ECOTOURISM
In El Carmen Tequexquitla Tlaxcala, México

Creating a sustainable tourism development for community growth
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Project Abstract

Today, as the global society becomes more mobile, our places of great beauty and environmental splendor are becoming more and more accessible, resulting in degraded natural environments and collapsing ecosystems in fragile locations. Ecotourism has been regarded as a way to introduce large numbers of people into the environment while at the same time protecting and preserving the environment. According to Oliver Hill, director of the Ecotourism Program at Conservation International, there isn’t a country where an ecotourism strategy hasn’t significantly improved the chances, politically and economically, for protected areas with significant biodiversity to be established.

With this framework in mind, this study proposes to design an ecotourism development within the community of El Carmen Tequexquitla in the state of Tlaxcala in central Mexico. This study will show the role landscape architecture can play in bringing together the roles of community, the natural environment, education, and tourism through targeting researchers, students, and tourists able to give back to the community. This development will set itself apart as a demonstration project for experimenting with sustainable technologies and sustainable development for the region. Also, within this development, an experience will be created to help visitors learn about sustainability while at the same time enjoying a wonderful tourist experience built around cultural, educational and participatory tourism.
Introduction

Eco-tourism is a hot topic within any field of design right now and one that has been getting more and more attention from landscape architecture. It has been regarded as a way to introduce multitudes of people into the environment, while at the same time protecting and preserving the environment. It also immerses people into a cultural environment and provides education and learning about the surrounding environment and landscape and in this case landscape architecture itself. This project provides a unique opportunity by not only introducing people into a unique natural environment, but also by introducing people to the ways in which landscape architecture and design can address a wide range of issues including tourism, recreation, environment, and material production to sustain ways of life in the community, such as in Tequexquitla El Carmen.

The ecotourism project is envisioned to attract tourists such as researchers, students, and those who will be able to give back to the community in the form of physical work and construction on the eco-tourism project, or through additional technology that can be used and showcased. The development itself is to be undertaken by the community, with help from visiting tourists, and is a prime example of how to use sustainable technologies and be a truly sustainable development. The development plan includes several differing habitats for various species found in the region and is designed using local knowledge of processes and techniques.
Background:

Ecotourism is a topic that has long been controversial, and landscape architecture has consistently been taking more of an interest in this topic. Ecotourism is also a broad topic and a term which is difficult to define, as there are a multitude of definitions as to what constitutes ecotourism. For the purpose of this project, ecotourism is defined as tourism which has 4 fundamental pillars: 1.) minimum environmental impact. 2.) minimum impact on and maximum respect for host cultures. 3.) maximum economic benefits to the host country’s grassroots 4.) maximum ‘recreational’ satisfaction to participating tourists. (Hetzer, 1965).

Tequexquitla El Carmen is a small town of about 12,000 people in the state of Tlaxcala in Central Mexico. The local priest and community leader, Padre Rojas, has envisioned the town as a hub for sustainable development, and as a showcase for sustainable technologies and how to apply these technologies to every day living.

The ecotourism development is just one part of the overall vision to stimulate economic growth and health which includes such other projects as a constructed wetland facility and nature preserve, the center for the optimization of regional resources and traditional construction technologies (CORTA), a merchant market bordering the eco-tourism development, and a working chinampas system. For more information on these projects, see Appendix C. The town has already started showcasing sustainable technologies with the addition of a constructed wetland to treat the municipal waste water, designed by Michael Ogden.

This review guided the research for an ecotourism project in El Carmen Tequexquitla. The literature reviewed assisted in identifying the needs and wants of the community of El Carmen in regards to an ecotourism development, identified the positive and negative impacts of ecotourism developments on environment and culture, identified components found in successful ecotourism and sustainable developments, and identified the types of tourists which frequent ecotourism developments and their needs.
Current or Proposed Projects

It is difficult to find relevant information on ecotourism developments due to the fact that there are no guidelines defining these developments and there are several resorts and other establishments which make false claims about being ecotourism destinations. One development which is a true ecotourism destination is the eco-hab project of the Instituto Nacional de Los Recursos Renovables y del Ambiente, the national park authority of Colombia. The eco-hab project uses design and materials knowledge used by the Tayrona Indians who lived in the region from the 7th to 17th centuries (Coyne, 1996). However, the project didn’t appreciate how the design and technology of the vernacular structures worked, which has caused problems. These problems include the elevations of the structures, the site placement, and the curing of thatch in traditional structures. “Eco-Lessons” brings to light that while it is very noble and right to strive for designs which are sustainable, a complete understanding of technologies and processes must be understood. The lack of knowledge in the eco-hab projects have resulted in a development which is economically and environmentally unsustainable, costing more money than is recovered and using more resources than wanted.

The eco-hab project focused primarily on individual cabins, but there are several projects which develop more site specific master-plans for ecotourism. One such project is a sustainable development plan being developed by EDSA for the Mayaguana Island in the Bahamas (Bennett, 2000). This project is similar to the El Carmen project in that it is a grassroots effort. The islanders want to create a tourism enterprise for their island, but want to avoid the negative impacts of ecological and cultural degradation (Bennett, 2000). The plan calls for five ‘boutique’ ecolodges, which vary according to the specific site in which they are situated (Bennett, 2000). Three of the lodges are limited to 40 units, while two others will be around 120 units, allowing for a 22,000 acre central nature preserve with the units spread around the 70,000 acre island (Bennett, 2000). The plan includes large permaculture gardens which use recycled wastewater and compost from the lodges to create produce which could be sold back to the eco-lodges for consumption and reduce slash and burn agriculture (Bennett, 2000).

Finally, the El Carmen project is still in the proposal stage, with limited work already begun on small parts of the vision such as a constructed wetland (Appendix C). According to the Land Design Institute, and conversations held with Padre Rojas and community members, El Carmen would like to build on this asset and create ecotourism opportunities to build up the economic viability of the community. The proposed project is a major ecological, tourism, recreation, aquaculture, bird-watching, and habitat management site (Land Design Institute, 2004). The project would include an ecological park of around 400 hectares, a wetland of 25 hectares, a bird zoo of around 25 hectares, a land based habitat of around 25 hectares, and a prairie of around 25 hectares.
All of these areas would be connected via canals and would connect with the constructed wetland and eco-village already underway as well as connect to the large chinampas system for growing food, supporting housing, recreational opportunities, and material production (Land Design Institute, 2004).

These three projects point out the importance of possessing a full understanding of processes and techniques which are vernacular to the host area when undertaking an ecotourism development. A grass-roots approach or extensive involvement of the locals is equally important for a successful ecotourism development due to the knowledge that can be gained from the local community.

**Environmental and Cultural Impacts**

Many ecotourism developments today are not as beneficial to the environment as they proclaim, and may actually cause more harm than good to the local culture and environment. Many consider Latin America to be the heartland of eco-tourism, with countries such as Costa Rica, Mexico, Brazil, and Belize capitalizing on efforts to bolster the eco-tourism trade (Nixon, 1999). However, if the ecotourism developments do not involve the local community, they in fact violate one of the fundamental pillars for eco-tourism and citizens end up having no control over what type of tourism occurs or the money these developments generate (Nixon, 1999). According to the Ecotourism Society, as much as 55% of revenue actually leaves the host countries.

If an ecotourism development exploits the host culture and community, and excludes them from the benefits of the development, it can not be considered sustainable, nor can it be considered a successful ecotourism development.

Host cultures and communities are not the only groups which can be negatively impacted. Ecological and environmental systems can be harmed by eco-tourism developments which claim to conserve them. Disturbance is a regular occurrence within eco-systems, but human interference can negatively accelerate or intensify these disturbances (Savage, 1993). Any human induced alteration on the landscape has to be carefully considered, especially within an ecotourism based model which strives to conserve the natural resources. Small changes can have large impacts, and disruptions of ecological cycles need to be included within the design.

Not all ecotourism developments have negative impacts, and some have greatly benefited their host areas. Oliver Hill, director of the Ecotourism Program at Conservation International states that he doesn’t know of a country where an ecotourism strategy hasn’t significantly improved the chances, politically and economically, for protected areas to be established with significant biodiversity (Thompson, 2000). Megan Epler Wood, president of the Eco-tourism Society also stated that at the grass-roots level, there is tremendous interest in ecotourism as a conservation tool (Thompson, 2000). However, it can also kill a community if it is not handled and designed properly.
There are cases where tourists simply should not go, fragile habitats of endangered species that simply have to be off limits (Thompson, 2000). Hitesh Mehta, from EDSA, also pointed out how important it is to learn the aboriginal approaches to the land from the locals (Thompson, 2000). This way, the design is not only improved, but the end result is better because the locals have a personal investment in the project and have their identity linked with it.

Ecotourism developments do possess the ability to harm the environment and culture they reside in. However, ecotourism is still in its early stages, and as more research and information come out regarding ecotourism, more evidence should point to ecotourism as a very viable way to protect and enhance the local environment and culture.

Ecotourism Principles

One of the largest problems in deciphering all the information about ecotourism developments is there are no concrete guidelines or principles which all developments follow. Generally, ecotourists range in age from 35-54 years old, with a 50/50 male/female split, about 82% are college graduates, and they have a high level of environmental awareness and a philosophy founded on protecting the environment (Pearson, 2002). Most people can determine a true eco-tourism development from imposters and can often see through the false claims, or ‘greenwash’, by developments claiming to be eco-friendly. Eco-tourism sites need to be identified and preserved based on ecological, scientific, economic, aesthetic, recreational, and regional concerns as well as include environmental protection, reclamation and/or enhancement in a formal plan (Pearson, 2002). Besides site specific goals, ecotourism developments should provide an economic means for the communities to live with and protect the environment (Pearson, 2002). Additionally, structures should take advantage of clustering, and maximized to use solar, hydro and/or wind energy (Pearson, 2002).

The article “A Passage to Yucatan” doesn’t detail principles or guidelines for a development, but follows the process of a group of designers performing a charrette to come up with ideas for an ecotourism development in the Yucatan Peninsula. Hans Herrmann makes one of the more interesting comments in this article, in that poverty is the most important factor in ecological degradation. The issues and principles brought to light by this charrette are that an ecotourism development needs to include proper site selection, renewable energy, on-site sewage treatment, and building with indigenous materials (Thompson, 1994). The article also brought to light that an ecotourism development takes a lot of people from differing backgrounds to tackle the multitude of issues. In this charrette, there were professionals from conservation, public policy, renewable energy, tourism planning, architecture, and landscape architecture (Thompson, 1994). Ecotourism is no cut and dry topic, and no single profession can claim is it the leading expert in it.

Hector Ceballos-Lascurain first termed the coin ecotourism in the 1980’s and further explores what considerations and issues need to be dealt with in designing an ecotourism development.
According to him, there are 9 requirements for ecotourism. They are as follows: 1.) It promotes positive environmental ethics and fosters 'preferred' behavior in its participants. 2.) It does not degrade the resource. 3.) It concentrates on intrinsic rather than extrinsic values. 4.) It is oriented around the environment in question and not around man. 5.) It must benefit the wildlife and the environment. 6.) It provides a first-hand encounter with the natural environment. 7.) It actively involves the local communities in the tourism process. 8.) Its level of gratification is measured in terms of education and/or appreciation. 9.) It involves considerable preparation and demands in-depth knowledge on the part of both leaders and participants.

The information provided above provides a great guideline for developing a plan for ecotourism development, but the guides are general and need to be considered with local conditions and the needs and wants of the community and region in question as well as the opportunities and constraints of the site.

Components for Sustainable Eco-Tourism Developments

There are several components which should be utilized in ecotourism developments, even though other components are site specific.

In Ecotourism: An Introduction, David Fennell discusses sustainable tourism, which branches into ecotourism. It uses resources sustainably, reduces over-consumption and waste, maintains diversity, integrates tourism into planning, supports local economies, involves local communities, consults stakeholders and the public, markets tourism responsibly, and undertakes research (Fennell, 1999). Fennell also discusses how the flow of local money needs to stay within the local community with the smallest amount of money lost to leakages, which is money spent on imports.

In The Encyclopedia of Eco-tourism, David B. Weaver discusses in more detail about the specifics of ecotourism. It is plainly stated in his book is that ecotourism is nature-based. Another component identified by Weaver is that ecotourism experiences are educational and interpretive about the natural environment and any associated ‘cultural manifestations’ (Weaver, 2001). The ecotourism establishments should also be sustainably managed, meeting the needs of the present without compromising the ability of future generations to meet their own needs (Weaver, 2001). The Encyclopedia of Eco-Tourism also provides several different definitions of ecotourism. The definition that seems most applicable and desirable is that given by the National Ecotourism Accreditation Program of Australia for a site to achieve an eco-tourism status. The components require that a development integrate opportunities to understand natural areas into each experience, represent best practices for ecologically sustainable tourism, provide constructive contributions to local communities, are sensitive to, interpret, and involved different cultures (Weaver, 2001). Not every ecotourism destination can always protect the environment and support economic activity, and that not every component can be met in every situation (Weaver, 2001)
Background/Literature Review

The Global Development Research Center defines sustainable tourism as an industry which attempts to make a low impact on the environment and local culture, while helping to generate income, employment, and the conservation of local ecosystems. It is responsible tourism which is both ecologically and culturally sensitive. The Global Development Research Center also defines ecotourism as tourism which focuses on local cultures, wilderness adventures, volunteering, personal growth and learning new ways to live on our planet and is typically defined as travel to destinations where the flora, fauna, and cultural heritage are the primary attractions. The website goes on to further declare that responsible ecotourism programs include elements that minimize the adverse effects of traditional tourism on the natural environment, and enhance the cultural integrity of local people (GDRC, 2005). Examples include initiatives by hospitality providers to promote recycling, energy efficiency, water re-use, and the creation of economic opportunities for local communities (GDRC, 2005).

In order to meet the environmental and conservation goals of ecotourism, a solid understanding of sustainability and sustainable developments is needed. Sustainable development is defined as meeting present needs without compromising the ability of future generations to meet their own needs (Marten, 2001). One of the most key issues in sustainable development is how to connect social systems and ecological systems. Also, the material cycles and energy flows are key components (Marten, 2001).

Within the development, waste should not exist, or should exist at a minimum. Another key component of an eco-tourism development is that the end product must not be ‘loved to death’ to the point where ecosystems collapse. Collapsing ecosystems has led to the declining profitability and degraded environmental conditions, in many of the commercial tourism developments. Two additional components of a sustainable development, are not to damage ecosystems, and do things nature’s way so that nature does as much work as possible (Marten, 2001). The main thing to remember in all this is to use nature as a guide in development and to ensure that the community uses its resources in a way that allows for the next generation to enjoy the benefits of the same resources.

Sustainability is further defined by Jala Makhzoumi and Gloria Pungetti in their book Ecological Landscape Design and Planning. According to the authors, there are two types of sustainability: technological sustainability and ecological sustainability. The former deals with issues on a global scale, while the latter observes that we can think globally but can take action locally and that it can only be achieved from bottom up, using the vernacular and traditions that evolve out of culture and place (Makhzoumi, 1999). Lastly, some important aspects to include in development of an ecotourism development are that the development is considered and studied as a system, it integrates human-related, socio-economic processes, and ecological processes and that it is responsive to existing ecosystem diversity and sustainability, natural and cultural resources, the local character of place, and vernacular knowledge (Makhzoumi, 1999).
In conclusion, ecotourism includes a wide spectrum of thought and practice, including sustainable and traditional tourism, sustainable development, economic development, and maintaining the integrity of place including the local culture and traditions. Ecotourism is also unique in that it attempts to change a place for the better, while at the same time making sure it stays the same. Ecotourism should be guided around nature and the ecological processes inherent in our environment and not around man, but man should be a definite beneficiary of the development as well. Also if done without regard to the systems it will inherently impact, ecotourism can significantly disrupt and harm the local environment, and the local integrity of the community in which the development resides. Ecotourism is sensitive on all sides and ensures that every move is calculated to maintain the social and ecological balance.
Problem Statement

This study analyzed the physical and social needs and wants of the community of El Carmen Tequexquitla as well as the environmental and cultural impacts that ecotourism developments have on their host areas. These analyses have been synthesized in order to determine an appropriate design and program for a sustainable ecotourism development in El Carmen, Tlaxcala, Mexico to benefit both tourists and the people in the community.

Project Aspirations:
1. Create an eco-tourism development that is sustainable to the community of El Carmen
2. Create a development that conserves the local cultural and natural environment.
3. Create a development which integrates ecology, tourism, recreation, production, and habitat.
4. Create a development that is desirable to tourists as a unique experience.

Project Significance

Tequexquitla El Carmen is a community ahead of its time in Mexico, experimenting with topics surrounding sustainable technologies such as constructed wetlands to treat waste and by using local materials and vernacular methods in new construction projects.

This project is significant because it is first and foremost a grassroots, community led project that can bring revenue, pride, ownership, and outside knowledge and assistance, and by being a showcase for the region of sustainable technologies.

This project also has integrated components and issues such as the local culture, environmental protection, education, and local involvement. This project has synthesized elements of ecotourism and sustainable development into an ecotourism development that is appealing to tourists and that integrates and connects tourism, ecology, recreation, food and material production, and wildlife habitat. The project highlights the roles which landscape architecture plays within our world, and the wide range of issues which landscape architecture is poised to solve. The end result is a development that is successful environmentally and appealing aesthetically and experience worthy to the ecotourist.
Inspiration and Case Studies

During the summer of 2005, I had the opportunity to spend 3 weeks in El Carmen Tequexquitla participating in a design/build project alongside many members of the community. Along with the citizens of El Carmen, we designed an ecovillage on the grounds of the constructed wetland and started construction on a prototype cabin for the development. My experience with the community and my exposure to the many projects the community wanted to undertake as well as their absolute enthusiasm and superb knowledge excited me and led me to pursue this project to continue the work started there. The projects in El Carmen, along with the following three case studies provided more than enough inspiration for the project.

Eco Paraiso - ecoresort in Celestún, Yucatán, México

Eco Paraiso is an ecoresort development in the Yucatán Peninsula that provides a concrete example of what the El Carmen ecoresort aspect of the project may look like. Eco Paraiso contains such elements as:
- Swimming, museum, kayaking, interpretive trails, cycling
- 15 cabins or cabanas
- Contained within 240 acres
- Located in a biosphere reserve
Inspiration and Case Studies

GRUPEDSAC - sustainable technology demonstration in Federal District of Mexico and the state of Oaxaca

GRUPEDSAC is a civil association to promote education and sustainable development. It is a prime example of how the El Carmen project may function as a demonstration center for the region and for Mexico. GRUPEDSAC contains program elements such as:
- sustainable technology demonstration
- community development
- educational seminars and sessions
- participation in hands on explorations of technologies

Grupo Ecologico Sierra Gorda - nature preserve located in Querétaro, México

Grupo Ecologico Sierra Gorda is a national biosphere reserve with eco-tours, sustainable education, community development programs, and land management programs. It is a great example of how the El Carmen project might be designed to integrate such programs as are shown with the Grupo Ecologico Sierra Gorda.

Images from http://www.sierragordamexico.org/es/
**Project Vision**

The vision for this project is to develop an ecotourism development nicknamed ETARA (ecológico turismo aquacultura recreativo avicultura) by the community of El Carmen. ETARA is translated to ecological.tourism.aquaculture.recreation.aviculture. The ETARA is a tourism strategy based around sustainable technologies and participating in activities for tourists based on education and pleasure. The ETARA will be connected to the vast natural resources of the region and will include an ecovillage for everyday living, recreation in the form of soccer, baseball, swimming, fishing, football, basketball, and volleyball and provide the opportunities for research in 3 differing habitats of woodland, scrubland, and wetland.

**Clients and Users**

The main client for this project is Padre Rojas, the local community priest, community leader, and visionary. He has led the charge for many community development projects.

The people of El Carmen are also clients in this project, because it is for their benefit that this development is being designed. Their input and opinion is invaluable.

Lastly, the tourists are undoubtedly users as well, for there would be no ecotourism development without the tourist. Their wants and needs as it pertains to an ecotourism destination are also invaluable.

Additionally, the ETARA project will be only one jewel among many attractions planned for the community of El Carmen Tequexquitla, including merchant markets, specialized research centers, larger nature preserves and demonstrations on practical ways to apply sustainable technologies.
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<th>Sub-Property</th>
<th>Uses &amp; Amenities</th>
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<tr>
<td><strong>ETARA Project Site – 317 Acres</strong></td>
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<tr>
<td>Constructed Wetland 37 Acres</td>
<td>EcoVillage</td>
<td>29 Housing Units, 6 Staff Lodges, 9 Demonstration Buildings</td>
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<tr>
<td></td>
<td>Agriculture</td>
<td>produce and material production, demonstration</td>
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<td></td>
<td>Wetlands</td>
<td>treatment of waste water, paths, information panels</td>
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<tr>
<td></td>
<td>Gathering Space</td>
<td>community space, programming, recreation</td>
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<tr>
<td></td>
<td>Parking Lot</td>
<td>long-term visitor parking, car and bus</td>
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<td></td>
<td>Receiving Area</td>
<td>information and orientation to visitors, small markets, showcase of goods, docks</td>
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<tr>
<td>Recreational Grounds</td>
<td>Athletic Fields</td>
<td>3 soccer fields, 2 baseball fields, 2 football fields</td>
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<td></td>
<td>Swimming</td>
<td>large lagoon like swimming area with beach</td>
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<tr>
<td></td>
<td>Athletic Courts</td>
<td>8 basketball courts, 3 volleyball courts</td>
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<tr>
<td></td>
<td>Gathering Space</td>
<td>open recreational space</td>
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<td></td>
<td>Receiving Area</td>
<td>information and orientation to visitors, small markets, showcase of goods, docks</td>
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<tr>
<td></td>
<td>Parking Lot</td>
<td>short term parking for day visitors</td>
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<tr>
<td>Land Based Habitat</td>
<td>Trails</td>
<td>gravel trails, information panels</td>
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<td></td>
<td>Research Stations (3)</td>
<td>wired stations, small cabins</td>
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<td></td>
<td>Observation Blinds (4)</td>
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<td>Exotic Bird Aviary</td>
<td>Trails</td>
<td>gravel trails, information panels</td>
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<tr>
<td>Prairie Habitat</td>
<td>Research Stations (2)</td>
<td>wired stations, small cabins</td>
</tr>
<tr>
<td></td>
<td>Observation Blinds (2)</td>
<td></td>
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<tr>
<td>Wetland Habitat</td>
<td>Trails</td>
<td>gravel trails, information panels</td>
</tr>
<tr>
<td></td>
<td>Research Stations</td>
<td>wired stations, small cabins</td>
</tr>
<tr>
<td></td>
<td>Receiving Area</td>
<td>information and orientation, one building, docks</td>
</tr>
<tr>
<td></td>
<td>Parking Lot</td>
<td>short term parking, bioswales</td>
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El Carmen Tequexquitla is located in Central Mexico nearly due south from San Antonio, Texas. It is centered almost equidistant between Mexico City to the west and Veracruz to the east, both of which are tourist hot spots. From Mexico City, it takes around 3 hours driving to arrive. El Carmen Tequexquitla lies in the far eastern corner of the state of Tlaxcala, as shown to the right. Tlaxcala is one of the smaller states in Mexico, as well as one of the poorer regions. The surrounding landscape is very mountainous, with large flat valleys that surround the mountains. It is a very remote and beautiful landscape that is starting to be recognized more and more by tourists.
The site was selected because of its proximity to the constructed wetland system and because it is land most easily acquired by Padre Rojas for use as an ecotourism development and development of the ETARA. It is located just southeast of a very major intersection connecting Mexico City and Veracruz and is located close to the town.
El Carmen Tequexquitla lies to the east of a large subterranean lagoon that is surrounded by the municipalities of El Carmen, Oriental, and Zapateca, with El Carmen being the largest. Within the regional context, El Carmen lies in a very rich area that contains 2 pre-columbian historical sites, a famous pine tree forest in the mountains north of town, and there are several meteor impacts in the region which have created beautiful blue lagoons. The capital city of Tlaxala is to the east of the site, and the historical and magnificent city of Puebla is about 1.5 hours southeast of the site. All of these regional attractions and relationships need to be considered as they will be part of a larger tourism strategy that will include the ETARA development.
The subterranean lagoon and subterranean river play a very important role in the dynamic of the site. For approximately 3-4 months out of the year, a massive underground lake raises about 15-20” above the ground surface just to the east of the site. For the rest of the year, the waters recede underneat the earth’s surface, but the water table remains a very close 3-4’ below the surface. The underground river which runs underneath the corner of the site feeds the underground lagoon and has a flow of around 30 L/s. Water and the movement of water play a vital role within this environment.
The site is extremely flat and contains little to no vegetation, but the conditions are right for it and contains a lot of potential.
The site is surrounded by farmland to south and east. Tequexquital production to the north, and scattered residential to the west.

Fairly remote location with close ties to El Carmen and the main highway connecting Mexico City and Veracruz.
Analysis

Winds from Oct. – Feb.
Winds from March-June
Subterranean River – potential water source

Opportunities and Constraints:

Site contains regosoles, cambisoles, litosoles, salenchakes, fluvisoles meaning that the soil tends to have a high salt content and is flooded quite often. Plan for flooding and choose salt tolerant vegetation.

Underground river runs under the southeast corner of the site which could be used as a water source for a contained lagoon or to feed canals.

The site lies within in a flat valley, so plan for cold air to rush down off the mountains in the evening. Organize living spaces to shield against large temperature differentials.

The area receives around 17” of rain per year and has an temperature range of an average low of 42.6 F to average high of 71.24 F. Create spaces to maximize shade and also sun.

The elementary school and proximity of neighborhoods creates the opportunity for a tight connection to the community as well as educational programs.
The organic concept divides the site up in a very non-linear manner and treats edges very loosely.

**Benefits:**
- Easy to maintain
- Habitats are more ‘natural’ and are naturally confined
- Has the feel of a non-designed landscape, mother nature’s design

**Cons:**
- Doesn’t connect itself to the constructed wetlands
- Ecovillage is lacking any structure or arrangement of spaces
- Doesn’t connect the entire site with itself
The geometric concept divides the site up into 4 quadrants plus the constructed wetlands. Everything has a very defined edge and the boundaries are not blurred.

Benefits:
- Very easy to divide up site
- Seamlessly connects with the linear constructed wetland system
- Simple to assign uses and user groups to spaces

Cons:
- The natural habitat parcels are too rigid and feel like a manicured landscape
- Out of context with the surrounding farm and pasture land
- Site is almost too divided, still not connected with itself
The combined concept looks to reconcile the cons of both the organic and geometric concept while at the same time not losing the benefits. It creates a progression of space from very geometric to more organic.

**Benefits:**
- Constructed wetlands and areas with heavy human use are very geometric and easy to understand and divide into uses.
- Areas with a heavier natural and conserved focus are more organic and not heavily ordered or divided up.
- The site progresses from one end to the other, connected by anchoring both ends of the site with a natural or constructed wetland.

**Cons:**
- Some areas still don’t match with the surrounding context.
The master plan for the ETARA development further developed the combined concept. The site was divided with an emphasis on the ecovillage, recreational parcel, woodland habitat, scrubland habitat, and natural wetland habitat. The entire site is connected via trails and canals, with a few access roads to bring in visitors from the main highway or from town. Within the ETARA, visitors can engage the site by exploring it through it’s trail systems or by navigating the channels.

Trails throughout the site link visitors to small research stations and blinds to observe wildlife. The ecovillage and recreation grounds are very active as far as human activity is concerned, and thus are grouped together and slightly separated from the rest of the site. Access into the site occurs at the far western edge of the contracted wetland grounds and at the western and eastern edges of the ETARA site.
The ecovillage is the hub for all visitors to ETARA. It is here that the tourists will live, sleep, eat, and work. They will participate in demonstration workshops as well as participate in traditional cultural festivities and arts. A central marketplace to showcase the communities assets and services is key, as is connection to the existing constructed wetlands. The grounds contain plenty of opportunity to explore and learn, with many native landscapes and interconnected systems of production and harvesting that tie in the entire site. Also, community members from El Carmen live within the village, providing a one on one interaction with the local community. The village is a mix of private cabins and personal space with public gathering and demonstration spaces to ensure a healthy variety of places.
Aerial view of the Ecovillage
Aerial view of the entire ETARA site looking east across the ecovillage and recreational grounds.
The canals are an integral component to the design of the ETARA site. The use of canals is modeled after the ancient ‘chinampas’ system of production used by the Aztec Indians. The canals are only about 6’ deep and serve to bring water from the high water table to the surface and provide the habitat parcels with adequate water as well as to serve as natural barriers between the parcels to preserve the integrity of each parcel. The canals will also be a living habitat full of fish species and other aquatic life that the community can harvest and use. The canals also have recreational value by allowing boating, canoeing, kayaking, and fishing within them.
In order to fully utilize the canals as natural barriers, permanent crossings were avoided. Instead, a system of floating docks that can be pushed or pulled across the canal on a pulley system have been created, allowing for a unique experience and for creating a sense of place and arrival with each individual parcel of habitat or use.
The trail system consists of gravel trails through the woodland and scrubland habitat and elevated boardwalks to guide visitors through the natural wetlands. The system allows tourists to interact with the surrounding environment without disturbing it by keeping them on designated and marked trails.
The recreation parcel is a vital link between connecting the tourists and the community members of El Carmen. Everyone loves some good outdoor activity, and this 70 acre parcel is devoted solely to providing recreation for the tourists and providing ample recreational opportunities for the community as well. Within this parcel there is swimming, basketball, volleyball, fishing, soccer, football, baseball, and just general open space for whatever other forms of recreation can be thought up.
Receiving Docks

The receiving docks are the entrypoint into the ecovillage if coming from the main highway. It creates quite an entryway, as the tourist arrives on boat. The docks are also the critical link between the ETARA site and the constructed wetland and ecovillage site. It is a hub of activity, with information and receiving centers on either side and a large central pool in the center for all the water related recreational activities to start from.
The merchants market is the central gathering place for the residents of the ecovillage. It is a place to see what is going on for the day, to purchase crafts made by locals and by other tourists in demonstration projects and hands on activities and it is a place to simply sit and relax and a grab a bite to eat from one of the vendors selling some cultural bites. It is the centerpiece of the village, centered on the main road between the two information centers.
Merchants Market

Section through the center of the merchants market

Mid-day in the merchants market

Section through the center of the merchants market
The streetscape is one of the most unique and personal touches of the ecovillage. The individual cabanas are all unique, as they are all created by different groups of tourists. The streets are lined with cacti forming living fences and the roads themselves are little more than compressed gravel walkways. All of these add up to a very personal scale that makes any tourist feel comfortable and at home within the limits of the ecovillage. A walk through the village is also an interactive learning lesson, with all many differing technologies and plant life showcased.
Streetscape

Walking out of the merchants market to the information center

Section of a typical street in the ecovillage
The individual tourist cabanas are a unique experience to the ecovillage. As the village grows, each tourist group will have the opportunity to design and build a cabana for another tourist group. This will contribute to a truly eclectic arrangement and assortment of cabins, as well as ensuring that each cabin is utilized as a learning process. The cabanas will be constructed using local materials, traditional knowledge, and a modern twist of creativity to make the cabanas desirable to the modern day tourist. Each cabana should house 3-4 people and provide for a living space and bathroom and provide for a small outdoor private space.
**Assorted Details**

Canal and lake details

Cabana details
To achieve its goal of being a sustainable ecotourism destination, the materials and people of ETARA need to be closely watched and ensure that they form cycles and loops that are closed and utilize waste at every possible turn so that positive feedback loops are created such as shown here. Every process and item produced is tied back into the ETARA development as a positive element.
ETARA is a progressive development and one that will be built up by years and years of visiting tourists and hardworking community members. These visual timelines are to help see how the development may grow through the years. In the first 5 years, construction would be on the information centers and some scattered staff and tourist cabanas. In 10 years, the development would focus on the market and accompanying demonstration buildings along with additional cabanas. Finally, in 15 years, construction would emphasize finishing all the cabanas and creating shelters and an observation tower for use in the recreational grounds.
Conclusion

ETARA is a place for the tourist to walk away with an experience rich with educational learning, sustainable technology knowledge, and cultural sharing and understanding. An experience unparallel to any other tourist experience available and an experience that combines the best of educational tourism, ecotourism, and pleasure tourism. The ETARA is a place to learn to live and live to learn.

Tequexquitla El Carmen is a progressive community that knows the importance of sustainable design and teaching others how to practically use these design principles. The masterplan and subsequent development of ETARA only furthers the status of El Carmen as a trend setter and a town willing to take bold risks in the right direction. The design process has resulted in several concepts which have been synthesized into an appropriate site plan that maximizes the opportunities of the site and capitalizes on connections to other portions of El Carmen.

As this project, and others continually progress in El Carmen, more research and work will need to be performed on the additional projects mentioned in Appendix C. Ecotourism will continue to gain more press and recognition as people continue to move into beautiful and unprotected areas of our planet. With the addition of ETARA, El Carmen is taking a very positive leap in the right direction.
Appendix A: Definitions

1. Eco-tourism: as defined by Hetzer, 1965, will be: tourism which has minimum environmental impact, minimum impact on and maximum respect for host cultures, maximum economic benefit to the host country’s grassroots, and maximum recreational satisfaction to participating tourists. Also, as defined by the Global Development Research Center, eco-tourism specifically stresses ownership by locals, and focuses on interpretation and learning experiences.

2. Eco-tourists: for this project, will be the tourists visiting El Carmen for the purposes of learning more about sustainable technologies and participating in the educational opportunities El Carmen will have to offer.

3. Sustainable: as defined by Marten, 2001, sustainable means being able to meet present needs without compromising the ability of future generations to meet their own needs.

4. Cultural Impacts: those impacts which will alter the local culture and traditions of the host community and those impacts which will alter the daily life of residents.

5. Environmental Impacts: those impacts which will alter the environment around El Carmen, including but limited to; water quality, air quality, noise pollution, ecological disturbances, and over-use of the natural resources of the area.

6. Local Resources: those resources, both physical and human, which can be utilized in and around the community of Tequexquitla El Carmen, Tlaxcala, Mexico.

7. Permaculture: a diverse, complex ecosystem where the elements interact in mutually beneficial ways to produce a whole which is greater than the sum of its parts.
Appendix B: Research Bibliography


Ceballos-Lascurain, Hector. Tourism, ecotourism, and protected areas. SADAG: France, 1996


Nixon, Ron. “Green Travel.” Hispanic 13 May (1999)

Pearson, Larry. “Nature bound: ecotourism principles are an important guide to developing and maintaining the increasingly popular ecotourism resort destinations,” Urban Land 61 Aug. 2002 56-60


The International Ecotourism Society, www.ecotourism.org


Weaver, David B. The Encyclopedia of Ecotourism. CAB International: United Kingdom, 2001
Appendix C: Additional Materials

Research Questions for Padre Rojas

What are the soil conditions?
¿Cuáles son las condiciones del suelo?

What is the water table condition?
¿Cuál es la condición de la tabla del agua?

What specific types of birds and animals are envisioned?
¿Qué animales y plantas en específico se prevén?

What specific types of plant and tree life are envisioned?
¿Qué plantas y árboles en específico se prevén?

Is the chinampas system to be connected to the ecological park?
El proyecto de chinampas ¿está conectado al parque ecológico?

Is a market wanted along the highway?
¿Se desea un mercado o área comercial en la carretera?

What uses are envisioned within the development?
¿Qué usos se prevén durante el desarrollo?

Is agriculture part of the plan? If so, what kind?
¿La agricultura es parte del plan? Si es así ¿qué tipo?

What are the climate seasons?
¿Cuáles son las estaciones del clima?

Are tourists expected to visit year-round?
¿Se espera que los turistas visiten todo el año?

What types of tourists are expected? (students, researcher, pleasure, age-range?)
¿Qué tipos de turistas se esperan? (Estudiantes, investigadores, diversión, ¿edades?)

What activities are expected for the eco-tourism development?
¿Qué actividades se esperan para el desarrollo del eco-turismo?

Will the eco-tourism development be linked to CORTA (training and research center and extension)
¿El desarrollo del eco-turismo estará relacionado con CORTA? (centro de entrenamiento e investigación)

What will the merchants market house?
¿Qué tendrá la case de los comerciantes?
Appendix C: Additional Materials

Sampling of plant life to be used in ETARA

Agave horrida, Agave salmiana – cactus
Nolina longifolia (Mexican Grass Tree/Sotol) – cactus/succulents, great accent plant
Yucca filifora (St. Peters Palm/Izote) – trees/cactus/succulents, dark green foliage
Dasylirion acrotriche (Green Desert Spoon/Palma) – cactus/succulents
Opuntia hyptocantha, Opuntia robusta (Prickly Pear/Nopal) – cactus/succulents
Mammaliaria magnimamma (Mexican Pincushion/Biznagga) – cactus/succulents
Buddleia perfoliata (Wooly Butterfly Bush/Salvia de Bolita) – medicinal herb
Bouvardia ternifolia (Scarlet Bouvardia/Trompetilla) – evergreen shrub, bright red flowers
Pinus Cembroides (Stoneseed Pinyon/Pino) – small to large evergreen shrub or tree
Schinus molle (California Pepper Tree/Pirul) – large evergreen tree, small leaves
Pinus oocarpa (Ocote Pine/Ocote) – grows in mountainous regions
Ligustrum lucidumaiton (Glossy Privet/Trueno) – large evergreen shrub, small tree, moderately drought tolerant
Cedrus spp. (Cedar) – large columnar evergreen, drought tolerant
Eucalyptus spp. (Eucalyptus) – evergreen with silverfish leaves, drought tolerant
Salix babylonica (Weeping willow/sauce lloron) – deciduous tree, lots of water
Populus nigra (Lombardy poplar/Chopo) – decidous fase growing columnar tree, deep watering
Morus nigra (Black mulberry/Mora de arbol) – fruit producing shrub
Appendix C: Additional Materials

El Carmen Community Development Project*
El Carmen Tequexquitla, Tlaxcala, Mexico

*Adapted from the work of Dr. John Motloch of Ball State University, Dr. Pedro Pacheco of Instituto Tecnológico y de Estudios Superiores de Monterrey and the Ball State University graduate students in Landscape Architecture.

Overview and Purpose
El Carmen is a town of 20,000 people located east of Mexico City along the interstate between Veracruz and Mexico City. The town’s very location, along with its precious assets make it a prime spot for the development and conservation suggested by this document.

The main goal of the development of El Carmen is to provide the locality and the larger region with an environmentally based community development model that will enhance the environment along with restoring it while providing better resources to the people of the area creating a better and more fulfilling way of life. The development of the area will focus on sustainable practices that will culminate in the new and refurbished construction. The development is to have an educational tone that will help explain the purpose of the development itself and how the technologies practiced here could be implemented in other localities within the larger region.

Although the main beneficiaries of the development are the people who live here, above all else, they are the ones who are going to be living here and all design and development decisions should be made with this in mind. The travelers and researchers who will be drawn here are to be thought of in terms of how they will contribute to the community and its future along with the future of the region as a whole.
Community Profile
A clear hierarchy exists among the population of El Carmen. Father Jose Rohas is the man in charge of everything going on in the town and he is highly respected and well thought of by the town’s people, thus anything happening or planned within the community must go through him because he truly represents what is in the best interest of the people.

Community Organization
- Father Rojas as Religious and Community Leader
- Youths
- Farmers
- Other Community Leaders and Activists
- Artisans
- Schools and Educators
- Businesses
- Network of organizations to defend and promote community resources
Appendix C: Additional Materials

Community Assets
A variety of assets have been identified by the various groups that have visited the area. Clarification and additions to this list that has already been made is below.

Habitat
- Regional habitat being naturally regenerated once wastewater pollution of the wetlands has been corrected by building the constructed wetland wastewater treatment plant
- Regional habitat being rebuilt or enhanced by Padre Rojas’s plantings

Flora
- Regional flora characterized by the abundance of grasses and cacti (nopal, agave, and other varieties).
- New plant material being introduced by Father Rojas in the surrounding land of the sewage treatment plant.

Fauna
- Regional fauna returning to the watershed as a result of the environmental improvement of the area, including naturally regenerated habitat and habitat being rebuilt by Padre Rojas.
- Fish being produced in the wastewater treatment facility.

Locations and Attractions
- The watershed and its expansive natural wetland for the chinampas project
- The colonial town including indigenous and colonial architectural styles and practices
- The pre-Hispanic site in the hills above the city
- Cantona, the pre-Hispanic ruins north in the state of Puebla near the town of Tepeyahualco
- The large meteor/asteroid craters in various locations just outside the town
- The waste-water treatment plant
- The existing commercial area created by the interstate road (includes the main intersection with the interstate and state road leading to Puebla)
- The aquaculture research center
- The natural springs and associated community washing site adjacent to the watershed area
- “soza caustica” extraction sites (to produce soap)
Appendix C: Additional Materials

Locally Available Materials/Technologies

Material to produce soap (soza caustica)
Byproducts of the waste-water treatment plant (carrizo, tule which is used for crafts and chairs, tulquete used for bedding, treado used for animal fodder, cattle grass, garden grass, vegetables, flowers, fish)
Cactus (maguey, nopal) includes cualote, the item of the maguey plant used as framing structures for building
Stone
Sillar
Adobe
Ceramic clay
Sand used in pottery (Tequexquite)
Centeno

Crafts

Mats out of palm
Baskets out of carrizo and reeds
Pottery
Weaving
Painting by Father Rojas
Furniture, room dividers and other handcrafts out of Tule, a tall grass produced locally

Farming Practices

Current government programs being introduced to help families increase their income.
Testing of new crops and alternatives methods by Father Rojas around the sewage treatment plant.
Wind erosion is extreme due to poor farming practices where all vegetative matter is removed from the fields and in the winter wind picks up what little soil remains on the fields. Education of the farming public is necessary to maintain a sustainable farming industry in this area.

Food

Traditional dishes and candy prepared by community residents using local resources
Eco Tourism Area

Overview
According to Padre Rojas, there are plans to develop a five hundred hectare (+/-) site to include an ecological park (400 hectares), a wetland (25 hectares), a bird zoo (25 hectares), a land-based habitat (25 hectares), and a prairie (25 hectares). All these areas would be accessed by water channels as in the chinampas system. These areas will be public and subject to investment. The idea is to commercialize the products harvested from these sites. This project is based on the following principles.

Integration of Ecology, Tourism, Recreation, Production, and Habitat
This eco-tourism project integrates ecological, tourism, recreation, aquatic production, agricultural production, animal habitat, and site management.

Integration of Tourism and Productive Systems
This project integrates tourism into the site’s productive systems. Visitors recreate through experiencing the site’s metabolic systems, symbiotic relationships, and productive landscapes.

Integration of Community Resources
This project provides exciting eco-tourism experiences through the integration of the El Carmen community’s physical, biologic, material and human resources.

Integration of Productive Systems, Development, Site Management, and Eco-education
This eco-tourism project enhances the site productive, develops value-adding industry based on sustainable harvesting (food, materials), manages the site for enhanced health and production of its metabolic systems, and educates the eco-tourist about these systems, productivity, sustainable harvesting, and healthy people-environment relationships.

Tourist Gateway into the Network of Projects
The Eco-tourism Project introduces tourist into the network of five projects contained in this report. It introduces people from within and outside the local region to a new vision of the relationship of people and nature’s productive systems, and informs them about learning more about El Carmen’s people-environmental relationships, harvesting from local productive systems, and products they may purchase (food, flowers, crafts and building materials) that have been sustainably harvested from these systems.
Appendix C: Additional Materials

Location
The El Carmen Eco-tourism Project is located along the South side of the highway from Veracruz to Mexico City. It is on the left as one enters El Carmen from the Vera Cruz side.

Concept
The El Carmen Eco-tourism Project is a major ecological, tourism, recreation, aquaculture, bird-watching, and habitat management site. This site extends for several miles.

Ecological, Tourism, Recreation, Aquatic Production, and Bird Habitat Project
As one approaches El Carmen from the Vera Cruz direction, the Eco-tourism Project contributes to a truly unique aquatic gateway. Looking to the left along this gateway, the visitor sees first the large lake and then a major ecological, tourism, recreation, aquatic production, agricultural production, and bird habitat project. Two and a half kilometers into this gateway, the visitor arrives at the Embarcadero, complete with services, a restaurant, a hotel and commercial shops. This embarcadero gives boat access into this ecological, tourism, recreation, aquatic production, and bird habitat area. Traveling three or four kilometers through this 400 hectare area, the visitor arrives at a series of habitat “islands”, each surrounded by water and building upon what is there already. Each is more than 600 meters long and 500 meters deep. The first is a wetland habitat. The second is home to a population of rabbits, fox, and other land-based animals. The third is a zoological area with more exotic birds for consumption, including ostrich and emu. The fourth is an educational island complete with information module overlooking the existing lake. This module includes education and demonstration of the uniqueness and high productivity of natural wetlands and chinampas.

Research
The El Carmen Eco-tourism Project is part of El Carmen’s integrated research program that seeks to raise understanding of the interconnection of people, nature’s productive systems, sustainable harvesting, and value-adding processes that enhance local resources and quality of life. This includes understanding of the benefit of El Carmen’s traditional technologies as a case-study of the types of integrations that other communities in Mexico and throughout the world could be achieving.