A MODEL FOR SUSTAINABLE LIVING

LOS CARRIZOS ECOVILLAGE IN SAN MIGUEL DE ALLENDE, GUANJUATO, MEXICO

By: Melina Smith
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BY

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SENIOR PROJECT
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INTRODUCTION

THIS CHAPTER WILL EXPLAIN THE FOCUS, GOALS, AND METHODS OF THIS SENIOR PROJECT. FURTHERMORE, IT WILL INTRODUCE THE ECOVILLAGE DOCUMENTED IN THIS PROJECT, LOS CARRIZOS.
FOCUS

This senior project is focused on examining the inner workings of ecovillages. This includes the social, economic, community, and sustainable aspects of these off-the-grid communities. Furthermore, the economic aspects of ecovillages will be highlighted at an even greater depth. This examination will occur both through the evaluation of case studies, and also through an in-depth, first hand account of an ecovillage, Los Carrizos, located on the outskirts of San Miguel de Allende, Mexico.

METHODS

This first hand account of the Los Carrizos Ecovillage was made possible through a two week stay in the village. I stayed in a completely off-the-grid shipping container on the land. During this time, I participated in the sustainable practices such as composting, water catchment, solar energy, dry sewage system, and crops. Furthermore, I conducted an interview with a man who, with his father and his sister, started the village. Since the project’s inception, the intention has been to create a final product that would both fulfill the Cal Poly senior project requirements, as well as contribute to the efforts, and provide a documentation of Los Carrizos as desired by the community members. The information contributing to this project has been acquired through research on ecovillages from the Global EcoVillage Network, Case Studies of economically independent Ecovillages in New York and Germany, and the experience in Los Carrizos.

GOALS

As desired by community members, providing a documentation of the Los Carrizos Ecovillage, assessing the process from planning through implementation.

Provide a discussion and recommendations to address the question, “How can ecovillages sustain themselves economically without compromising the ethics and values of ecovillages?” or “How can ecovillages sustain themselves economically while maintaining autonomy from the global economy”

Evaluate lessons learned and takeaways from the Los Carrizos project.
THIS CHAPTER WILL DESCRIBE ECOVILLAGE. EXPLAIN THE TIES ECOVILLAGES HAVE WITH THE GLOBAL ECONOMY, AND INTRODUCE THE SITUATION OF RESOURCE CONSUMPTION IN SAN MIGUEL DE ALLENDE, MEXICO.
The Los Carrizos ecovillage is located in the central state of Guanajuato, Mexico (See Figure 1). To better understand the current pressures facing Guanajuato’s water supply, the historical development of the area must be considered. The vulnerability of Guanajuato to water availability is a side effect of a combination of different political and social factors that have intensified socioeconomic inequalities, and ignored the availability of water.

As stated in the article, *The Politics of Regional Water Management: The Case of Guanajuato, Mexico*, by Carmen Maganda, the Bajío region in which Guanajuato is located, had the highest population density of New Spain. This was due to the availability of mining resources and the infrastructure created around the mining industry. Furthermore, Guanajuato is in the center of the country, giving it a geographical advantage, which led to a rapid expansion of urbanization (Maganda, 2003, 390). During the 17th and 18th centuries the population grew rapidly, which resulted in a diversity of employment ranging from textile workers to agricultural labor. During this time the agroindustrial activity started to boom (Maganda, 2003, 391). The agricultural activities counted on investment and labor to “create irrigation systems, multiple irrigation channels, canals, and dams to irrigate scattered areas” (Maganda, 2003, 392).
In the 1940’s and 50’s demographics began to change due to the implementation of heavy infrastructure for the purpose of industrial development. With this came a movement known as the “Green Revolution”, which brought with it a plethora of agricultural activities, farmer subsidies, and the construction of the Allende dams for irrigation purposes (Maganda, 2003, 393). This led to the construction of large dams in Guanajuato, which paralleled the simultaneous organization of irrigation districts.

The 1960’s brought with it heavy agroindustrial growth when horticulture activity and fruit production began to be exported (Maganda, 2003, 393). A large petrochemical industry was developed in the region, reinforcing activities such as intensive agriculture and leather products manufacturing. As stated by Maganda “Government strategies focused on agricultural exports because of the area’s comparative advantages, such as climate, cost of labor, access to land, and the availability of water, giving the region its reputation as an environmental bonanza” (Maganda, 2003, 394). In addition, the political agenda attempted to incorporate the state of Guanajuato into the world economy. Unsatisfied with the support for agroindustry, politicians decided to invest in heavy industry (Magdanda, 2003, 394). The rapid industrial expansion was able to take place due to support from federal, state, and local policies, which was a compromise between the use of water resources and the activities of the growing industrial sector. Unfortunately, the government did not adequately consider the consequences of the subsequent effects of the urban growth of commerce and services (Maganda, 2003, 395).
In 1990, Guanajuato’s average growth rate was 1.32% which is higher than the national average of 1.22% (Maganda, 2003, 396). This growth in the industrial sector was a result of “an incongruent development bet made by the state of Guanajuato, without taking into account the availability of water resources” (Maganda, 2003, 296). Though development brought about significant advancements to national production and the local economy, it also created contamination and overexploitation of the region’s natural resources, especially water. The government’s vision of urban development only considered the visible outcomes, and did not take into account more geologic concerns, such as underground hydrology (Maganda, 2003, 400). As stated by Maganda “Since the 1970’s, the Bajio region...has had only 30% of Mexico’s water resources, compared to 70% of the nation’s industry” (Maganda, 2003, 395). Since 1995, the state’s aquifers have been overexploited, and the situation is being exacerbated by the increasing needs of the growing urban industrial industries (Maganda, 2003, 396).
CURRENT PRACTICES

THIS CHAPTER DISCUSSES THE CURRENT PROBLEMS WITH GROUNDWATER EXPLOITATION IN THE STATE OF GUANAJUATO, AND THE CURRENT PRACTICES FOR ADDRESSING THIS PROBLEM.
THE PROBLEM:

Eighty percent of Mexico’s population lives in the central and northern region where less than 20% of the available water is located. Guanajuato state, where San Miguel is located, contains 4.5 million inhabitants (Sandoval 2001). With its rapidly growing development, Guanajuato is vulnerable to pressure for water in the upper parts of the Lerma-Chapala Basin as a result of the abstractions of groundwater for Mexico City’s supply (Sandoval 2004). There is an existing deficit of nearly 200 hm per year in surface runoff, which is due to the difference between the flow that reaches the state from upstream sources and the downstream flow. According to estimates conducted by the State Water Commission, the greatest hazard affecting the state’s development is the 1,200 hm/year deficit in groundwater (Sandoval 2004).

On the institutional side, growing budgetary and human resource restrictions have made it increasingly difficult to deal with the complex, scattered and constantly transforming phenomenon of deep well drilling (Sandoval 2004). Apart from the lack of capability to monitor, measure, and initiate legal procedures against illegal extractions, the regulatory system is constantly burdened because of the difficulty of and the time needed to administer these procedures. Furthermore, due to the inadequacies in the legal framework, the federal water authority often loses legal cases against those who drill new wells without authorization, extract illegal amounts of water, or fail to install metering devices according to law (Sandoval 2001).
THE PROBLEM:

Groundwater is the main water supply source throughout the state, supporting 99% of domestic water use, 60% of agricultural production, and all the industrial demand in the state (Sandoval 2004). With almost 17,000 wells, Guanajuato carries 25% of the country’s deep wells. As a result, the groundwater overdraft is being seen in a yearly water level drawdown for 2-3 m, creating some pressing problems.

These problems include an increase in operation replacement costs for communities and industries who are depending on groundwater. Furthermore, the withdrawal of water containing arsenic, iron, magnesium, and excess salinity from natural sources, growing vulnerability, and land subsidence problems.

The issue of groundwater exploitation is facilitated by economic triggers and technological evolution. The accessibility of increasingly efficient deep-well pumps with large power networks, along with the public policies of decentralization and the “green revolution”, are outrunning a slow developing legal framework and weak law enforcement mechanisms. Figure 6 shows the evolution of deep well drilling in Guanajuato State (Sandoval 2004). Paradoxically, within the three time periods in which deep-water-well drilling has been banned throughout the state, the number of deep wells has nearly doubled (Sandoval 2004).

CURRENT PRACTICES

Figure 6: Dynamics of demographic water scarcity. Water availability (m3/person/yr)

Figure 7: Record of deep well construction in Guanajuato State.
THE PROBLEM:

In the northern part of Guanajuato, where San Miguel de Allende, the municipality in which Los Carrizos is located, ninety-nine percent of the water consumed comes from an underground reservoir known as the Independence Aquifer. The Independence Aquifer water basin, and the municipalities it serves, can be seen in figure 8. According to Caminos de Agua, a non profit working with water consumption in Mexico, the aquifer is deteriorating at a rapid pace (Caminosdeagua.org). The wells are drying up, and the remaining water may contain arsenic and fluoride levels that are eight times the recommended limits from the World Health Organization. Figure 8 graphically displays flouride levels often found in the aquifer. The culprit of this crisis can be attributed to an unsustainable over extraction of groundwater for agriculture that is exported to the United States.

Roughly 85% of the water pumped from the aquifer goes to crops like broccoli, bound for markets in North America. This has forced wells even deeper into mineral-rich “fossil water”, where the arsenic and fluoride lie (Caminosdeagua.org). The exporting of the finite water supply coupled with lenient water policies, and the expansion of agriculture is placing Guanajuato in an increasingly pressing water crisis.

Figure 8: Geographic Location of Guanajuato
Source: CaminosdeAgua.org, 2016.
THE PROBLEM:

The World Health Organization suggests that fluoride levels should not exceed 1.5 (mg/l). Levels as high as 18.2 and 17.3 are often found in the Independence Aquifer. Children are at the greatest risk as their growing bodies absorb these minerals at a much higher rate, and exposure to high fluoride in utero has shown severe impacts on children’s mental development later in life.

**Figure 9:** Fluoride Levels in the Independence Aquifer
Source: CaminosdeAgua.org, 2016.
Before Los Carrizos can be discussed, it is important to evaluate the current initiatives taking place in Guanajuato. To try to address the pressing issue of groundwater exploitation, a state water program has been set in motion that is furthering efforts towards integrated management, an initiative that began in 1995 and led to the development of the state water plan that was presented to the federal government in 2000.

The Guanajuato government in upgrading to implement an intense program for investing inefficient water-use technologies as well as organizing and supporting water users. In addition to water savings, two dams are being projected for the purpose of bringing in nearly 150 hm per year to the state (Sandoval 2001). Additionally, close to 90% of the urban wastewater will be treated to aid in creating water exchange programs and conserve water resources (Sandoval 2001). This program was funded to “achieve a multi-institutional improvement that extends from the enhancement of monitoring capabilities and the development of mathematical models, to the introduction of training, legal, financial, and cultural transformations” (Sandoval 2001). Figure 10 displays the scope of the program.

Figure 10: Conceptual Model of the State Water Program
Due to the breadth of this project, the implementation is highly complex. Reclaimed water serves to supply cities by adding to their current groundwater sources through exchanges of untouched water for treated wastewater. Furthermore, this is achieved through the direct reallocation of water rights. This effectively increased the treatment capacity from 54% in the year 2000 to 82% in the year 2006 (Sandoval 2001). A crucial aspect of the water reclaimed from agricultural modernization from wastewater recovery also serves for “reinventing base flow” in rivers and conserving water resources.

Concurrently, the bigger cities Guanajuato such as Leon and Celaya, are requiring the state to create two major water importation projects- one from Rio Verde in the state of Jalisco, and the other from Rio Santa Maria, to the North (Sandoval 2004). Figure 11 displays the populations of cities in Guanajuato from largest to smallest. The results of this have not yet been reported, however it was predicted that these projects would bring 150 million m^3 per year to Guanajuato (Sandoval 2001). This resulted in relatively expensive water. This simultaneous program is aimed at creating an enabling environment for integrated water management. This program has identified the groundwater issue as the fundamental problem because it presents a major hindrance to the state’s future development and, in the near future threatens the public supply of water. To approach this issue, the program is supported by a technical, social, and institutional foundation.

Figure 11: Largest Cities in Guanajuato
Source: http://www.citypopulation.de/Mexico-Guanajuato.html
POLICY:

Technical foundation for Groundwater Management

Prior to implementing the technical program, the knowledge of distribution, availability, and behavior of groundwater sources were analyzed and brought up to date (Sandoval 2001). Following this, a technical program was setup to make a systematic evaluation of the state’s aquifers. This consisted of a thorough inventory of existing deep wells, analysis and construction of the hydrogeological framework, water quality characterization, and mathematical transport models for 14 study areas (Sandoval 2001). This led to nearly 15,700 deep wells being registered and classified based on their characteristics and use (Sandoval 2001). Figure 12 displays a map showing well quality throughout Mexico.

With regards to water quality, monitoring networks are being created for the varied study areas based on a catalogue of potential sources of pollution and water quality surveys. Pollution vulnerability models and maps have been developed for three of the study areas (Sandoval 2001).

Figure 12: Overexploited Aquifers and areas of Salinization (Fig 6-7 of Geo-Mexico, all rights reserved)
Source: http://geo-mexico.com/?p=5320
CURRENT PRACTICES

Social Foundation: COTAS Approach

The COTAS approach is the second foundation for a more effective groundwater approach being implemented in Guanajuato. This approach includes the implementation of 14 groundwater user’s associations (named “technical water councils” or COTAS) which join together to in a state water-user’s council, and are designed to grow towards integrated water management units. The state government has supported each of these 15 organizations since 1998 (Sandoval 2004). The COTAS (see figure 13) are essentially consensus-building organizations where integrated water management models and programs are to be designed and carried out.

Figure 13: Structure of COTAS.
COTAS are Multi-Stakeholder platforms at an aquifer level aimed at organizing users in aquifer management councils to reach agreement on reductions in extractions. All water users of an aquifer can become a member of COTAS, it is multi-sectoral. There are 14 COTAS + 1 coordinating institution, which is the Consejo Estatal Hidraulico, Guanajuato (http://agua.guanajuato.gob.mx/cotas.php). The 14 COTAS groundwater user’s associations can be seen in Figure 14.

**Figure 14:** COTAS Associations
**CURRENT PRACTICES**

**Social Foundation: Outputs of COTAS**

1.) Technical support to users
2.) Studies and mathematical models of all aquifers
3.) Institutional development
4.) Communication of a “water culture”
5.) User-oriented Services

**Social Foundation: COTAS Challenges**

The COTAS model poses two main challenges to the usual approach to groundwater management in Mexico:

1.) Regardless of whether or not the requirement of a strong technical foundation is taken into account as a basis for an adaptive management model of the system, the model is designed to depend more heavily on social agreements based on the best science available (Sandoval 2001).

2.) Typically, user participation is limited to temporary exercises where governmental technical areas gather people’s views, organize them, and select the most appropriate ones based on the technical vision of the experts. However, the COTAS from Guanajuato are creating a permanent area of interaction where each organization has the opportunity to set up its own agreements, obtain funding from the sources available, and adjust themselves to the conditions in their own context (Sandoval 2001).
CURRENT PRACTICES

Institutional Foundation

Though there have been huge efforts made by the federal government to register, control, and regulate the water-rights allocation systems, it appears that groundwater management sector of institutional settings is being overlooked. This is not only a federal problem with regards to corruption and lack of managerial coordination, but also the lack of a monitoring and control system has eroded many opportunities for building social agreements (Sandoval 2004). In the political context, COTAS efforts have not always been successful, however they have certainly pushed all government levels to find alternatives for handling particular problems of their regions. Much of the difficulty comes from trying to achieve long-term policies supported by concrete short-term actions in a context where continual political change is the norm.

The State Water Council is taking control of a progressive concept of water information management through the center for hydrometric and climatic information (Sandoval 2004). This will give them the chance to create and sell specific services that are useful for irrigation forecasts and improve public access to water information (Sandoval 2004). This is a very controversial function of these users associations for two reasons. One because there are many risks associated with having an independent source of climate and hydrological information.

The second being that the because of the deviation that it can represent in terms of the fundamental function that was thought to be the COTAS’ main role. The COTAS groundwater management model is a technical and organizational foundation designed to be instrumental in reaching the goal of slowing down if not reversing groundwater depletion rates in Guanajuato. COTAS was created bearing in mind that this could result in the establishment of a local organization which is reliable and morally authoritative enough to effectively perform a set of concrete actions that will achieve real results in terms of aquifer renovation (Sandoval 2004).

Conclusion

Guanajuato’s groundwater-management model seeks to broaden the scope of public participation through merely consultative services. These services are aimed at establishing a permanent space to facilitate cooperation and communication between water users- who are empowered enough to carry out local initiatives, and authorities- who play a secondary role of financial and technical supporters, instead of being mere one-sided regulators. The issue of groundwater exploitation can, and should be addressed by governmental policies, however, this document will discuss the impact that independent communities such as Los Carrizos can have on such issues.
THE IDEA

This chapter will introduce the concept of ecovillages and the sustainable qualities that ecovillages support as a possible solution to resource exploitation.
According to the Global Ecovillage Network, an ecovillage is “an intentional, traditional or urban community that is consciously designed through locally owned participatory processes in all 4 dimensions of sustainability (social, culture, ecology, and economy) to regenerate social and natural environments” (GEN 2018). GEN has reached out to nearly 10,000 communities on all continents, through their research they have found that there are three core practices shared by all. These practices include:

-> Being rooted in local participatory processes

-> Integrating social, cultural, economic, and ecological dimensions in a whole systems approach to sustainability.

-> Actively restoring and regenerating their social and natural environments

(GEN, 2016)

Figure 15: Los Carrizos landscape
Source: Melina Smith
THE IDEA

ECOVILLAGE PRINCIPLES:

• An Ecovillage is not a specific outcome, but a continual process. Each ecovillage is a place of continuous growth and exploration of how to achieve a regenerative future.

• Ecovillages are not designed by anyone except the communities themselves.

• Ecovillages focus on more than just ecology. Though many ecovillages start with a focus on the ecological aspect, preservation and restoration of nature can only be achieved when there is a resilient social fabric, an inclusive cultural climate, and people find a way to integrate their appreciation for the planet with their need to economically sustain themselves. Evidence has shown that with time, ecovillages will naturally develop to encompass the four dimensions of sustainability.

• Ecovillages are not reserved for the elite. Some of the most marginalized communities are ecovillages. Ecovillages in wealthier countries typically focus on lifestyle simplification in order to bring ecological impacts below local and global carrying capacities. Ecovillages in less affluent countries typically focus on preserving precious low-impact traditions, while improving living standards.

(ECN, 2016)

ECOVILLAGES & SOCIETAL TRANSFORMATION:

Ecovillages help to implement the UN’s Sustainable Development Goals and climate agreements on local levels. Many social innovations developed in ecovillages can be modeled after, and local solutions to global challenges can add up to create impactful and positive societal transformation (GEN 2016).
Ecovillages encompass a holistic approach to sustainability, integrating the Social, Cultural, Ecological, and Economic dimensions of existence. Many ecovillages employ participatory processes in order to blend ecological, economic, social, and cultural dimensions of sustainability in order to regenerate social and natural environments. Please see figure 15 for a visual of the four dimensions of sustainability.

Figure 15: Global EcoVillage Network Dimensions of Sustainability
Source: https://ecovillage.org/projects/dimensions-of-sustainability/
Social Sustainability

Ecovillagers actively seek to create a collaborative and open environment, while ensuring that community members feel empowered and listened to. Ecovillages often facilitate social inclusiveness, and thus sustainability, through communal projects, common goals, and community relationships, while simultaneously celebrating each member’s uniqueness (GEN 2017).

Cultural Sustainability

Ecovillages facilitate cultural rejuvenation and preservation by encouraging people to empower and care for each other, their communities, and the planet. Celebration, art, dance, and other vehicles of creative expression are often embraced as a fundamental aspect of a thriving community. Respect for cultural traditions that support human dignity is of utmost importance to ecovillage principles (GEN 2017).
4 DIMENSIONS OF SUSTAINABILITY:

Ecological Sustainability

Ecovillages aim to access food, shelter, water, and energy through methods that respect and preserve the cycles of nature. Their intention is to integrate humans with the rest of nature in a way that increases biodiversity and regenerates ecosystems, and that provides people with the opportunity to experience their interdependence on the cycles of nature directly (GEN 2017).

Economic Sustainability

The economic sustainability of ecovillages relies on a sharing of resources, mutual support, and strong local economies and networks that cater to the needs of local people and ecosystems. Most ecovillages ardently work to give sustainable alternatives to the mainstream economy and monetary system. Furthermore, they aim to think about prosperity as something that is inclusive with all aspects of life, not just monetarily. Central to the economy of many ecovillages lies local currencies, sharing, social entrepreneurship, circular economy, and collaborative forms of ownership (GEN 2017).
THE PROJECT

THIS CHAPTER INTRODUCES THE ECOVILLAGE PROJECT, LOS CARRIZOS. INCLUDED ARE INTERVIEWS CONDUCTED DURING A TWO WEEK STAY IN THE VILLAGE.
The Los Carrizos ecovillage is located in the town of Sosnabar. Sosnabar is a small rural town on the outskirts of the municipality of San Miguel de Allende, in the state of Guanajuato, Mexico. Sosnabar contains 1,035 inhabitants.
The demographics of Los Carrizos are as follows. There are 493 men, and 542 women. The rate of child rearing, is 3.34 children per woman. Only 0.48% of inhabitants are from outside the state of Guanajuato. In Sosnabar, 13.82% of the inhabitants are illiterate. 10.5% of them are men, and 16.79% of them are women. Employment rates show that 23.19% of the inhabitants are economically active, 34.89% of them being men, and 12.55% of them woman.

In Sosnabar, there are 220 dwellings. 92.92% of the dwellings have electricity, 87.26% have piped water, 41.98% have toilet or restroom, 78.50% have a radio receiver, 82.55% a television, 2.83% a personal telephone, 1.89% a landline telephone, and have 1.42% internet access. Figure 16 shows the percentages of people who do not have basic amenities.

(https://en.mexico.pueblosamerica.com/i/sosnabar/)
The town is mostly rural. With large plots of land surrounding the main square. Los Carrizos is located approximately 10 miles from the main square, on a four acre parcel of land. There are six existing adobe structures on the land, including one shipping container used as a living space. The structures include homes of the inhabitants, a store, a therapy office, and a supply structure. There are also two straw built public restrooms. There are currently three families living on the land, consisting of twenty people total on the land. It is a small village that is trying to grow.

This summer, I spent two weeks living in the shipping container. While here, I tended to the crops, maintained the water catchment system, learned about the solar energy, spoke to community members, and conducted one formal interview with a man who, with his sister and father, started the village. The first part of the interview I will introduce, is the social and political standpoint that sparked the idea.
**MOTIVATION FOR THE PROJECT:**
This section of the interview identifies the motivation behind starting the Los Carrizos ecovillage. The interview was conducted on September 2, 2017. The interviewee is the son of the family who began the village. His name is Atahualpa Caldera.

**Me:** “What Motivated the idea of the Los Carrizos village?"

Atahualpa: “We were tired of seeing the destruction that comes about from living in the city, and as a family we wanted to live more in contact with nature, and leave the big city.”

**Me:** “Was there a political and social position with this idea?”

Atahualpa: “Yes, We didn’t see how an ecovillage would fit or work with this corrupt capitalist system. We wanted to live outside of it. Mexico’s capitalist environment is extremely corrupt with its politicians, and we didn’t want to have anything to do with it.”

**Me:** “Do you think ecovillages in general make a political declaration?”

Atahualpa: “Right now yes, because its an autonomous form of living without the government, and it helps the immediate surrounding communities.”

**Me:** “Did the existing environmental and social conditions affect the idea of the ecovillage?”

Atahualpa: “Yes, neoliberalism in Mexico has led to the privatization of many of our natural resources. Things like water, especially in Guanajuato are scarce. We did not want to be relying on the government who has so much to do with making this scarce to be providing us with things that are necessary for life.”
CHOOSING THE LAND:
This section of the interview discusses how Atahualpa and his family went about choosing the land, and the first steps to starting the village. The interview was conducted on September 2, 2017. The interviewee is the son of the family who began the village. His name is Atahualpa Caldera.

Me: “What were your first steps in starting the village?”

Atahualpa: “Our first steps consisted of finding the land, we wanted to be close to a city for access, culture, hospitals, services, and most importantly security.”

Me: “Where were geographic aspects that contributed to your the location chosen for Los Carrizos?”

Atahualpa: “Yes, first we did not want to be in a flood zone. We wanted land that was flat and secure, and one where we could catch water. We wanted to be far enough to be secluded, but close enough to the city for access and security.”

Figure 18: Entrance to Los Carrizos
Source: Melina Smith
THE PROJECT

Figure 19: Entrance Directory

Figure 20: Part of the land

Figure 21: Road within the village

Figure 22: Part of the land

Source Figures 19-22: Melina Smith
CONSTRUCTION:
This section of the interview discusses how Atahualpa and his family constructed their homes, and he describes the sustainable aspects of the village. The interview was conducted on September 2, 2017. The interviewee is the son of the family who began the village. His name is Atahualpa Caldera.

Me: “Please, describe the materials and techniques used for constructing the village.”

Atahualpa: “All the structures are made from adobe, the roof is from the land too, the cement inside the homes is madera from the land, we used blocks found in Sosnabar for other things, and various materials from whatever was close. For this region, Adobe made sense because it is dry here. We used a lob technique for building with the adobe.

Me: “Please describe you sewage system.”

Atahualpa: “Our system is dry toilets, we then use the waste to fertilize the land.”

Me: “Is your sewage and energy system completely off the grid?”

Atahualpa: “yes”

Me: “How do you capture water? Is your water system completely off the grid?”

Atahualpa: “Rainwater is caught on the roofs, and then it is stored underground in cement water holding containers. We catch rain during the 6 months of the rainy season, and this is sufficient enough to last during the 6 months of the dry season. I have never run out of water. Yes, it is entirely off the grid”

Me: “Is all of your electricity and energy off the grid? Is it entirely solar powered?”

Atahualpa: Everything is solar powered and solar heated. Each house is independent, if one runs out of electricity the other is fine.
Figure 23: Community toilet with dry sewage

Figure 24: Solar Panels

Figure 25: Water catchment from the shipping container

Figure 25: Community consulting structure made of adobe

Source Figures 23-25: Melina Smith
Me: “What is expected in terms of contribution of those who live in the community? Has this changed since you started?”

Atahualpa: “We encourage everyone to cultivate what they can and maintain their place. Maintenancing our land and homes is a lot of work and everyone is expected to take care of their water, solar, and cultivation. It has changed, there are more activities now since the beginning. There are more things we want to do with the village, like more cultivation.”

Me: “What challenges do you face when finding new people to join the community?”

Atahualpa: “Finding people that love nature and are willing to live communally. People that live here need to be willing to share, and not live so independently, we all rely on each other.”

Me: “What is the daily maintenance of life here? With regards to water, solar, the land ect.”

Atahualpa: Cleaning the bathroom, taking care of the garden, feeding the animals, and checking on the solar equipment, are usually things that happen daily. There are often things that need to be painted or fixed. There is always a task

Me: “How does the community connect with each other? Is there interaction with the surrounding communities?”

Atahualpa: “We see each other in passing, we connect a lot with the surrounding communities. Not formally, but we help each other out. I would like there to be more of an effort amongst everyone to have gatherings.”
Figure 26: A view of most of the houses in the community

Source: Melina Smith
**ECONOMICS:**
This section of the interview will discuss the economic aspects of the village. The interview was conducted on September 2, 2017. The interviewee is the son of the family who began the village. His name is Atahualpa Caldera.

*Me:* “What do you think are the economic impacts of an ecovillage? Either with regards to yourself or with the rest of the community surrounding the village?”

Atahualpa: If working well, it is a way to earn money while also helping all the people that live here and in the surrounding community. We all cooperate. If one of neighbors is sick, my sister (who makes herbal medicines) will go help. We share food, and we help each other with the trades we know. Instead of hiring people to do things, there is someone in the village that knows how to do it. It is a circle of helping people, and not just in the village, we are very involved with the community in Sosnabar as well.

*Me:* What do you find to be the greatest economic challenge?

Atahualpa: “It is difficult for us all to commit to having the ecovillage being our main source of income. We all still have to go into the city everyday for work, and we don’t have time to focus on cultivation, or getting the educational courses and work away started. It is all our goal to be sustained off the village, but just getting started is hard. My sister was selling her medicines from here for awhile but wasn’t getting enough business. So she opened up a place in San Miguel, where she makes a lot from, but she still has to go into the city everyday which she doesn’t want to do. Its conflicting for all of us, because the purpose of this village is to be independent from the government, but we still need the city for money. So I guess the greatest challenge is getting started.”

*Figure 26:* The cultivated part of the land, here they grow Milpa, a plant that is corn, bean, and zucchini all in one. They also grow chia and amaranth.

*Source: Melina Smith*
Figure 27: The house of Atahualpa’s sister, Citlali

Figure 28: Communal seating area

Figure 29: Side view of Atahualpa’s house

Source Figures 27-29: Melina Smith
**FUTURE:**
This section of the interview will discuss future plans for the village. The interview was conducted on September 2, 2017. The interviewee is the son of the family who began the village. His name is Atahualpa Caldera.

Me: “Do you have plans to grow? Either geographically in size, with the amount of members in the community, or economically?”

Atahualpa: “Yes, I would like to grow with more people, but with more people comes more problems. I would like more people to be here to help with maintaining the land, and in order to grow we need more people.

Me: “In general what expectations of living in the ecovillage have changed? What has stayed the same?”

Atahualpa: The social part is more difficult than any of us would have expected, whenever there is someone new the whole dynamic changes, and we are all living so closely it needs to be harmonious. The expectation that has stayed the same is the peace of living so in contact with nature.

Me: With the ecovillage, do you have other economic or educational goals?

Atahualpa: My sister and I would like to have educational courses here, like on sustainable practices. I want to build some cabanas so people can come here for a work away type of thing. If we do this we can cultivate more, which is ultimately the goal. We would really like to be completely sustained from food on the land. We would also love to have schools come and visit on field trips or something. We are open to many things. For these types of things we also need to be in agreement amongst the whole community which is a challenge.
Figure 30: Atahualpa’s Backyard where the interview took place.
Source: Melina Smith
THIS SECTION ANALYZES THE LOS CARRIZOS ECOVILLAGE. TOPICS COVERED ARE WATER CONSUMPTION, ECONOMIC AUTONOMY, AND RECOMMENDATIONS FOR IMPROVEMENT.
As explained earlier in this document, the water situation in the state of Guanajuato is riddled with contamination, scarcity, and political arguments. Los Carrizos practices rainwater catching as their sole method of collecting water. Each house on the village catched their own water, so if there is an issue with one house it does not affect the other. In the adobe homes, water is caught in Rotoplas containers (see figure 31) on the roof of the home during the rainy months (June-October). This rainwater is funneled into cement or adobe storage basins beneath the house. These storage basins keep the water cool and uncontaminated. At certain points the containers must be adjusted, or sometimes due to wind the amount they capture can be affected. However, as long as they are monitored these problems can be avoided.

According to Atahualpa, a founder of the village, the water he catches in the wet months has always been enough to last him in the dry months. He has never ran out of water, and this is also the case with other village members.

Los Carrizos is successful in separating themselves from the water crisis in Guanajuato. They do not outsource for water, and every member of the village actively participates in the water catching process. The only aspect of this that keeps them tied to the global economy is the use of the monopolized water catcher containers, Rotoplas. To further secure themselves as a self sustaining village, a recommendation is to make their own water catchers, ideally with the use of recycled materials.
ECONOMIC AUTONOMY:

One major component of a self sustaining community, is being economically independent from the greater global economy. This means having the ability to earn money through methods perpetuated only by the village itself.

Economic independence is a facet of the ecovillage model where Los Carrizos experiences the most difficulty. The nearest city to Los Carrizos is the tourist-packed San Miguel de Allende. San Miguel is an upscale tourist destination where many locals travel to for economic purposes. According to Atahualpa, many people in the village, out of necessity, travel to San Miguel everyday for work in some way. They use the money made in San Miguel for upgrades on the village, however the time spent in San Miguel takes a lot of time away from focusing on self-sustaining economic methods. He describes this as being the greatest challenge faced at Los Carrizos.

Another founder of the village, Citlali, once had an herbal medicine store in the Los Carrizos, however due to lack of foot traffic, she was forced to move her store to San Miguel. I believe there is an opportunity here. Her store in San Miguel is very central and receives many visitors. Almost all of the visitors are tourists who are taken by her traditional medicinal practices and shopping there feels like an authentic experience. One way in which Los Carrizos could benefit from this, is if Citlali promoted the village in her store. She could offer tours of the plants that she creates her medicine from, or offer herbal classes that take place in the village. Community members within the village could help with transport, and the other aspects that would go into making this happen. This would start to move the work into the village, and maybe she could eventually re-open her store in Los Carrizos.

Another way in which Los Carrizos can start shifting the work into the village is through partnering with education programs. Cal Poly partners with a school there called Los Arcos. This school has study abroad programs for Architecture and City and Regional Planning. Los Arcos focuses on integrating the students into Mexico, and providing them with an authentic experience. Los Carrizos has components that are directly relevant to both architecture and City and Regional Planning. They could partner with Los Arcos, and give students tours, educational classes, and eventually provide a type of situation where the students stay there and partake in their methods for an amount of time.

I received the opportunity to stay at Los Carrizos through a lecturer I met at Los Arcos who temporarily lives in the village. I found the ecovillage to be so interesting that I suggested that the architecture studio who was at Los Arcos at the time take a tour of the village. They did, and they really enjoyed it. Therefore, I believe this to be a viable method to start bringing more income into the village.
CONCLUDING STATEMENTS:

Overall, for a small ecovillage, Los Carrizos has been successful in being self-sufficient in many ways. Their sewage, energy, and water is entirely off-the-grid. There is opportunity for improvement in their methods of producing income and food. Though, they do cultivate their land, and their basic food (corn, beans, squash, chia, and amaranth) come from this cultivation, village members still seek outside sources for foods such as meat and dairy.

Before more cultivation and cattle raising can take place, their economic independence and inflow of income will have to be established. They can begin small shifts, such as providing tours, classes, and partnering with local schools. Eventually they can adopt more systemic and sophisticated methods such as becoming a part of a cooperative for long term economic autonomy.

The next section provides a more in-depth discussion about economic and ecovillages and examines two economically independent villages.
THIS SECTION ADDRESSES THE QUESTION: “HOW CAN ECOVILLAGES SUSTAIN THEMSELVES ECONOMICALLY WHILE MAINTAINING AUTONOMOUS FROM THE GLOBAL ECONOMY”
Ecovillages are economically distinct from most local economies around the world in that they tend to display a unique type of clout and perseverance. There is a wide variety of economies throughout the world of ecovillages. There are some who use no money internally and have a single account for handling community member’s cash. To others, which have complex bureaucratic structures with intricate money flows to help them navigate the national legal systems, while attempting to maintain autonomy from the greater economy. The situation of maintaining economic autonomy, and sustaining a village economically without compromising the goals and values of ecovillages, is a complicated one.

The economy of many ecovillages consists of artisan crafts, products, local organic cheeses, wines, and produce, and most predominantly ecotourism and education. Though compared to mass industrialization and consumerism these methods of financial subsistence are relatively low impact, they are still inextricably tied to the greater global economy. For example, non-formal education is the greatest producer of income for many ecovillages, yet in order for prospective students to access these ecovillages they must leave behind large air-mile carbon footprints behind them (Slater 2016).
These issues make it difficult for ecovillages to initiate a new paradigm of economic behavior. Where mass-produced goods continue to cost less than those locally made and sourced, how can ecovillages find a way to sustain themselves and simultaneously cut ties with the global economy? Is there no possibility for a middle ground between integration into the global economy and cutting all, or most links with it? Identifying such a path can be described as the “Holy Grail” for ecovillages (Dawson 2006).

There have been a few responses to this dilemma that are discussed here:

**MUTUALITY:**

Mutuality as a means of cutting ties with the global economy can be described as follows. Mutuality is the idea of mutual support amongst groups who aim to cut ties with their dependence on the capitalist system (Dawson 2006). Here, lucrative worker-owned enterprises use their profits to start up, and support other enterprises also owned by their workers.

This is also known as a cooperative. Cooperatives are supported by the mutual backing within producer co-ops, consumer co-ops, credit co-ops, as well as co-ops for marketing, health, insurance and many other crucial goods and services.

Two characteristics of the cooperative movement are particularly important for contemporary reasons:

- First, by ensuring one vote per investor, it grants democratic rights in the economic sphere, which is generally dominated by capitalists (Dawson 2006).
- Second, the co-op movement enables owners of cooperatives to make decisions based on factors other than maximizing short-term profits (Dawson 2006).

Early co-operators focused on concerns that are predominantly social in nature. Such as, improving working conditions, getting better access to food, and strengthening communities. Today, there is a strong emphasis on environmental protection and restoration. So how would an ecovillage economy borrowed from the cooperative experience look?
Through policy:
England has created an Industrial Provident Society, which is a legal form established under the earliest piece of cooperative legislation, to permit members to invest in community-owned enterprises and initiatives. Through this, over a million dollars has been raised from community members and supporters for investment in community initiatives, including a buy-out of the community store, the purchase of wind turbines, and investment in affordable housing (Dawson 2006).

Potential issue:
In today’s globalised economy, policy on a larger scale will have to take place in order for true change to take place. A crucial step is to acknowledge that individual ecovillages on their own are much too vulnerable to the gravitational pull of the global economy. The boundaries of mutuality must reach well beyond the limits of the ecovillage. This is only achievable if ecovillages consciously identify themselves in the economic realm as belonging to a family of initiatives much larger than themselves (Dawson 2006).

Two case studies are looked at to further this discussion.

Three steps for ecovillages:
1. Identify themselves as belonging and of service to something larger than themselves alone
2. Create alliances with partners with which they can work bioregionally
3. Develop ties specifically of economic mutuality

Two case studies using the cooperative model for a means of sustaining will be looked at to further this discussion.
CASE STUDIES

THIS SECTION EXAMINES TWO CASE STUDIES: SIEBEN LINDEN, AND ECOVILLAGE AT ITHACA. THESE ARE MODELS OF ECOVILLAGES THAT USE THE CO-OPERATIVE METHOD TO SUSTAIN THEMSELVES ECONOMICALLY.
Okodorf Sieben Linden was established in 1997 in the Almark region of Eastern Germany. The property is around seventy-seven hectares. Since 1997, the village has grown to around eighty adults and thirty children. The project was initiated by a psychologist and a professor named Jorg Sommers who was very influenced by ideas of communes and communal projects (Gesota 2008). Sieben Linden was chosen as a case study because of its unique organizational structure and use of the cooperative movement for economic stabilization.

Organizationally speaking, Sieben Linden has three main legal bodies:

**The Settlement Co-operative:** The responsibility of the Settlement Co-operative is to acquire land for Sieben Linden, and to incur other expenses for the community not to exceed its total capital base. Every person who is accepted into the ecovillage contributes between 11,000 euros (13,500 dollars) and 15,000 euros (18,400), to the settlement co-operative. The settlement co-operative is run by a Board of Directors which is an elected body (Gesota 2008).

**The Housing Co-operative:** The housing co-operative is also run by an elected body of a board of directors. Its main responsibility is to construct and finance housing for the residents. The homes are constructed by the housing co-operative through various means: federal funding, low interest rate bank loans, capital accumulated by the settlement co-operative, and private loans from private individuals. The loans are then paid off with the rent paid by residents.

**The Freundeskries Oekodorf Co-operative:** This is a non-profit body of Sieben Linden residents and friends/supporters of Sieben Linden. This non-profit is responsible for public relations, organizing seminars, conference, and an education program.
Beyond these legal bodies, the community is organized in a co-operative form:

**The Food Co-Operative:** This co-operative is responsible for acquiring food for the residents over and above what is grown at Sieben Linden, as locally as possible and in accordance with the season.

**The Visionary Circle:** This is a group of people who meet once a month to discuss current issues at Sieben Linden from a high level and assess its shared vision and beliefs and discuss its higher aims and general strategy. Apart from these, the ecovillage is organized into several working groups comprised of volunteers who are responsible for day to day operation.

**ECONOMICS:**

Economically, one of the goals for self-sufficiency was to be as independent of bank loans as possible, especially for purchase of land. Apart from the initial contribution to the settlement co-operative, the residents make a monthly contribution to the housing co-operative for rent for their housing and the settlement co-operative for using communal resources. This is used to pay for utilities, and chefs. Furthermore, a small rent is paid for the use of communal rooms (Gesota 2008).

The Freundeskries Co-operative organizes seminars and conferences which results in income to the community as well. There is a combination of individual income and shared income. Certain neighborhoods within the ecovillage, such as Club99, practice a shared economy. Individually, residents follow different professions, some residents run small businesses from the community, and some work as freelance consultants or have jobs outside (Gesota 2008).

The general strategy is to recycle income from the residents within the community as often as possible. For example, when they are building homes, some people employed for construction are people from within the community. Therefore, the capital that goes towards building the houses is recycled back into the community. This recycling of income is an important part of the economic sustainability of the community. The community looks for ways to get state funding, however, they are not dependent on any state funding (Gesota 2008).
Sieben Linden relies on a complex system of co-operatives to organize and economically sustain their village. They seem to have been successful at cutting all, or most ties with the global economy. The lack of dependence on state funding allows them to be economically independent. A closer look at the small businesses that individual residents run from the community will need to be analyzed to a deeper extent in order to make the conclusion of whether or not they are completely independent from the global economy. However, their system of specified co-operatives offers a promising example for using the idea of mutualism as a means for achieving this autonomy.

**Figure 33:** Cooperative Cultivation Practices at Sieben Linden
Source: https://www.gordonwelters.com/portfolio/photography/ecovillage-sieben-linden/

**Figure 34:** Cooperative Grocery Store at Sieben Linden
Source: https://www.gordonwelters.com/portfolio/photography/ecovillage-sieben-linden/
EcoVillage at Ithaca (EVI) is located on 175 acres of land the finger lakes region of upstate New York, just 2.5 miles from downtown Ithaca. It was initiated in 1991, and founded by a non-profit organization called EcoVillage at Ithaca- Center for Sustainability Education. Their primary goal was to educate the public on sustainable living through the model of an ecovillage (Walker 2012).

The village is comprised of an intentional community and the non-profit educational organization. There are 109 adults and 58 children who live at the ecovillage. EVI works on developing an alternative model for suburban living, which provides a satisfying, healthy, and socially rich lifestyle while minimizing ecological impacts. It is the largest and one of the most well known ecovillages in the U.S., and is recognized internationally for its pioneering work in developing a mainstream ecological community that appeals to the middle-class, while cutting resource use by more than 40% (Walker 2012).

EVI focuses on co-operative relationships and programs between Cornell College, Ithaca College, and the County in order to economically sustain itself.
ECOVILLAGE AT ITHACA

**CASE STUDIES**

**COOPERATIVE FUNDING PROGRAMS:**

**Center for Transformative Action at Cornell (CSE):**
The center for transformative action serves as a fiscal sponsor. CSE works with students and researchers, often by utilizing the "living laboratory" of the village and its small farms. It provides tours to over a thousand visitors annually.

**Science of Sustainability:**
This is a curriculum developed for Ithaca College, paid for by a grant through the college.

**Groundswell Center for Local Food and Farming:**
This is a program developed by the EVI that recently won a major USDA grant to teach beginning farmers all aspects of starting small farms.

**County Project:**
EVI partnered with the Tompkins County Planning Department to apply for, and receive an EPA climate Showcase Communities grant which started in April, 2011. This three year grant will enable project staff to study lessons learned from the past twenty years of developing the Ecovillage at Ithaca, and apply these lessons to the three pilot projects in Tompkins County. An important overarching goal of the grant is to find ways to replicate this successful and unique project in the context of more mainstream development (Walker 2012).

![Figure 36: Students from Cornell learning cultivation practices at Ithaca.](http://ecovillageithaca.org/)
CASE STUDIES

ECOVILLAGE AT ITHACA

CONCLUSION:

Ecovillage at Ithaca manages to economically sustain itself through educational programs and partnerships with its county. It is a model of an independent community living within a mainstream city, but supporting itself without capitalist methods. The Ithaca model is promising for ecovillages that seek to gain a greater autonomy from the global economy, while also making a contribution to the emergence of steady state economies. It must be noted that Ithaca college and Cornell college are inextricably tied to the global economy and perpetuate values in contrast to those of ecovillages. However, EVI is providing educational services to spread ecovillage values. Whether or not receiving funding from these colleges excludes EVI from being a candidate for being a model of an economically independent community is subjective. Regardless, the concept of education and partnering with a local government are ideas that should be further explored as a means of economic independence.

Figure 37: Cooperative Cultivation Practices at Ithaca.
Source: http://ecovillageithaca.org/
THIS SECTION DISCUSSES ECOVILLAGES AS A MODEL FOR RESOURCE PRESERVATION IN MODERN CITIES, AND OPTIONS FOR ECOVILLAGES AND ECONOMIC AUTONOMY.
Resource depletion, especially with regards to water in Guanajuato is a pressing and inevitable issue. Water contamination, scarcity and privatization in Mexico is making a human necessity increasingly difficult to have access to. This is not an issue exclusive to Mexico, many major cities such as Cape Town, and our own California are facing water complications that could lead to dire situations in the future. Ecovillages offer a potential solution, or method to slow down this depletion, or bring it to a halt immediately. Whether literally in practice, by catching rainwater and harvesting it, or in mindset, the model of the ecovillage should be looked at closer for modern cities.

Ecovillages can be looked at as a sub-city that provides an intersection of environmentalism, community, and consumption outside of the capitalist model. In contrary to the capitalist model which relies on production and consumption of goods as a means to conserve the environment, ecovillages strive to reduce consumption through calls for simplicity. This is an idea which alone could lead to resource preservation in modern cities.

Figure 38: Ecovillage at Sieben Linden
Source: https://www.gordonwelters.com/portfolio/photography/ecovillage-sieben-linden/
ECOVILLAGE AS A MODEL FOR MODERN CITIES

Ecovillages offer solutions to environmental degradation not through the consumption of “green” products, but by changing the way people think and behave in relation to each other and what we consume. The ecovillage model involves a cultural change in how humanity defines the environment and the idea of community. It offers a holistic definition that encompasses social justice, human rights, and an economic model that is not supported by continuous growth and personal wealth (Chitewire 255). Ecovillages can perpetuate a national dialogue on how we live by modeling an alternative to suburban sprawl.

The ecovillage community model encourages voluntary individual and communal simplicity, making recycling, composting, and being a good steward to the environment a natural way of living. Modern cities can learn from this lifestyle that put nature and the environment in the conscience of its residents on a daily basis. “It is through the very things that ecovillages encourage—communication, sharing, open debate about consumption and resource use, that we begin to confront the larger problems of community and environmental degradation” (Chitewire 270).

Figure 39: Ecovillage at Sieben Linden
Source: https://www.gordonwelters.com/portfolio/photography/ecovillage-sieben-linden/
Thus, the ecovillage provides a stage for middle class families living the U.S. to begin an honest dialogue about our culture that puts individuality before community, capital accumulation before conservation, and consumption before preservation. Ecovillages raise questions that extend far beyond organic farming and composting, they provide an opportunity for contemporary cities to consider changing the paradigm of how we think of sustainability.

Though small, Los Carrizos is attempting to respond to the issues of water scarcity, environmental exploitation, disconnect from nature, and the capitalist model. Rather than responding simply through dialogue, this ecovillage is responding through example. An example that the surrounding larger cities of San Miguel de Allende, and Guanajuato can learn from. Whether or not dry sewage systems and water catchment are practical in every city, the mindset and intention of the ecovillage model could in itself perpetuate the change needed as we face the future of sustainable cities.

CEA. “COTAS Gto.” COTAS Gto.:Comisión Estatal Del Agua, agua.guanajuato.gob.mx/cotas.php.


Mexico’s Freshwater Aquifers: Undervalued and Overexploited. geo-mexico.com/?p=5320.


