodge will rely heavily on its energy efficiency. Sustainable themes will include utilizing natural light and shade, optimizing indoor air quality and harvesting solar energy.

B9 Developing this project to a level of personal understanding with respect to its buildability is an important part of my proposal.

B10 Consideration of the appropriate building materials as well as their respective assemblies will be a particular focus in the design of my eco-lodge.
Displayed here is a series of images depicting potential site conditions as well as local opportunities that will influence program, building materials, and other design strategies.
current lodging

recreation

swimming
While tourism serves as the world’s leading service industry,1 80% thrives in costal regions.2 Although the majority of this tourism is classified as mass tourism, there is a rapidly growing sector headstrong with environmental awareness. The combination of this progressive take on tourism coupled with one of the front running themes in architecture, namely sustainability, evokes a necessary and valid thesis study. Development of these destinations should meet the goals of the present, without compromising the ability of future generations.3

As I gravel to find a starting point for this thesis, I need to make one thing clear. I feel forced, in a way, to establish the notion that some sort of architecture has to happen in order for the ecotourism experience to happen. The architecture is the facilitator in this equation [opposite]. Otherwise one potentially could critique every move made from the viewpoint that once humans step foot anywhere, they have jeopardized the site’s completely natural characteristics and it is no longer a candidate for the ecotourism model. I approached the thesis with a combination of the points addressed in the two definitions on the following page,
Responsible travel to fragile, pristine, and usually protected areas that strive to be low impact and (often) small scale (as an alternative to mass tourism). ¹

Responsible travel to natural areas, which conserves the environment and improves the welfare of local people. ²

¹<http://www.wikipedia.org>, Nov. 2011
²TIES (the international tourism society) definition, 1991
In order for the benefits of an entirely self-sustaining eco-lodge to be fully appreciated by the user, it needs to be designed to the human scale. Users should visually engage with the sustainable features without sacrificing serenity. A successful eco-lodge is one which is designed to mirror the size of its neighboring community and not impose on local ecologies.

What will ultimately make this a successful thesis project is the design of an ecotourism destination that responds specifically to Fennell’s definition, and in the end, serves as a hybrid prototype for ecotourism projects in the future.

This thesis will benefit most by defining a specific genre to focus on within ecotourism industry. There exist only few living examples of ecotourism destinations that deal primarily with the water conditions of a particular site. In an attempt to bring something new to the table, in terms of a unique ecotourism model, I have chosen oceanography as the basis for the design of my destination. For me, this includes multiple areas of interest such as tidal changes, wave-generated power, rainwater collection, raingardens, ocean-sport activities, ocean wildlife, oceanography, shoreline habitats and wildlife, etc.

I decided early on that the destination I would ultimately develop would be of the oceanography genre. A destination that focuses on all the water conditions present at the site including an educational component supported by the University of Costa Rica’s Biology Department (extension teaching), and two water-sport activities for users to engage in: surfing & diving.
The themes and definitions of Ecotourism don’t speak directly about architecture necessarily. This thesis aims to study the ecotourism model through an architectural lens. It should define the role architecture plays in the development of a successful ecotourism destination.

During which time this project is under construction, units will become available to rent out. For visitors particularly interested in the development and tectonics of ecologically sensitive architecture, the educational component will expand to promote these sustainable techniques. As a result, users will witness first-hand how these systems operate, and ultimately gain a better understanding of the sustainable principles.
The intent is that throughout the design of this ecotourism destination, these principles should serve as a base for design decisions. Wherever applicable, I will challenge their ‘minimums’ and provide solutions that are appropriate, but at the same time, unique.

**CODE OF ETHICS FOR SUSTAINABLE TOURISM**

1) tourism should be culturally sensitive
2) tourism should be a positive influence on local communities
3) tourism should be managed and sustainable
4) waste should be disposed of properly
5) wildlife and natural habitats must not be needlessly disturbed
6) there must be no commerce in wildlife, wildlife products, or native plants
7) tourists shall leave with a greater understanding and appreciation of nature, conservation, and the environment
8) ecotourism should strengthen conservation efforts and enhance the natural integrity of places visited
This particular thesis topic requires the investigation of an exact site location much earlier than most thesis topics do. A specific site location, and an in-depth knowledge of that site’s characteristics cannot be underestimated.

Many of the most prestigious and well-renowned ecotourism destinations are found primarily in Africa and Central America. Considering my cousin’s familiarity with Costa Rica and all it has to offer, I feel this is a great starting point for the thesis. From a marketing standpoint alone, it makes sense to develop a destination such as this where there are already a handful of potential clients as well as the necessary users.

In comparison [opposite] Costa Rica is roughly one-third the size of the state of Nebraska. However, it’s population is over double that of Nebraska. Moreover, two-thirds of the four and a half million live in the central valley region surrounding the capitol, making a very population density.
Selecting the site was an attempt to locate these components in the closest proximity to one another. This project revolves around the idea of the ocean and a few of its many assets, oceanography, diving, surfing. Therefore, it shall be located near the ocean. In order to take advantage of the Universidad de Costa Rica’s extension teaching program, it would be ideal if the site was also in close proximity to the University. Central to this thesis is the notion that an ecotourism destination is low-impact and focuses on connecting users with natural landscapes and ecologies, therefore it shall be located in a remote setting.

This map [opposite] charts the locations of each of the three desired components across the entire country. The black circle highlights the ideal location to apply this thesis. The Pacific shoreline is considerably longer, more picturesque and more accessible than its atlantic counterpart. It is also exposed to a much larger body of water, producing ideal surfing conditions along the majority of the shoreline. The Pacific coastal lowlands, preceding the ridge-line further inland, receive slightly less rain during the winter season.
locations:
- Puertoviejo
- Manuel Antonio
- Golfo de Papagayo
- Catalina Islands
- Bat Islands
- Isla del Caño
- Moctezuma
- Piedras Blancas
- Cocos Island
- Santa Rosa
- Palo Verde
- Juan Castro Blanco
- Carara
- Diria Poás
- Braulio Carrillo
- Barbilla
- Cahuita-Cangreja
- Tortuguero
- Irazú
- Turrialba
- Tapantí
- La Amistad
- Chirripó
- Corcovado
- Barra Honda
- Las Baulas
- Rincón de la Vieja
- Tenorio
- Guanacaste
- Isla Uvita
- Playa Grande
- Playa Tamarindo
- Playa Avellanas
- Playa Negra
- Junquillal
- Playa Lagartomarbella
- Ostional
- Nosara
- Guiones
- Camaronal
- Playa Coyote
- Santa Teresa
- Mal País
- Boca Barranca
- Tivives
- Playa Agujas
- Playa Escondida
- Isla Herradura
- Jaco
- Playa Hermosa-Esterillos
- Playa Rey
- Dominical
- Rio Claro
- Backwash
- Cabo Matapalo
- Pan Dulce
- Playa Zancudo
- Pavones
- Boca Damas
- Playa Uvita
- Puerto Viejo
- Salsa Brava
- Cocles
- Manuel Antonio
- Playa Hermosa-Esterillos
- Playa Rey
- Dominical
- Rio Claro
- Backwash
- Cabo Matapalo
- Pan Dulce
- Playa Zancudo
- Pavones
- Boca Damas
- Playa Uvita
- Puerto Viejo
- Salsa Brava
- Cocles
- Manuel Antonio
- 1:500,000
- Popular diving location
- Popular surfing beach
- National park
- National volcano park
- National marine park
- University
- Cocos Island (550 km from the mainland)
Parrita is a small community of less than 5,000 complete with the following amenities: 2 gas stations, 2 banks, 2 grocery stores, internet cafe, medical facilities, restaurants, bars.

There is a peninsula near Parrita which runs parallel to the shore creating a unique estuary condition that allows land owners to enjoy the raw power of the ocean on one side and calm river mouths accompanied by mountain views on the other.
32 ACRES

1800’
BEACHFRONT

32 ACRES
Playa Palo Seco is unique in that the peninsula’s orientation to the ocean offers two conditions. To the south, the entire beach-front is exposed to the raw power of the ocean. To the north, the entire site is bordered by the calm waters of the mangrove estuary.

The naturally created harbor condition is ideal for this program as there needs to be dock access for boats which are set up for diving tours. Views facing both directions are entirely unique from one another, and shall make for great options in the final design.
Early on in the process, I laid out a prioritized flow chart that would help focus my efforts. The outline reads, in priority from top to bottom, left to right, within each of the categories. All of the elements included herein are crucial pieces of developing a successful ecotourism destination.
Cultural Notes

THE TICO NATION

PEOPLE Costa Rica was colonized throughout the 16th century by the Spanish who found few indigenous people that could survive the European diseases brought on them.

Demographics - 4,600,000
  93% white [14% mestizo]
  around 40% in greater capital region

Ticos, as they call themselves, rank high in both the human development and quality of life indexes.

ECONOMY Known traditionally for both the production and exporting of coffee beans and bananas, their economy has undergone a major shift to tourism.

2009 - per capita GDP $10,900 USD
  inflation rate, 8.3%
  unemployment rate, 7.8%

United States - receives 24% of Costa Rica's exports
United States - provides Costa Rica with 43% of its imports
CLIMATE  Tropical. Regardless of its small size, Costa Rica boasts a number of micro-climates from the high points of mountainous regions, to their intersecting valleys and costal regions. Areas around 4,000’ (i.e. San Jose) remain around 70 degrees year-round. Low coastal areas at sea level fluctuate between 80 and 90 degrees year-round.

2 SEASONS

Invierno & Verano (winter & summer), during which invierno is the rainy season (June-November). Essentially, the seasons occur opposite on the calendar year to what the United States considers winter & summer. During Invierno, mornings are typically sunny, followed by increasing overcast conditions which develop into brief downpours in the afternoons.

Summer [Dec-May]: very little rain, avg. 72 degrees
Winter [Jun-Nov]: heavy rain, avg. 72 degrees

Sunrise - 6:00 am CST / Sunset - 6:00 pm CST

RAINFALL

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% SUNSHINE

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<td>37%</td>
<td>39%</td>
<td>33%</td>
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<td>20%</td>
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LOWS

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SOCIAL NORMS  Ticos tend to be extremely nice, overly generous, and quick to appease. Often, everyone partakes in large gatherings of friends and family for events, and especially during holidays. They take extreme pride in oneself by dressing to the nines.

FESTIVALS  Festivals occur often, and locally, throughout towns and villages across the country. One of the most well known, Festival de Verano: Transitarte (held in San Jose), celebrates the summer season with an abundance of local foods, arts, music and dance.

AGRICULTURE  Much of the landscape has been shaped by a society who initially capitalized on the fertility of their soil by establishing independently owned farms across the countries highlands.
**FOOD** One of the more famous entrees are the tamales wrapped in banana leaves. Tamales are especially sought after during the Christmas season. Perhaps the most common traditional entree is some variation of rice and beans.

**EDUCATION** Since abolishing their national army in 1948 and reallocating many of those national funds for better education and healthcare, Costa Rica has experienced major improvements in these areas. More and more graduates are attending post-secondary education every year.

**ARCHITECTURE** Some traits seen throughout common constructions include heavy use of cinder block and metal roof systems. Minimal attention to detail is an apparent issue, and the architecture, overall, is definitely of the more temporary sort.
Cultural Notes

THE TICO NATION

ON LOCATION

- food
  - lounge service (authentic cuisine)
- bar/lounge
- agriculture
  - part of the land (small scale)
- festival(s)
  - on the beach

OFF LOCATION

- food
- local restaurants
- local grocery
- festivals
- bar/lounge
- agriculture
  - local farm tours (large scale)
- festivals
  - festival de verano: transitarte
- local residents
- music
- dance
- art
A number of the previously mentioned cultural activities should feed into the program of this ecotourism destination, but by no means do I see it as an all-inclusive resort. In order to fully experience the culture, visitors will be encouraged and even guided out into the community for events, dinners, and other adventures. Promoting this idea helps support the ecotourism model.
ARCHITECTURE IN LATIN AMERICA

MAHO BAY [eco]

Virgin Islands National Park, St. John Island, U.S. Virgin Islands
Initiated 1976
Founder: Stanley Selengut
Comprised of two developments: Maho Bay Camps & Concordia Eco-Tents
Deemed as the poster child project for ecotourism

One of the greatest things about this project is that in each unit, there is a simple computer kiosk connected to that particular unit’s power converter, educating the user(s) about how much energy they have used over the duration of their stay.

I think a similar system calculating the water harvested/used in a particular unit would be very effective at an ecotourism destination where the users’ connection to water is a central theme.
In an attempt to take full advantage of the mild climate, I am interested in exploring the boundaries of the indoor/outdoor threshold. Seamless transitions from the interior to the exterior are so much more interesting when that threshold is blurred. In the case of Puerta A La Vida, this has been achieved by specifying appropriate flooring material(s) and their application. Also, a large cantilevered roof system, providing the necessary shelter, allows the sides of the space to completely open up.
[healthy living] residence
under construction circa 2011
ARCHITECTURE IN LATIN AMERICA

Pictured here, are just a few other examples of similar themes previously expressed about seamless threshold, etc. Many of the bamboo structures I found were actually superstructures with randomly allocated program spaces contained within that canopy. This seems like a very appropriate, attractive design feature, considering the climate. It also allows for more flexibly designed spaces.
new bamboo
marcelo & benjamin villegas, jimmy weiskopf

ew bamboo
marcelo & benjamin villegas, jimmy weiskopf

ew bamboo
marcelo & benjamin villegas, jimmy weiskopf

eco-banda
guludo beach lodge, mozambique
neal & amy carter-james; 2008
Process

DEFINING ARCHITECTURAL PRINCIPLES

WHAT IS THE ARCHITECTURE TRYING TO DO?

1) recreate a vernacular experience
2) make visitors feel as though they are a part of nature
3) emphasize a one-to-one ratio between the user and building materials
4) provide an accessible estate
5) offer a means of evaluating site in its entirety
DEEP OVERHANGS In order to experience a seamless transition from deep inside a private/interior space to more public/exterior space and still be protected from the tropical climactic elements (intense solar heat and heavy rainfall), a roof structure with deep overhangs provides this protection as well as serving as the physical element bridging the spaces.

AIR FLOW Structures with their intended use as inhabitable space throughout the night, or otherwise independent of unfavorable weather shall be raised off the ground to maximize air flow. The idea here is to eliminate the use of air conditioning units. Structures serving daily uses at the water’s edge can afford to have a more lightweight/temporary feel and don’t require elevation, mainly because of their intended use.

REPLACING THE CANOPY In a tropical environment, protection from the sun and heavy seasonal rains is paramount when it comes to designing overhead. In many areas a defined canopy, as well as a thick understory, dominate the landscape and provide us with a number of natural structural opportunities. Coconut palm have evolved over time so that they are able to withstand extreme winds and as a result they have developed strong/flexible properties. I see this as an opportunity to secure overhead sun-shade tarps, replacing what canopy is excavated for purposes of building and creating vistas.
Process
EARLY IDEAS
By making this move, it allows the air at those two points to remain natural.

Foundation Plan

Land/Water/Views

Hardcape

Retained/Experience

Land/Water

This I can modify; the others I can't.

10'

Style
Process

STARTING TO VISUALIZE
Process

SCHEMATIC DEVELOPMENT

single cabin

dive hut

surf hut
## Site Program

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<td>Reception/Greeting</td>
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<tr>
<td>Seating</td>
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<td>Unisex Restrooms</td>
<td>(2) 120 sq ft</td>
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<td>Diving Equipment/Instruction</td>
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</thead>
<tbody>
<tr>
<td>Single Units</td>
<td>(14) 435 sq ft</td>
</tr>
<tr>
<td>Double Units</td>
<td>(7) 550 sq ft</td>
</tr>
</tbody>
</table>

3,675 TOTAL footprint sq ft
17,180 TOTAL sq ft
## Personnel

### THE STAFF & THE GUESTS

#### DAILY STAFF

<table>
<thead>
<tr>
<th>Department</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>front office</td>
<td>1 manager</td>
</tr>
<tr>
<td>kitchen</td>
<td>1 head chef</td>
</tr>
<tr>
<td>wait staff</td>
<td>3 servers</td>
</tr>
<tr>
<td>maintenance</td>
<td>2 yard hands</td>
</tr>
<tr>
<td>housekeeping</td>
<td>1 care taker</td>
</tr>
<tr>
<td>education/activities</td>
<td>1 oceanographer, 1 dive instructor, 1 surf instructor</td>
</tr>
</tbody>
</table>

#### ecoTOURISTS

<table>
<thead>
<tr>
<th>Cabins</th>
<th>People per Cabin</th>
</tr>
</thead>
<tbody>
<tr>
<td>(14) single cabins</td>
<td>2 [+ people each]</td>
</tr>
<tr>
<td>(7) double cabins</td>
<td>4 [+ people each]</td>
</tr>
</tbody>
</table>
## Business Model

<table>
<thead>
<tr>
<th>Department</th>
<th>Staff</th>
<th>Hourly Rate</th>
<th>Hours</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front Desk</td>
<td>1 secretary</td>
<td>$9/hr</td>
<td>56</td>
<td>$504</td>
</tr>
<tr>
<td>Kitchen</td>
<td>1 lead chef</td>
<td>$18/hr</td>
<td>42</td>
<td>$756</td>
</tr>
<tr>
<td></td>
<td>1 support cook</td>
<td>$12/hr</td>
<td>42</td>
<td>$504</td>
</tr>
<tr>
<td>Servers/Bartenders</td>
<td>3 wait staff</td>
<td>$8/hr</td>
<td>42</td>
<td>$336</td>
</tr>
<tr>
<td>Maintenance</td>
<td>2 yard hands</td>
<td>$12/hr</td>
<td>42</td>
<td>$504</td>
</tr>
<tr>
<td>Housekeeping</td>
<td>1 maid</td>
<td>$8/hr</td>
<td>21</td>
<td>$168</td>
</tr>
<tr>
<td>Culture Experience</td>
<td>1 tour guide</td>
<td>$10/hr</td>
<td>30</td>
<td>$300</td>
</tr>
<tr>
<td>Education/Activities</td>
<td>1 oceanographer</td>
<td>$25/hr</td>
<td>30</td>
<td>$750</td>
</tr>
<tr>
<td></td>
<td>1 dive instructor</td>
<td>$25/hr</td>
<td>30</td>
<td>$750</td>
</tr>
<tr>
<td></td>
<td>1 surf instructor</td>
<td>$25/hr</td>
<td>30</td>
<td>$750</td>
</tr>
</tbody>
</table>

**$6,498/week TOTAL**
I felt a need to compare and contrast minimum wages to get an idea of how this resort sets up in regard to all expenses paid. After a little research, it was shocking to me how low their minimum wage is, compared with the U.S. standard. Shown here [in U.S. dollars] is the equivalent. I have calculated a rough total needed to pay-out weekly for staffing needs [opposite] based, more or less, on U.S. wage standards.
Site Plan Iterations

‘YOUTH LAGOON’

presented at the close of semester one [12/2011]
Sifting through a number of precedent studies led me to the consideration of bamboo as a primary local material for this project. Its use within Latin American architecture is relevant not only because of its availability, but also its rapid growth rate.

Throughout the past 20 years, scientists, engineers and architects alike have tested and explored material qualities, capabilities and various applications of bamboo. With regard to its rapid growth rate, and carbon offsetting qualities, it is one of the most sustainable natural building materials in the industry. Bamboo turns its life cycle in one third the time of most softwoods typically used in construction, so unlike forest plantations which are take 20+ years to develop, bamboo can be harvested for construction use in 4 to 6 years. Considering its harvesting characteristics, bamboo would be an ideal plant to incorporate into the landscape design of my site. Whereas typical softwood plantations are clear-cut, bamboo can be harvested sporadically.

“a CO2 sink embellishing the ecotourism landscape”
- Villegas
I researched numerous means and methods for using bamboo in an architecturally structural way. Most of the tools needed to work with bamboo are simple and for the most part it just requires a skilled laborer, of which there are many in Costa Rica. Upon working with bamboo myself, I found it interesting the number of variations there are for one single connection point. A few standard configurations are shown here [opposite].
SOME TYPICAL BAMBOO JOINT CUTS

- one-ear
- two-ear
- bevel
- flute
- fish mouth

minimize this distance to optimize strength.
The circular nodes which vary in distance from one to another with respect to the bamboo’s diameter are key structural elements for joinery.

Where there aren’t nodes in ideal places, a shaped wooden dowel or filed smaller-diamater segment of bamboo should be inserted for reinforcement.
The strength/weight ratio of bamboo is rare among typical structural members such as wood timbers and steel. Its tensile strength is [up to] 40 kN/cm, rivalling competing materials such as steel with a tensile strength of 36 kN/cm. 39 species of bamboo are known to exist in Costa Rica.
Ecotourism can be defined as responsible travel to natural areas which conserves the environment and improves the welfare of local people. It is generally considered an alternative to ‘mass tourism’, a concept that has slowly been swallowing our beautiful coastal regions worldwide over the past 50 years. Countries such as Costa Rica rely heavily on a steady flow of tourism to support their economy. If we can sustain a trend of developing smaller-scaled tourist destinations with lighter ecological footprints, natural areas will no doubt retain their beauty for a longer period of time. Behind this concept, I believe in an architecture that also must withstand the test of time, one that has permanence, yet responds appropriately to its surroundings.

The underlying themes of sustainable building practices and the definition(s) of ecotourism go hand in hand, and will drive the majority of this thesis study. This particular project is an ambitious undertaking as far as ecotourist destinations are concerned. It shall be evaluated at multiple levels, first looking at the users one-to-one contact with the vernacular architecture and ultimately, the social interaction(s) which take place by venturing into the local communities ensuring a connection with the native culture(s).
This ecotourism destination focuses on the users’ relationship with water. Its program promotes an oceanography genre of the ecotourism industry, one I feel has yet to fully be explored. And while an obvious need for being situated near water seemed apparent, the chosen site is actually the end-condition of an offshore peninsula along the central Pacific coast. An educational component with ties to the University of Costa Rica’s biological science department is a key part of the come/learn/experience approach at this ecotourism destination. The users’ physical interaction with the water occurs while scuba diving and/or surfing, both on-site and at nearby beaches. An additional educational component will promote the harvesting of local materials and strategic construction techniques used to validate the project. Rapidly renewable resources such as bamboo will be planted on-location, and will stake their place as dominant building materials.

The challenge in designing within the ecotourism guidelines lies in the contrast between the local/indigenous/more temporary structures seen across Latin America, and a desire for a more permanent/sustainable architecture. In the tropics, architecture must respect the canopy and what it does naturally for the land and its people. It shall create comfortable inhabitable space, conscious of the way nature’s elements perform on it, as well as with it.
Site Visit

ME & THE BEACH

eco TOURISM

costa rica
Playa Palo Seco is set in an extremely remote area of the central Pacific shore. Over the course of three days, I spent hours along the beach engaging in each of the three activities mentioned above and could count the number of people I saw during that time on one hand. Here exists the opportunity to truly become ‘one’ with nature. Appropriate architecture providing a stage for the oceanography/educational component will reveal the ecological discovery of this ecotourism destination.
smell
sight
taste
hear
feel
CONCLUSIONS

After conducting a week-long site visit covering the majority of the west-central pacific coastal region, I made a number of conclusions. Two that were the most crucial to this thesis were the idea that architecture takes a backseat to the natural landscape and vegetation, and that architecture doesn’t need to (and sometimes can’t legally) impose on areas of interest, in regard to tourism.

In short, an overpowering and unstoppable native landscape, in most cases, is what initially defines space, and architectural program is then design within that space. Secondly, while spending three days at Playa Palo Seco, it became clear that one’s connection to the ocean is more defined simply by the use each of our five senses than anything. What I had initially conceived of as a resort focused on themes of the ocean with its respective cabin-units being located as close to the water as possible, no longer seemed relevant. It was only after spending this time pacing the shoreline and enjoying the uninterrupted vistas that I understood the real ecotourism experience. It is held in that very exchange of the ocean and the land. The short journey one makes from their cabin tucked back into the dense canopy out to the sandy beach has so much to offer.
ecoTOURISM
costa rica
Site Visit

NATIVE PLANTS

As previously noted, the natural vegetation plays a major role in shaping the landscape with respect to how one moves through spaces. It is an unstoppable beast of beauty helping to stabilize the ecological structure of any one particular place. The widespread blanket of canopy along with its thick, lush understory, governs our views through places, provides home and shelter for thousands of wildlife species, and ultimately serves as a beginning template for an accompanying architecture. An architecture that is to be designed in a way which uses the features of this vast landscape to its full potential, yet not intrude on or compete with its immediate connection to the earth. Shown here [opposite], are a number of native plants and trees that would be an integral part of the site design, many of which are already present on Playa Palo Seco.

EXISTING REMEDIES

Pictured here, is the road that twists and winds down Playa Palo Seco to the site I chose. In recent years, it has been built up to protect against high tides that have been washing away at portions of the road which run close to the beach. The idea of this elevated road will eventually play into the design of the arrival sequence of this ecotourism destination.
This is a photo I took while roaming around Playa Palo Seco. It became the inspiration for proposing that there be similar **FRAMED VIEWS** of the beach or estuary from each of the cabins. The coconut palm that are harvested in order to create these vistas are to be reused in the retaining wall design for the entry plaza and communal gardens.
One arrives at this ecotourism destination via a preexisting manually built-up sandy beach road that twists and winds down a 5 mile-long peninsula known collectively as Playa Palo Seco.

It is assumed that the majority of visitors at this location are flying in from other parts of the world, so therefore, a group would be picked up from the airport by a staff member with a company vehicle. They arrive on the elevated plinth which contains the main entry plaza. This point is the furthest any motorized vehicles are permitted.

Visitors are then escorted through the main entry plaza where the ground plane transitions from the natural earth to an 18’ wide boardwalk which is elevated 4 feet. A series of incrementally narrowing boardwalks connect the first two communal pods of cabins, the dive/surf hut, and eventually the remaining secluded cabins.

One of the main ideas employed in the site design is the notion that the user doesn’t step foot on the actual ground of the site until they’ve arrived at their respective cabin and venture to the ocean’s edge on their own terms.
eco TOURISM costa rica

BIODIVERSITY EXCHANGE
DEFINE, THEN DESIGN

The ecological beauty of this site is defined along the water’s edge, that place where the ocean exchanges an entire world of biological matter overlooked by most humans. Beaches that are overtaken by mass tourism are commonly destroyed by non-biodegradable waste, the employment of uncontrolled cleaning processes, and day-to-day general intrusion by humans, vehicles, etc.

In light of designing an ecotourism destination that focuses on the site’s water attributes, it only makes sense that one would avoid disturbing the shaded area [opposite] at all costs. This will benefit the site design both biologically and visually.

After spending a few days on Playa Palo Seco, it was easy to define where the ecotourism ‘experience’ happens. It then became clear that whatever architecture happens on the site should develop around this experiential area. On the this particular site, the architectural impact happens between the two areas, becoming elongated in plan. Most literature on the topic of architecture as it impacts ecotourism destinations, in terms of built square feet, speaks primarily about a percentage of a site’s area that the architecture occupies, but doesn’t necessarily talk about density. The site plan I am proposing for this ecotourism destination incorporates a very light architectural footprint as well as an extremely dense layout, with regard to the site’s overall acreage.
There are only 3 areas of the site where the land is altered to cater the architecture. The main entry plaza and all of the cabins located in both communal gardens are built on plinths and extend out over the landscape.

These plinths only account for roughly 2.5% of the overall acreage of the site.

The architectural elements define a slight gradation across the site. As one moves along the circulation spine, the cabins decrease in density, the pathway becomes incrementally narrower, and so by nature, there are fewer people.
The visitor arrives at the entry plaza on the first of three plinths. They continue along an elevated boardwalk until they arrive at their respective cabin. It is not until this point that they step foot down onto the actual ground. And from their, they experience the beach or estuary on their own terms. A gradation in the vegetation also exists, transitioning slowly from a dense, manicured landscape to a more sparse arrangement of vegetation near the edge of the beach/tree line.

The allocation of ‘single’ and ‘double’ units helps define the gradation of privacy across the whole site.

(note: the slightly larger ‘single’ cabin located west of the main entry plaza is intended for use by a resort caretaker)
Building the site model helped define the spatial relationships between the units as well as the vistas created by the vegetation across the landscape.
looking southeast from road

looking east from entry plaza

looking down the central circulation space from the lookout/water tower
first communal garden

two adjacent cabins sharing a staircase leading down onto the ground

last grouping of cabins
boardwalk narrows to 4 feet
The central Pacific shoreline of Costa Rica experiences considerable tidal shifts throughout the day. The tides washes in and out twice daily, reaching its peak just after 12:00 noon and 12:00 midnight. Even with the shallow grade at this site, the depth of the beach from the tree line grows considerably in size during the low tide periods.

If and when the harvesting of energy from tidal shifts becomes available at a small enough scale, it would be a perfect source of alternative energy for this site. The harbor would serve as the inlet for the power carrier to make landfall, thus not disturbing the views or activities on the south-facing beach side.
The entry plaza houses the majority of all the communal program elements. While all of the programmed spaces are sheltered by a large overhead roof supported by a column grid, much of the space is completely open to the outdoor air. The kitchen, restrooms, laundry and check-in desk are all lockable spaces. The superstructure roof catches all of the necessary rainwater needed for greywater services throughout the plaza. A lookout/water tower is located adjacent to the beginning of the boardwalk as well as the kitchen/bar/seating area. Couples and families can easily catch a drink or snack from the kitchen and climb up the lookout/water tower and take in a great view from just over the palm canopy.

**GOALS FOR THE ENTRY PLAZA**

1) serve as a prominent main entry point to the site  
2) provide a communal platform for dining services  
3) enhance the user’s view of the site  
4) produce all of its own solar energy  
5) collect all the necessary water for greywater its services  
6) provide storage space for maintenance crew
eco T O U R I S M
costa rica
NTS
Entry Plaza

ARRIVAL

The majority of the entry plaza is built on a natural-earth plinth elevated to the same height as the entering beach roadway. The retaining wall that supports the plinth is constructed with select-cut coconut palm from the site. A number of trees will need to be cut in order to achieve specific views from many of the cabins. The most ecologically friendly way of dealing with this timber is to reuse it on location.

The ocean-side of the entry plaza contains the dining platform which extends out beyond the plinth creating a sort of floating feeling where one last bay of columns support the dining deck and roof structure above.
MINIMALIST APPROACH

The majority of visitors will not spend much time in their cabins. Therefore, they have been designed accordingly. Arranged within this efficient 475 square foot floor plan is plenty of room to shower, prepare small meals, sleep, and lounge outdoors. A studio-style bedroom adjoined to a semi-private washroom accounts for 250 square feet, while an additional 225 square foot porch space provides nearly as much room to be ‘outside’ as there is to be ‘inside’. The floor plan diagram below illustrates which spaces are enclosed [and lockable] and the entire area covered by the main upper roof structure.
ROOF STRATEGY A single sloped [2/12 pitch] roof structure allows for the most simple rainwater catchment system. In Costa Rica, ten degrees from horizontal is the optimal angle for harvesting solar energy from a photovoltaic panel system, so if many of the roof structures are already at this angle, less assembly hardware will be needed to install the panels. The roof is pitched toward the front of each structure to catch ocean breezes and prevailing winds, filtering them to the rear of the structure's enclosure. The [main] upper roof serves as the primary shading device and primary water diverting component.

DOUBLE LAYER Under the main roof layer, an additional ceiling is secured to the overhead transverse support beams. This double layered ceiling technique provides even more protection from heavy rainfall, intense solar heat gain, a means for channelling air flow to the back of the structure.

RAINWATER CATCHMENT Each cabin has its own 1500 gallon cistern located directly beneath the plumbing fixtures. Annual rainfall exceeding this 1500 gallon limit (overspill) is dealt with simply by diverting the relatively clean rainwater to a small gravel bed near the base of the structure and allowing it to filter back into the soil thereby recharging the local soil and fighting saltwater intrusion. A 250 square foot roof on each unit will easily fill its respective 1500 gallon cistern during the rainy season, and will also yield considerable overspill.

\[
\frac{A \text{ catchment area (square feet)} \times R \text{ annual rainfall (inches)}}{1000} \times 600 \text{ gallons} = G \text{ gallons harvested}
\]

COMPOST SYSTEM A composting toilet system is ideal considering the structures' elevated position and relativity to each other across the site. The system uses greywater collected from the structure (7.5 flushes per gallon).
This [structural] model is representative of a simple cast-in-place concrete column grid with an extending bamboo rafter system and metal panel roof. The only materials needed for the structure are concrete (utilizing long bamboo slivers for reinforcement), three varying sizes of bamboo cured for structural use (6” dia, 4” dia, 2” dia), and metal panel roofing. Joinery details for the bamboo members can be found on page 61.
Cabin

STRUCTURAL MODEL

1. U.S. Naval Civil Engineering Laboratory, (brink/rush, 1966)
2. bamboo costa rica, Oct. 2011
   <http://www.bamboocostarica.com>
reduction in boardwalk size

dlockable storage for surf equipment

lockable storage for dive equipment

retractable door facing the green space

rainwater diverting system

VIEWS/BREEZE

main central circulation
Dive/Surf Hut

CENTRALIZED ACTIVITY SPACE

Centrally located along the site’s circulation axis, the Dive/Surf Hut is the space which houses the recreational/educational activities. Daily dive instruction is provided by a local professional, and may be accompanied by research assistants from the University of Costa Rica’s biology department. Daily surf lessons are also available, taught by a local expert.

**FACING NORTH** The side of the dive hut which faces the estuary is a designated space for storing and locking any diving equipment which isn’t safe to stay on the boats. There is also a small, sheltered meeting/gathering space immediately adjacent to the boardwalk. From the hut, visitors progress down the stairs and across a similar narrow green space to the harbour docks where the boats are located.

**FACING SOUTH** The side of the dive hut which faces the ocean is a designated space for storing and locking all the surfing equipment and accessories and has a small, sheltered meeting/gathering space adjacent to the boardwalk.

The entire south facade is an operable unit which opens for full exposure. From the hut, visitors progress down the stairs and across the narrow green space to the instruction space located on the beach. This area is shaded by a large 500 square foot canvas tarp which is suspended overhead between the flexible coconut palm trees.
looking east through the entry plaza
The entry plaza is the first structure that visitors are exposed to. They arrive on the open courtyard space between the main entry building and the garage/storage building. As one grabs their gear and proceeds through the reception check-in space, this is the first view they have of 'the resort'. At this point, the ground plane transitions from grass to a 18-foot wide boardwalk which remains elevated 4 feet off the ground as it extends from the entry plinth eastward down the central circulation corridor. Visitors are also greeted by the obvious use of sustainable water catchment systems employed throughout the resort.

Routing circulation directly through the main entry plaza forces an immediate connection between the visitor and the architectural elements, sustainable systems, as well as other visitors.
entering one of the communal gardens
Think of the two communal pods as glorified flower boxes. Native trees, and various other plantings will be strategically added to the existing vegetation in attempt to create a dense garden space with no predefined pathways allowing the users to make their own way to the stairway leading up into their respective cabin.

At these two locations, cabins are arranged with their back sides to the interior of the garden space and each face toward either the ocean or estuary. Most cabins are paired by sharing a stairway which leads the visitor down onto the ground and on to the beach or dock.
arriving at the dive/surf hut
The dive/surf hut is located near the midpoint of the circulation corridor to provide seemingly equal access for all users. Other than the main entry plaza, it is essentially the only other space that is specifically organized for visitors to gather together.

As one moves along the central circulation corridor, the dense understory breaks open around the dive/surf hut and two clear, visual lanes direct the user’s view to either the surf instruction area to the south (shaded by the large overhead canvas tarp) or the docks and diving boats to the north.
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UNL FACULTY & FELLOW STUDENTS  After my first two months back in the academic world, and beginning to highly regret the move to Lincoln in pursuit of the MArch degree, I realized that it was just a new place with new faces and facilities that I needed to get used to and accept.  The breadth of knowledge present throughout your entire program has no doubt broadened my horizons in the field I am about to re-enter.

And a special thanks is in order to Tom Laging for taking on an unknown student to begin, and as it turns out, complete this year-long thesis project.  I have learned a great many things in the past eight months.

RITA RONCHI  Thank you for holding me in such high regard.  You are the most caring, honest person, and a true delight to have as a sister.  Your week-to-week support has really helped me get through these final years of school, and I wish you the best when it comes your turn.

BILL & MYRNA RONCHI  I would like to take this opportunity to put down in writing, for probably the first time ever, how thankful and appreciative I am for the support and encouragement I have received from both my parents throughout my life.  This academic milestone in my career may very well have never happened if it were not for your belief in me as a child, student, and soon professional.