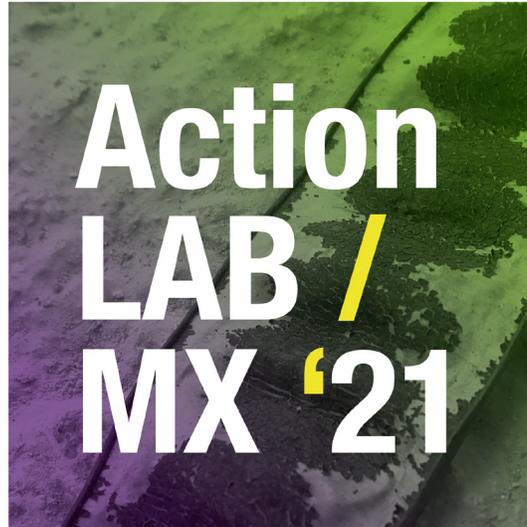


Action LAB / MX '21

Report 2021



Co-creating strategies to sustainable livelihoods and strengthening autonomy

Action Lab México - EI 20

WAT-E2070 - Sustainable Global Technologies Studio



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1. Introduction

This document is the final report of an Action Lab Mexico 2021 project, explaining why and how it was implemented in a Mexican community of El 20 and what the sub projects were this year. The project was a collaboration between Aalto University in Finland and two Universities in Mexico: Universidad Nacional Autónoma de México (UNAM) and Universidad Modelo. The Action Lab Mexico (ALM) is part of Sustainable Global Technologies (SGT) Studio course in Aalto University and part of study and community service modules at UNAM and Modelo.

Aim of the project was to help the about 500 inhabitants of El 20 meet their needs by creating sustainable projects in the community. One of the main identified challenges is that the community does not have sufficient amounts of good quality water. Another challenge is that the community members do not always have a stable income and are not necessarily able to cover unexpected costs such as medical bills. Some sources of income such as handicrafts and apiculture are not consistent and do not generate many tourists and purchases for consistent financial support. Therefore, it was decided that this year's intended impact is to **strengthen the autonomy of the community** and to **provide avenues to build a financially sustainable ecosystem** for the community. This was done by focusing on building a stronger identity for their handicrafts and apiculture businesses, providing self-sustainable solutions to the community to get good quality water, and creating opportunities for crowdfunding through the cookbook.

Main outputs of this year's projects included establishing a water strategy, designing water laboratory and artificial lake, identifying system level pain points and opportunities in order to sell the organic honey directly to the consumer, promoting the handicrafts by sharing the narratives of women artisans who play a crucial role in their creation, strengthening the brand identity of the Melipona honey and developing a commercialization strategy for the cookbook. Eventually these objectives will help the community to establish a more stable financial situation.

This year visiting the community was not possible because of Covid-19. This means that we had to be careful when defining our desired outcomes and outputs and to pick up goals which could be achieved remotely with limited involvement from the community. Hence, our primary focus was on building knowledge repositories, filling information gaps and working on systemic level strategies which can serve as a base for future teams to take these projects to execution. Due to the remote nature of work this year, it was even more crucial to have effective communication between and within the teams.

Since the ALM project is part of a study module in all three universities, the implementation of the project started in January and continued throughout the spring of 2021 until the end of May. An intensive camp, ALM Jam, was arranged in mid-March, during which a connection was established with the community.

2. Action Lab Mexico

Action LAB Mexico (ALM; previously Aalto LAB Mexico) is a collaborative project, which started in 2012 as a case study for Claudia Garduño's doctoral dissertation which took place in the community called 20 de Noviembre (EI 20). The aim of the project is to work in close collaboration and cooperation with the Mayan community of EI 20 and help bring pragmatic sustainable reforms within the community to create opportunities for better livelihood. It connects the Mayan community of EI 20 with academia, civil society as well as public and private sectors of Finland and Mexico.

The ALM project was adopted into the studio course of Sustainable global technologies (SGT) at Aalto University in 2015. Over the years, the project has been participated in by various actors and individuals. This year the project runs as a collaboration between Aalto University, Universidad Nacional Autónoma de México (UNAM), Universidad Modelo and a local NGO called DYA Design Your Action.

In the past ALM has created project ideas to potentially enable the people of EI 20 to sustain their **culture** and **environment**; but also, to achieve security in terms of **health** and **economy**.

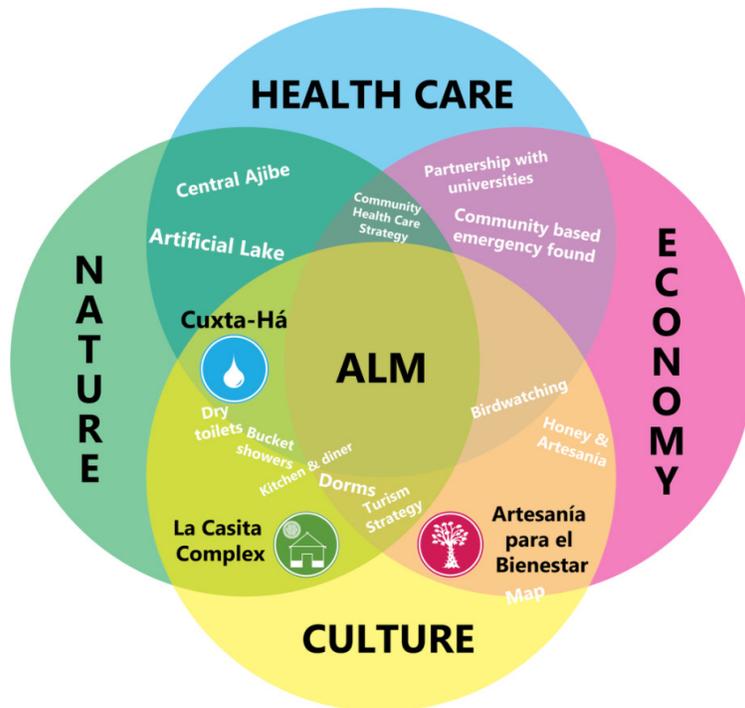


Figure 1 Focus areas and main projects of Action Lab Mexico (Action Lab Mexico's webpage: Projects, 2021)

3. Background of the community of El 20

This chapter covers the background information of the community of El 20 and some of the key challenges that the community is facing.

Ejido 20 de Noviembre (El 20) is a small Mayan community located in the municipality of Calakmul, in the state of Campeche in Mexico. According to the last population census in 2010, the community consisted of 420 inhabitants, which is expected to have become roughly 500 inhabitants by now. The community was founded in 1971 when a group of families moved from a Mayan region in the north of the state of Campeche to Calakmul. The region is occupied by 81 communities out of which El 20 is the most indigenous. The community consists of both Mayan and non-Mayan families, hence indigenous Mayan and Spanish are both spoken in the community.



Figure 2 Ejido 20 de Noviembre highlighted on the map of Mexico (Action Lab Mexico website: Maps, 2021)

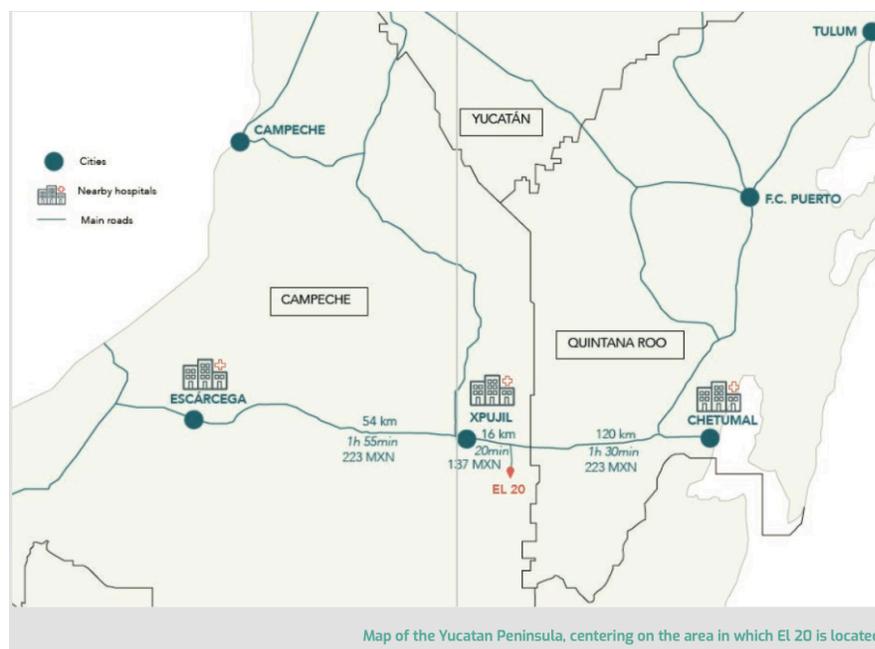


Figure 3 Ejido 20 de Noviembre highlighted on the map of the Yucatan Peninsula (Action Lab Mexico website: Maps, 2021)

Agriculture and apiculture are the main sources of livelihood for the community. The community also has a rich tradition of handicrafts which serve as secondary sources of income with the limited tourist traction received by the region. The community currently consists of an elementary school, shops, a few churches, library, and a community house called La Casita for meetings. The community also has a decision-making board called the Ejidatarios which consists of about 50 members, most of which are men. It has about 5 women and they too participate in the board only if their husband has passed away or their son is too young to be a member of the board. The board of Ejidatarios acts as the primary decision-making body for all the decisions related to community progress and welfare. All ALM teams have to get their approval before starting any projects with the community.

The community believes in retaining their Mayan traditions and belief systems. The elders in the community feel that their indigenous Mayan language is slowly disappearing since the younger generations do not use it to converse. The community largely believes in shared living and most resources like food and tools for cooking are shared within households. Sometimes women also lend each other utensils for a really low price for one time use. The community is surrounded by rich biodiversity and places a lot of importance on preserving their natural ecosystem. The women in the community also work towards preserving the Mayan culture and tradition. One example is women working towards the preservation of the Melipona bees in the community.

3.1. Climate

Climate in EI 20 is hot, humid, and challenging because precipitation varies a lot between seasons. Most rainfall takes place during the summer and fall months (June–October) whereas winter months are much drier.

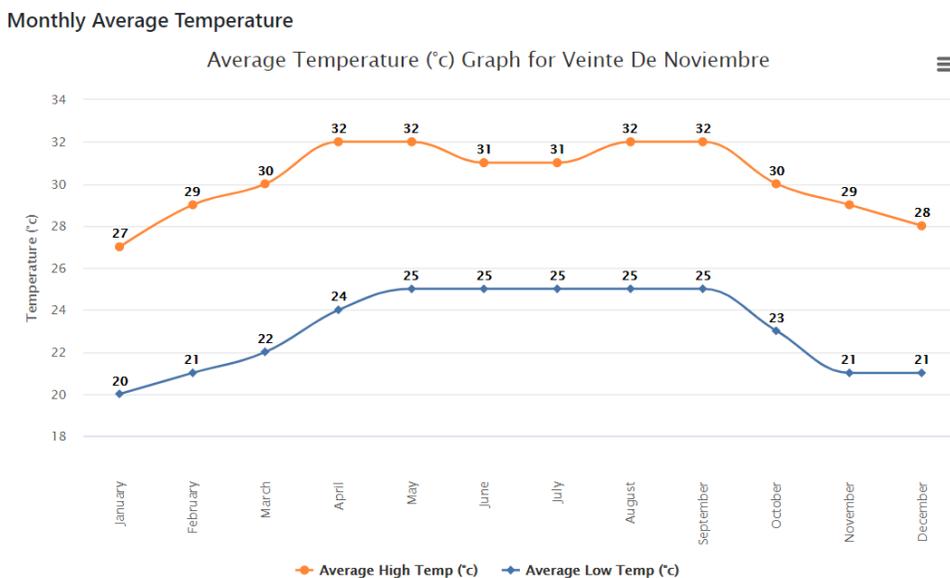


Figure 4 Average temperature during a year in EI 20 (World Weather Online, Veinte De Noviembre Monthly Climate Averages, Campeche, MX)

Additionally, the community members have said that they have recognized a 7-year-cycle of rains and dryness, which leads to periodic droughts. This is even more challenging since there might occur very long dry periods with no rain. It has been estimated that climate change will probably increase the droughts. This brings a challenge of storing rainwater since the storing capacity would need to be high enough to last over the dry seasons.

Monthly Average Rainfall

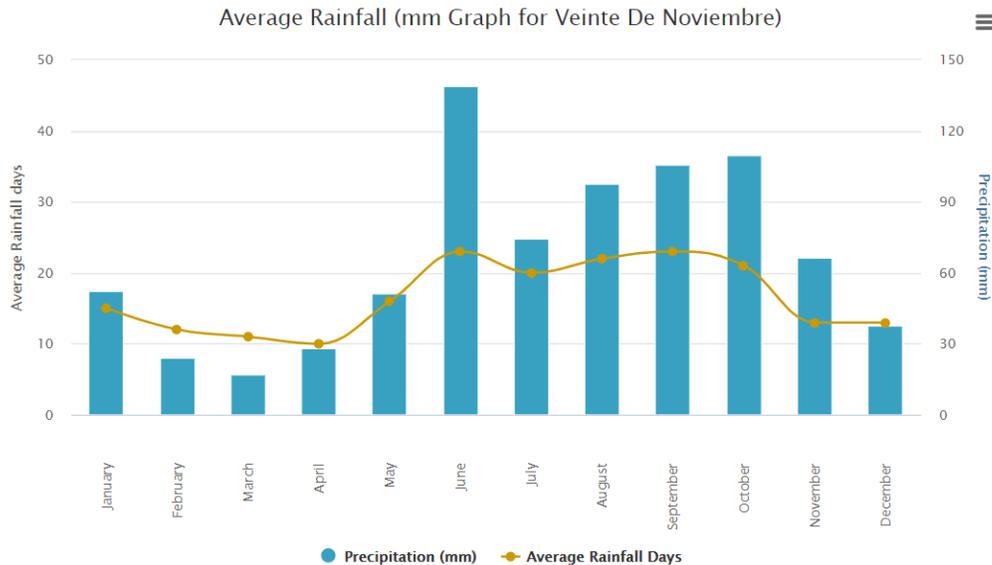


Figure 5 Average rainfall during a year in El 20 (World Weather Online, Veinte De Noviembre Monthly Climate Averages, Campeche, MX)

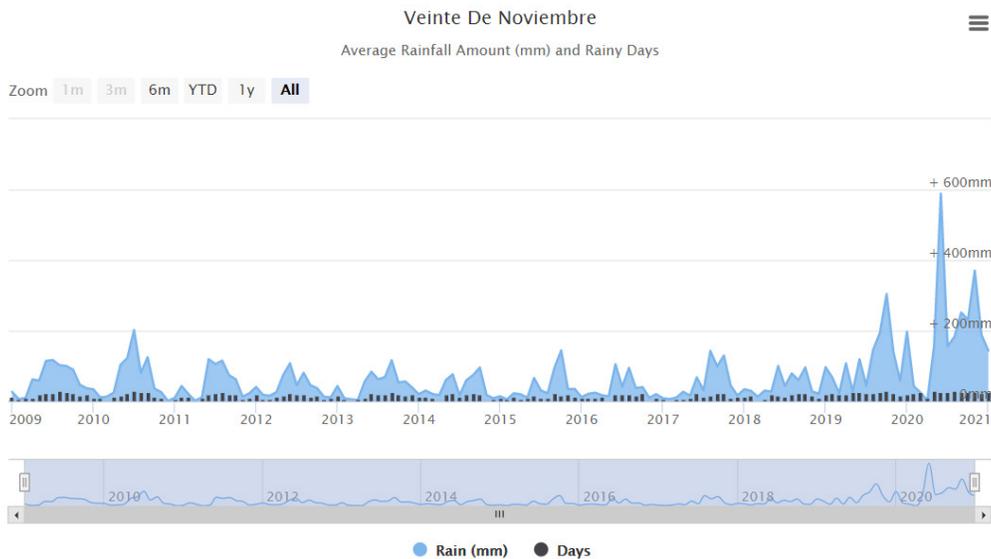


Figure 6 Historical data of rainfall in El 20 (World Weather Online, Veinte De Noviembre Monthly Climate Averages, Campeche, MX)

3.2. Water situation

Water project has been one of the main subprojects of ALM since the first year of Action Lab Mexico in 2012. Although water has been one of the main focuses, there were no water projects in the years 2019 and 2020, so this year's project was heavily based on what the team in 2018 found and continued from that.



Figure 7 Previous water related projects (Action Lab Mexico webpage)

The community is located in an area that has a gypsum rich ground, which makes groundwater as well as river water hard. Tests carried out by the team in 2018 estimated that the hardness is around 100-150 °dH, meaning extremely hard (the upper limit for hard water is considered to be 10°dH) and thus not suitable for human consumption. The community members have mentioned cases of kidney stones which might be caused by the hard water they drink.

Because groundwater is not potable, the community relies on rainwater as their main water source. However, since the precipitation is not constant through the year, the community has to either use the bad quality groundwater or to buy water during dry seasons. If groundwater could be softened enough, it could be used for some purposes, for example for laundry water, and that way the better-quality rainwater would last longer and the need to buy water would decrease.

Another issue with the quality of the groundwater is that E. Coli has been detected, however the source is yet to be identified and it is unsure whether it still is contaminating the water. Previously it has been hypothesised that the bacteria are probably coming from the septic tanks of the area. For this reason, it has been planned to have dry toilets at the La Casita complex in order to reduce the future groundwater contamination.

Hence, the community has problems with both the quantity and quality of drinking water. The problems could be eased by either improving the quality of the existing water (groundwater) or by increasing the store capacity of rainwater. Since it is not yet sure how the rainfall will be affected by climate change, it might be most useful to improve both. Because this year it is not possible to visit the community physically because of Covid-19, it is decided to focus this year's water project on the quantity of collected rainwater.



Figure 8 Bottled water is bought from a local shop in 30 l containers (Aalto Lab Mexico final report, 2018)

3.3. Handicrafts

Handicrafts are a secondary source of income for the community. The locals produce various handmade products such as hammocks, small wooden furniture and decorative elements, rock art and jewellery made out of seeds fallen from the trees. The challenge is that the current sales of handicrafts is not a lot and there is not much promotion for them to promote their sale. Another challenge is that these handicrafts are similar to that of the entire region of Calakmul and other communities surrounding EI 20. Hence, they don't make up the primary reason to attract tourists to EI 20. Promoting the handicrafts can be a way to generate income for the community and make them more financially sustainable.

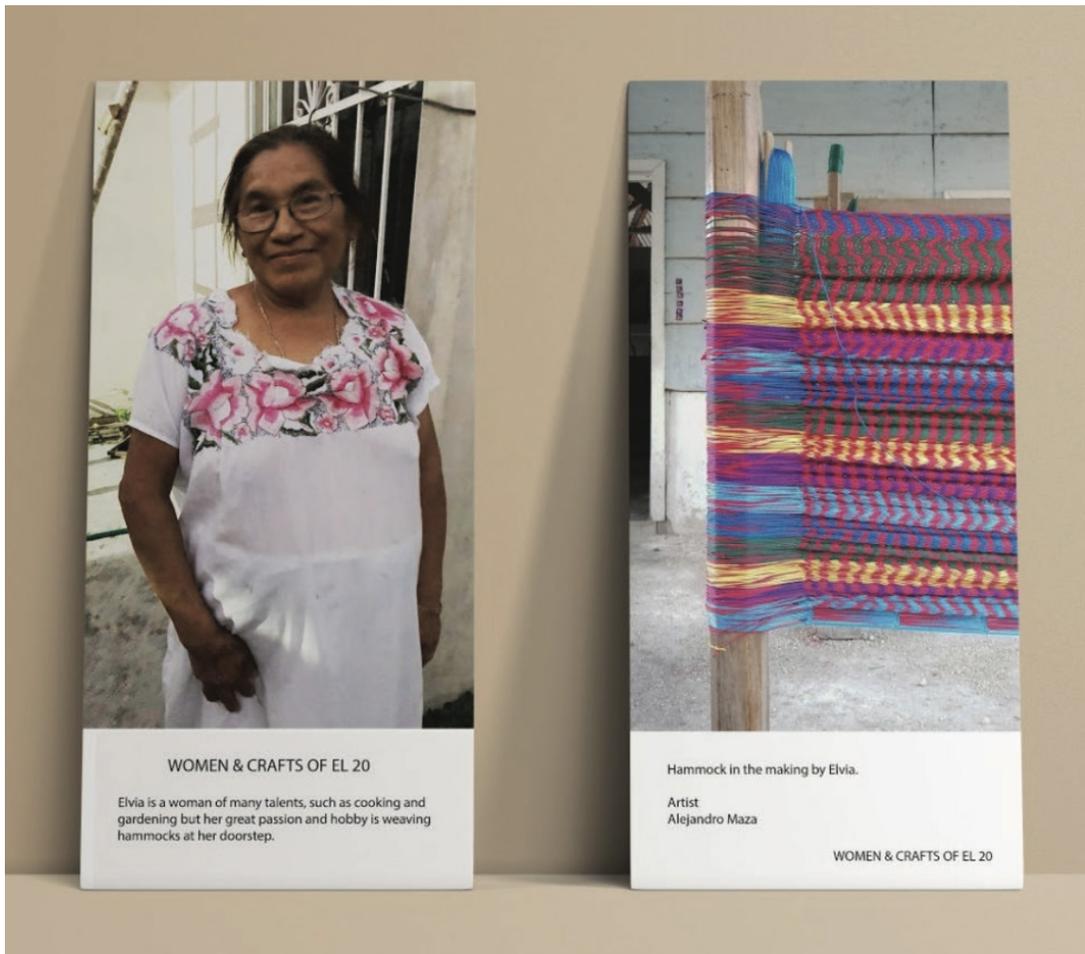
3.3.1. Women and Artesanía

Women and Artesanía became more focused as a project by the ALM team Mexico in 2019 with the intent to highlight the role of women in the community. Women take a very crucial role in the EI 20 community, since they are the ones taking care of their families, contributing to the kitchen and also keeping the Mayan traditions and values alive by preserving the indigenous handicrafts. They are the ones who not only take care of their own family but also contribute towards meeting the needs of their community by working in the community kitchen and working towards the preservation of the indigenous Melipona bee. Women have contributed massively towards preserving the Mayan wisdom and passing these traditions to the next generations. Handicrafts are one of the primary ways that they contribute to preserving the culture and making great use of the raw material available in their environment.

Some of the handicrafts that women work on are:

- Hammock weaving
- Natural bee honey production
- Stone carving
- Carpentry
- Natural seeds jewellery
- Woven textiles

The previous team decided to create a visual narrative to celebrate these women and give them a visual voice through a series of postcards and bookmarks. The bookmarks were specifically aimed to profile each woman behind the craft and share a little bit more about the life of each of them. The role of the bookmark postcards is to map and trace the evolution and connections of women and their crafts in future generations. This year the focus is to take this project ahead by building a visual narrative of the role of these women in the handicrafts of the community and leverage their identity by sharing their stories of resilience.



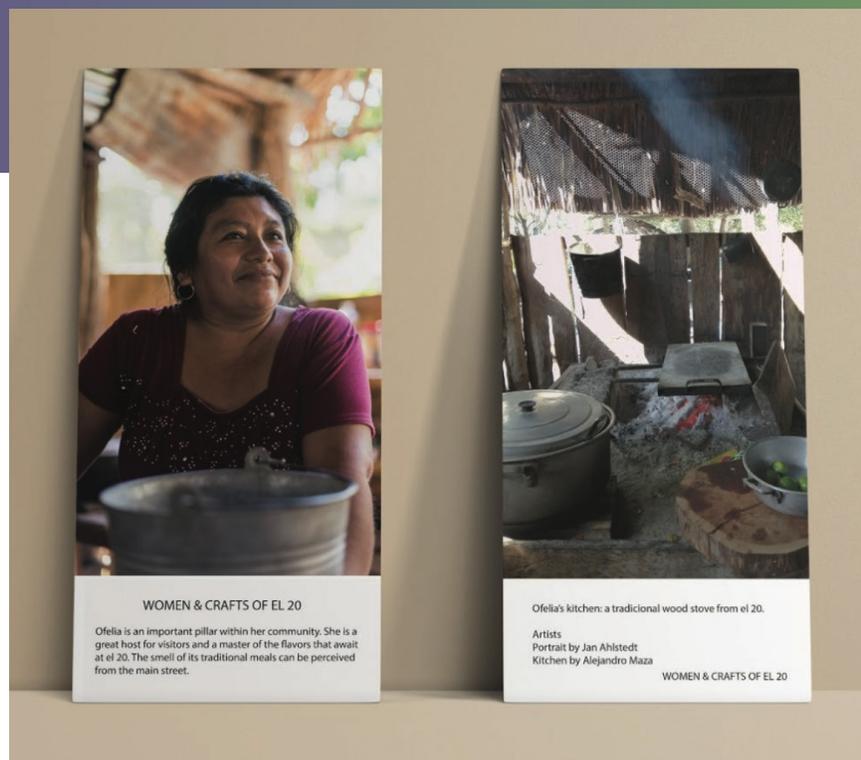


Figure 9 Bookmarks created by the ALM 2020 team to highlight the cultural and material value that the women of El 20 bring to the community

3.3.2. Honey

Apiculture plays a key role in the subsistence of the El 20 community. More than 50 % of the population in the community is involved in honey production. There are primarily two types of honey that are produced in the region, the *apis mellifera* honey, also known by the community as the organic honey and the melipona honey.

The Melipona honey (also known as liquid gold) is a rare variety found specifically in the region and is also an important part of the Mayan culture. The Melipona bee is a stingless endemic mayan species in danger of extinction. The Melipona bees have been raised by Mayans for hundreds of years and are also considered sacred within the community due to their medicinal properties like improving healing problems, eye problems, burns, throat infections and to help the immune system. The bees only feed on medicinal plants and flowers of the region and hence the community looks at the honey produced with respect and care. One hive of melipona produces about one to one and a half litres of honey per year and that too if the bees are healthy. Also, it takes way longer to extract melipona honey compared to *apis mellifera*, also known as regular organic honey. Due to the low production of melipona honey, it is only used by the community for their own consumption. It is the women who primarily work with the melipona bees and also use the honey in cosmetic products like lotions and soaps. These cosmetic products are also built by the women from scratch and occasionally sold to tourists visiting the area. They also offer local and foreign tourists to visit the meliponario to learn more about this species and spread its cultural and biological importance. The key challenge with melipona honey is its limited production since the species are in danger of getting extinct. There is a crucial need to preserve the Melipona species and sustain its role in the Mayan culture.

Creating awareness about the Melipona bee and generating income opportunities from the Meliponario can be one way to preserve the species nearing extinction. In the past, there was some work done on the brand identity of the melipona honey by a local branding team to increase the sale of melipona cosmetic products amongst tourists. At this moment, the community might not be in a position to generate enough honey for tourist consumption and hence the cosmetic sale might not be a long-term income generating solution. This year's focus will be to work on a strategy to build awareness about the importance of Melipona for the community and strengthen the Melipona identity to generate income for a melipona preservation fund. This fund will enable women working with Melipona to work towards the preservation of the Melipona bee.



Figure 10 Visual identity created for the melipona honey, provided by Melipona women on students visit last year



Figure 11 Melipona cosmetics packages by the community on display (picture taken by students from last years' visit)

The organic honey is primarily used for income generation and the process from beekeeping to extraction and selling is taken care of by men. Our interactions with the previous year teams highlighted some key problems that the artisans were facing regarding the sale of honey. Currently, the beekeepers work extremely hard to extract the organic honey and sell it in big jars to the middlemen for really low prices. These middlemen then sell the honey to other brands who sell the honey at much higher prices. In this process, the beekeepers are unable to reap the income benefits of the hard work that they have put in the extraction of the organic honey.

In the past two years, two projects were picked up by previous years' teams to increase the promotion of honey for tourists and bring forward the cultural importance of honey in the El 20 community. In 2019, the team proposed the idea of increasing the brand identity of the melipona bee and the melipona honey tasting experience for tourists. The team also proposed cross collaboration between artisans and honey producers to build a product that utilises and exposes different crafts of the region and allows the honey to be sold as a fully packaged product. It included a wooden base, a limestone jar to store honey and an embroidered ribbon to seal the box. This idea of cross collaboration of different crafts can be taken ahead to produce varied products and also generate cross income opportunities for multiple artisans. In 2020, the team proposed the idea of a sensory honey board for tourists to give them an experiential tour of the melipona honey. The product consisted of different wooden tools, built to engage multiple senses like taste, smell and touch.

3.4. Agriculture and food sovereignty

3.4.1. Ejidos

The Ejidos were formed after the 1910's Mexican revolution, through a process of redistribution of lands in Mexico that began in the year 1920 and continued through decades. The main aim was to reduce inequalities by providing land that could be cultivated to the landless. In this sense, each ejitario was given a parcel to cultivate and a plot that could be used to build a house. The remaining lands were allocated for common use such as livestock grazing. In the year 1991, after a revision of the constitution, the practice was revoked and the privatization of the ejidos was authorised.

The community of El 20 was formed after this agrarian reform. The village area is 35 000 hectares in where most families own a home and the rest is common and in where there are agricultural fields, jungle, and the Rio Bec Mayan ruins. In the community there is a defined urban area in which their houses can be built, and a defined area for agriculture. The rest is an area that was established to be conserved. At the moment, that area of the forest is a protected national area, which means that farmers cannot extend their land for agricultural and livestock purposes.

3.4.2. Food sovereignty

The agriculture and livestock are mainly for the community. They produce what is needed for their own use and they do not commercialize it. This means that the community mainly consumes what they have produced, without having the need to buy it from outside the community.

In other words, the community could be considered to have food sovereignty. The concept of food sovereignty was formally defined by La Vía Campesina as “the right of each nation to maintain and develop its food, taking into account cultural and productive diversity”. In short, having full sovereignty to decide what is grown and what is eaten.

Nevertheless, there are some limitations. As explained previously in the report (see 3.2. water situation), the water of the region is extremely hard to be both drunk and used in agriculture. Therefore, the community depends on the rainwater in order to keep their sovereignty. The problem is that there are periods of drought (which are increasing due to the climate crisis), in which the community cannot be fulfilled with their own growth. In this sense, both, improving the quality of the existing water (groundwater) or increasing the store capacity of rainwater could also be a possible desirable outcome in order to guarantee their production. Thus, the water project has a direct implication in addressing this issue.

3.4.3. Balance with nature

The most important aspect of the way of living at El 20, which allows for food sovereignty, is precisely the innate awareness of the inhabitants of the balance they need to have with nature. In every aspect of their lives, whether it is agriculture, honey harvesting, eating, tourism promotion or cooking, this notion is deeply rooted in their practices. For example, they respect seasons for planting and harvesting food; they know that they need to take care of the plants and natural resources of the area because the bees feed off of that and any change affects them greatly, but also because it is their way of healing a lot of the most common light illnesses they suffer, and they get wood to cook their meals; they're also very careful about not wanting to attract tourists that are not aware and protective of this delicate balance. So, their knowledge about the synergy of it all, is what allows them to have a very respectful and sustainable lifestyle, which is something that needs to be valued more, outside of the community but also within.

3.5. Tourism

3.5.1. Tourism in Calakmul

One of the most common tourist attractions of Calakmul is the archeological site in which the ruins of one of the largest and most powerful Mayan ancient cities could be found.

Also, what makes the area attractive to visitors is the wildlife and natural attributes of the area. The Calakmul region holds the largest rainforest in Mexico. Alongside with the protected areas of south-eastern Chiapas, other areas of the Yucatan Peninsula, the Petén of Guatemala and Belize they form the second largest area of tropical rainforest in America. Finally, there are the ecotourism projects operated by local communities that protect their forests and wild species through the development of this activity.

3.5.2. Tourism in El 20

One of the income sources of the community is tourism. The community offers unique experiences through meeting the local people and having different kinds of activities with them. One of the main attractions of El 20 is the Mayan heritage that the community holds. The village was founded by Mayan families, and it is the only Mayan community out of the 82 communities in Calakmul. Some of the experiences offered are visit to the artisans' workshops and home-made traditional meals in local houses.

The only possibility to buy artesanias and honey products, which are unique to this community is just when visiting the community which is an extra motive to want to visit El 20. This means that the income of the artesanias and honey products are directly affected by the tourism in the community.

The current pandemic has affected tourism dramatically. There have not been any tourists in El 20 since the breakout, and therefore there have not been any income dependent on this. It is unsure when the situation will be back to normal. Developing alternative sources of income is therefore a possible solution to address this situation. In this sense, both the book project and the artesanias are related to this issue.

3.6. La Casita

One of the main focuses of ALM has been building a La Casita Complex in El 20. At the moment one building of the complex, La Casita, has been built and others are in the planning phase. The La Casita building is owned by the community and serves as a community hub where for example different meetings can be held. It is located in the center of El 20 and it was designed by ALM and constructed in 2014.

Other constructed buildings will be kitchen, cafeteria, dormitory, toilets, showers, and water lab, which all are in a planning phase at the moment. Eventually the complex is planned to act as an eco-hostel where tourists can be accommodated, and the kitchen can also be used for cooking lunch for the school children.

Figure 12 La Casita's last state during the visit in 2020 (Picture taken by Ricardo in 2020)



3.7 Healthcare

The background of the health issues in El 20 can be framed within the boundaries of the services available, the location of the village in relation where those services can be obtained and the most common ailments they have and the resources they can have to face them.

We can start by describing the relative location of El 20 with the places that can help when they have health problems.

Within the community they have a health clinic, but it lacks medicines and other medical supplies. In the ALM report of 2020 it is stated that they open twice a week, but they only measure the weight of the children, and they have a few stretchers. The infrastructure is not fit to give consultations.

The nearest clinics and hospitals outside the village are about 16 kilometers away from them. To get to the nearest hospital at Xpujil can take 20 minutes by car and 3 hours by walking. And the hospital is not very well equipped.

The major Hospital that is closest to them is located in the city of Chetumal in the neighboring state of Quintana Roo and it is 115 km away and with a route that takes almost 2 hours by car according to Google Maps.

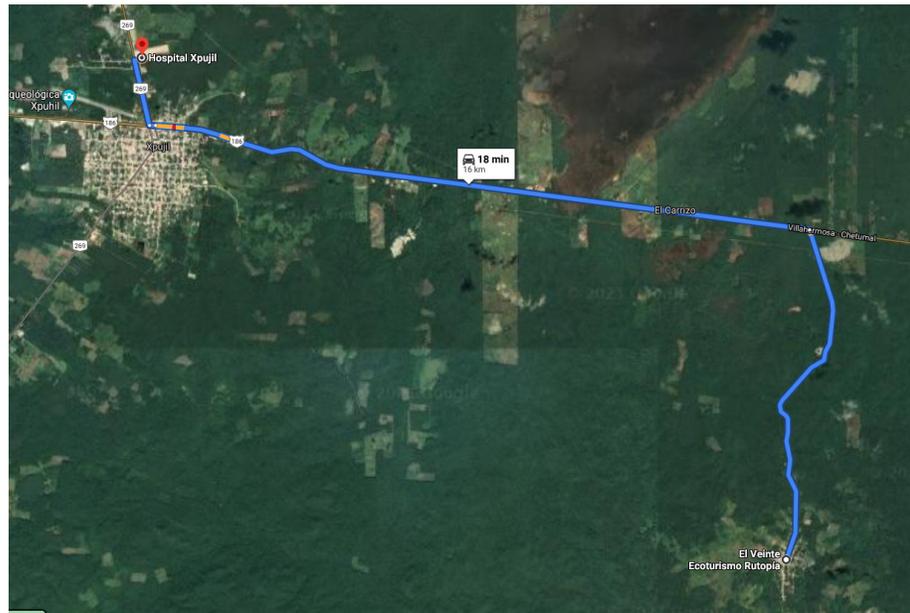


Figure 13 Route from El 20 to the nearest hospital in Xpujil as marked in google maps (Google maps: From El Veinte Ecoturismo Rutopia to hospital Xpujil, 2021)

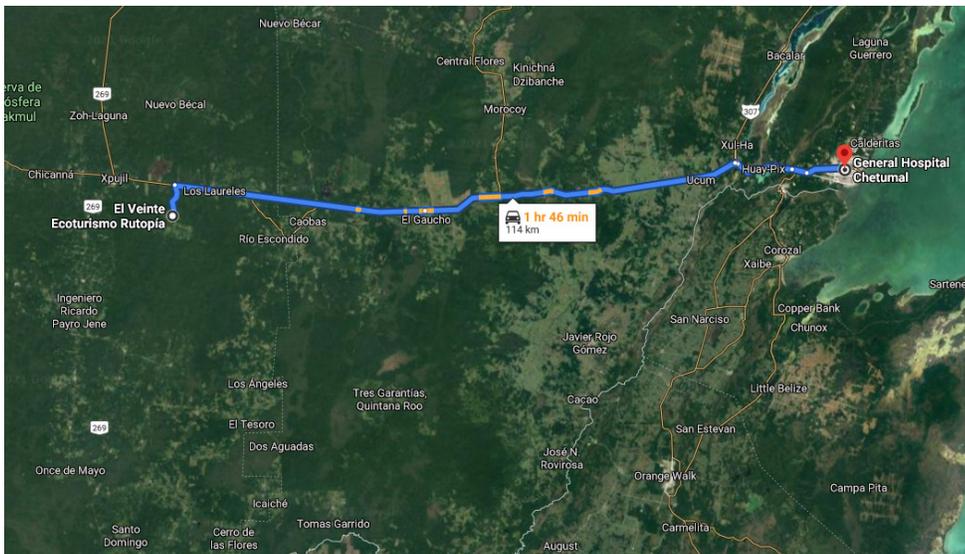


Figure 14 Route from El 20 to the hospital area in Chetumal as marked in google maps (Google maps: From El Veinte Ecoturismo Rutopia to General Hospital Chetumal, 2021)

According to a 2020 ALM health report the most common health problems are treated within the community with home remedies and traditional medicine treatments. They have a project called “Neek Ich Che”, managed by a single family and it consists of a set of plants and preparations for some ailments. They use some plants like ‘pata de vaca’ (cow’s paw), ‘aquik’ or ‘chaka’ and the melipona honey as well for things like headaches, sore throat, reduce pain or for skin injuries.

Related to these methods of self-care it is also very important to mention that changes in the models of attention for people without medical insurance in the public services has affected the people of the community. This reinforces their need of using alternative palliatives to the professional services regulated by the state.

In México exists a model of Full Health Public Insurance, but its coverage is limited to people who work for public institutions (ISSSTE – Institute of Social Security and Services for State Workers) or that work for the private sector (IMSS – Mexican Institute of Social Security) but is enrolled in the national tax paying system (SAT – Tax Administration System) by the private (or autonomous) organizations they work for (or with those they are related; UNAM students are covered by IMSS, and teachers by ISSSTE, for instance). For people who’s not covered by these two major systems, it was created, in the early 2000’s, a system called Seguro Popular (Popular Insurance). This system tried to cover some of the most common conditions at all levels of care, from small clinics to hospital attention, and for a very small fee paid by the people interested in using these services.

But the configuration of El Seguro Popular had several faults and the current federal administration decided to upgrade it and migrate it, supposedly, to a broader coverage with the creation of the INSABI (Institute of Health for Wellbeing). The Seguro Popular program had limitations that varied among localities and also hospitals. Several of the facilities of this program were the same as El ISSSTE or IMSS (or even from local health ministries, dependent on the management of every state governor), but its coverage for El Seguro Popular patients could be different according to region or even hospital. For instance, El IMSS can have hospitals that cover cancer treatments in Mexico City and Campeche for its own insured patients, but for El Seguro Popular patients, it could happen that there’s only coverage in Mexico City or for only a very few types of cancer in both places.

So, patients of El Seguro Popular may not have attention for some illnesses in facilities that already give the service for the other public services linked to tax paying or the management of the local governments of every state. Public services, like those of health, can be very complex and tangled in México. The goals of the INSABI are to fix this and other problems. Nevertheless, the new federal health program has not started very well either and the Covid–19 has also worsened the situation for people and families like those that inhabit El 20.

Hitherto it has been described as a very general panorama of how the public offer in Mexico is about the health services. We have to sum the distances (described above) that must be traveled when they need hospitals or clinics for problems whose severity go beyond the remedies (also mentioned above) that can be given within the community and the medical problems themselves.

According to the aforementioned report of ALM, the frequency of people who present symptoms that can escalate to highly specialized medical care is low to medium. Anyway, from the 420 adults that live in the community, some of them have had some problems like cancer or diabetes that should be treated in Chetumal with private medical services.

Also, for all the adults (regardless of gender) there are common incidents at work, especially in fieldwork whose range can vary from cutting injuries with work tools to snake bites.

There must be considered, too, the growing ailments of older people and those of children; who several times don’t have their basic preventive vaccinations and that also present asthma symptoms in high numbers without knowing specific causes; and the problems related with the water quality within the village.

As the public services are not fit enough for them for many reasons already described in the former paragraphs; they are in constant economic stress to cover their medical needs, because at the end is usual for them to use private services they cannot afford easily, as will be described further in chapter six along with some alternatives that we were exploring during this edition of the ALM.

3.8 Mobility

In this first inquiry about mobility of the community, a general vision of community displacements was approached, thus establishing a first approach to general mobility to understand how it is generated and under what circumstances.

In this initial path, a categorization within and outside EI 20 was proposed, establishing micro and macro mobilities, which help us to structure internal displacements and those that should be done outside the community. During this initial process, the ALM Jam Lab was developed, where the whole team met, bringing together people from Finland and Mexico, developing activities planned to be able to interact with the team, also with community members, being a way of getting to know each other, as to inquire about our issues. In this laboratory, for mobility, interviews were developed, talks were attended, and different meetings were able to demonstrate findings and sensitive points in the general movements of community members, also, in the structuring of the study, about what could be the basic principles of a future conformation of mobility, modes of transport, logistics of goods, places, contexts, situations and people in the community. This type of findings dazzled us that the mode of transport is not just a way to get around, or just a type of vehicle, but a condition of how we can interact with our internal or external environment to the community and the impact that this generates on the communities. social and economic dynamics in it.

In this process of learning and opening towards new knowledge, ethnographic study has been fundamental for the fine-tuning of interviews, digital observation, digital methods, collective work, and integration between the parties. In this dynamic, it has become evident that the members of the community are the determinants of our understanding, because they are the main actors of their environment, their heritage, and traditions, therefore, from the design and as a designer, the understanding their customs and their needs clarify their way of mobilizing, the need for it and the current solutions that are developed in it. Thus, in this way, the relationship with mobility is the understanding of the dynamics of the community, its daily activities, its basic needs, and the eventualities that may arise from a social group.

Now, in this structuring it was conceived that mobility can be categorized by Education, Health, Tourism, Transportation of goods, Food and General. And these are the first possible categories and the how and why of things, in a systematic study of consequence, dependent on the other activities of the community, in order to understand the subsystems that we find in this approach. Consequently, within mobility these categories are structured with two subsystems, the micro and macro, which are generated when it is inside or outside of it respectively, thus, discerning their codependent interrelations in a single mobility system. For the first subsystem, micro, several types of trips were established that help to identify their modes of transport and the vehicles involved; The micro mobilities are of a direct displacement, of a single activity, and these can also be related to the second subsystem, in certain cases they are mixed mobilities, meaning that they are not only carried out within the community, but can also be out of it. Now, these determinants were classified as follows: local mobility (Various activities), labor mobility, tourism, handicraft mobility (Honey and crafts), infant mobility, mobility for the basic and health food basket.

In summary, a general structure is proposed towards a qualitative and quantitative study, to initially understand the community, collecting the data through interviews, observation, digital tools, collecting and analyzing them through infographic mappings, journey maps and digital platforms for the study of the interactions of the general community in the mobility system and its subsystems. Laying the general foundations of a new field of study for this community and of the future teams that will be formed.

4. Action Lab Mexico 2021

4.1. ALM 2021 Team

The ALM 2021 team was a collaboration between Aalto University, two universities in Mexico: Universidad Nacional Autónoma de México (UNAM) and Universidad Modelo, and an association in Mexico called Design Your Action.

4.1.1. Students from Aalto University



Akshitta Kohli is a design student, currently pursuing her masters in the Collaborative industrial design Program at Aalto University. She is originally from India and is passionate about social design, collaborating with Business and Technology to realize products which are built ground-up by insights from end users and rooted in human values. In the context of ALM, she was working on strengthening the brand identity of the community by working on avenues that can help generate income for handicrafts and apiculture.



Miisa Villiäinen is a water and environmental engineering student at Aalto University. She is from Finland and is interested in solving water challenges with environmentally friendly solutions. This is also why she was part of the team working water issues in the ALM 2021 project.



Florencia Pochinki is a Creative Sustainability student. She is originally from Argentina and has a background in sociology. She is concerned with the socio-ecological crisis, which she understands from a Latin-American perspective. She is passionate about coming up with integral solutions especially in regard to food systems. In the context of Action Lab Mexico, she was involved in the book project which brings together many of her interests.

4.1.2. Students from Universidad Modelo



Katy Trejo is a student of architecture, currently residing in Progreso Yucatán, she is interested in environmental issues focused on sustainability in architecture. One of his main interests is the analysis of feasibility in space issues, in a comparative way between conventional architecture and bioconstruction techniques. For this reason, he works as a collaborator of the project in Ombligo, a biophilic design laboratory, focusing on the solution of techno-constructive details.



Alberto Medina is a student of architecture, in the city of Mérida Yucatán, one of the strengths of topics of interest are renewable energies and more sustainable construction methods. Currently he works as a collaborator on projects in Ombligo, biophilic design laboratory.

4.1.3. Students from Universidad Nacional Autónoma de México



Pablo Inclán is an Industrial Designer with experience in homeware products for retail. Currently he's a student of the master's program of Industrial Design at National Autonomous University of Mexico and he is researching non-professional design and its openness. He believes that other forms of learning and social organization are possible beyond the boundaries of the current models that are dominant in our socioeconomic structures.



Luis Alejandro Fernández Ruiz is a Colombian citizen, resident in Mexico City. Industrial designer specialized in car design. He is a student of the Master in Industrial Design at Universidad Nacional Autónoma de México and has been conducting his research on sustainable urban mobility. He has 14 years of experience in project management and, in addition, he is learning to make a better world for everyone through social design.



Itzel Rivera is a graphic designer from UNAM. With interests in caring for the planet. He is currently studying the master's degree in industrial design at the PDI with a project in urban gardens. Also part of the health and funding project in ALM.



Rogelio Lagunes Octaviano is an Architecture student from UNAM. He participated for the first time as a Labber in 2019, starting the Kitchen & Dining room project. In 2020 returned and in 2021 he continued working on the project. He is interested in local materials and social design.



Fátima Frías,
Communication (bachelor)



Arturo Peralta Rosales is an Architecture student from UNAM. He is interested in traditional mayan construction systems.

4.1.4. Alumni



Flor Arminda García is an Industrial Design student from UNAM. She participated for the first time as a Labber in 2019, starting the Honey and Crafts project. In 2020 she returned as a DYA volunteer and in 2021 she continued working on the project. She is interested in social design focused on supporting Mexican communities.



Aranzazu García has a master's in industrial design from UNAM with research focus on sustainability, sensory and strategic design. In her professional career she has worked for editorial, branding and web projects for a sustainable lifestyle's magazine, and then as part of the studio Abracadabra Diseño, where she worked for clients like the Secretariat of Federal Culture, the tourism area of the Municipal Government of Puebla and the Barroco Museum. Along with 2 other teammates, she imparted a Brand and Objectives Alignment Workshop for the education sector of UNESCO at Paris headquarters, as well as the redesign of the GEM Report visual identity towards the 2030 SDGs. She is currently working as a freelance designer and is part of the Design Your Action team, where she participates on projects of collaborative and social innovation design.



Ricardo Serrano Ayvar is an entrepreneur who holds degrees in architecture and a graduate specialization in industrialized building components. Also, he is currently finishing the Industrial Design Master's program at Universidad Nacional Autónoma de México in which his current research is focused on Resilience and Biomimicry applied to Disasters. He is originally from Acapulco, México, and one of his major convictions is to consolidate a hybrid practice between academic research and entrepreneurship endeavors aimed to improve daily life and be in harmony with the environment through design and innovation.

4.1.5. Facilitators



Claudia Garduño Garcia is the founder of ALM, associate professor at the Master's Programme in industrial design at UNAM and research director of DYA Design Your Action. During her master's studies in Aalto, she participated in Aalto LAB Shanghai, belonging to the very first team of 'labbers'. She saw so much potential in it that got the idea of taking Aalto LAB to EI 20 and making it the case study of her doctoral work "Design as Freedom". Since 2012, Claudia has been connecting and leading teams to collaborate on ALM.



Julia Renko works in the Sustainable Global Technologies Programme and mentored the team from Aalto University's side. She joined ALM as a labber in 2017 and wrote her master's thesis on community-based tourism enterprises in EI 20 and has general knowledge about all sub-projects.



Silvia Barrera Suarez is a second-time mentor at ALM. She studied Architecture at UADY to later do a master's degree on sustainable architecture and energy efficiency with a specialty on timber construction and bioconstruction. Since august 2019 she has been working at Modelo University, responsible for sustainability issues.

4.2. Common goal

Project impact was to provide avenues and strategies to strengthen the autonomy of the community and to build a financially sustainable ecosystem in EI 20. Since it is a long term process to create a financially sustainable ecosystem, our project focused on providing pathways for the community to move towards self-sustainable solutions including access to good quality water.

Another goal was to promote apiculture by helping generate long term income opportunities for

honey producers by enabling them to sell their produce directly to the consumer. The creation and crowdfunding strategies of the cookbook based on the recipes of Mayan women will also open income avenues for the community. All these possibilities will eventually lead to a more financially sustainable ecosystem and a stronger autonomy.

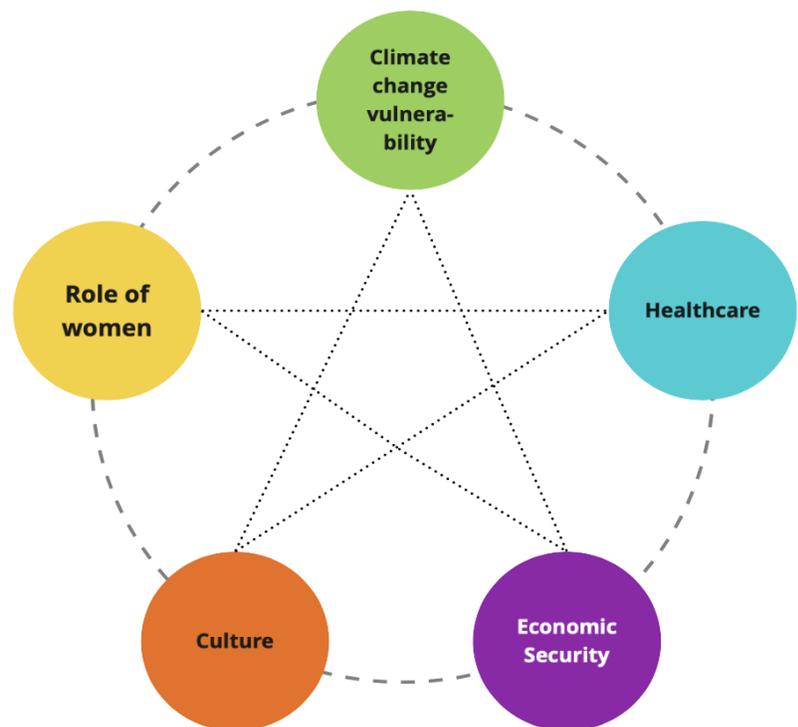


Figure 15 Key values we wished to address as a part of ALM 2021

4.3. Stakeholders

The stakeholder map was realized in order to acknowledge all the different actors that are involved or are affected (directly or indirectly) by the current project. In other words, the actors represented in the map are all those who need to be considered in the project and whose participation is crucial to its execution success.

Stakeholders

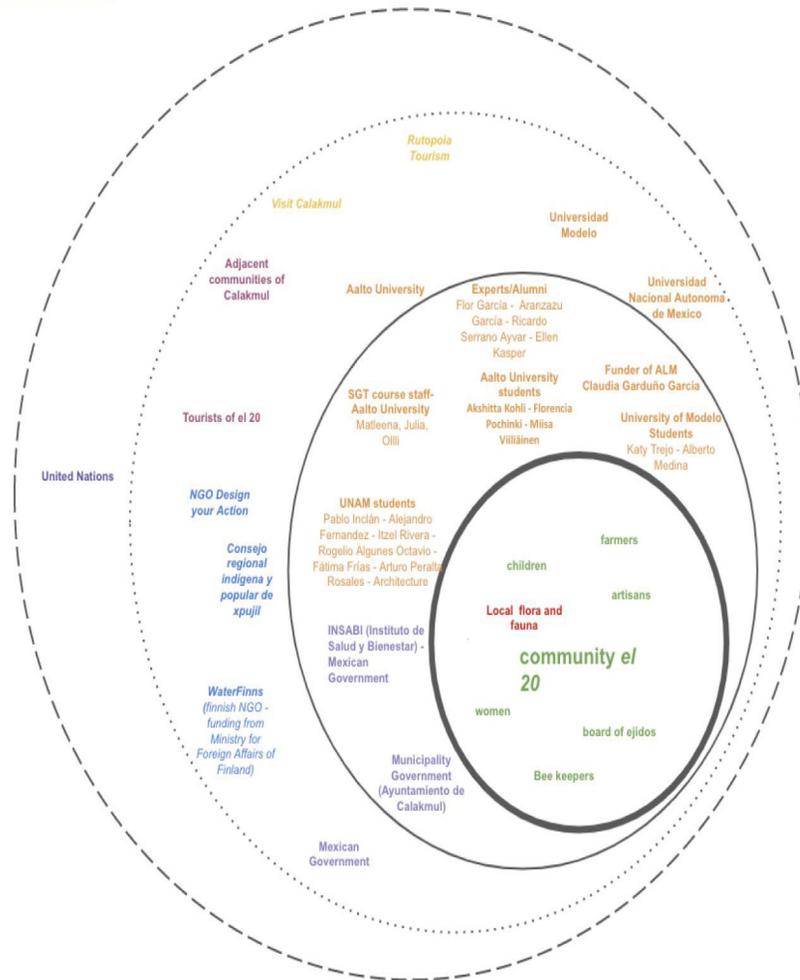


Figure 16 Stakeholder map created in the beginning of the project (ALM 2021)

The stakeholders are divided into five main categories, which are marked on different colors:

The community of El 20: Accounts for the members of the community of El 20, which are also at the core of the map as they have the most influence. Different actors among the community are recognized: the women, farmers, artisans, children, and beekeepers. The outcomes of the projects will affect these stakeholders differently. As the initiatives in question will directly affect the community, seeking their engagement is crucial for the implementation of the activities.

Academia: Includes the universities that were involved with the project, as well as actors that form part of this initiative through their link to these universities. This includes Aalto University and Helsinki University from Finland, and Universidad Nacional Autónoma de México and Universidad Modelo from Mexico. Both, this year's team members as well as previous years' team members who are still involved in the project are included in the map. It also includes the staff involved in the projects. For example, the STG course staff from Aalto University.

Governmental Organisms: Accounts for the governmental organisms that are directly or indirectly related to the project. In a close relation there is the Municipality Government (Ayuntamiento de Calakmul) as well as the INSABI (Institutos de Salud y Bienestar), which is the institute of health and well-being of the government of Mexico. Moreover, under this category is Mundo Maya, which is an organism of the Mexican government that aims to boost the development and tourism of the region that includes the states of Campeche, Chiapas, Quintana Roo, Tabasco y Yucatan). Then there is the Government of Mexico which affects directly or indirectly the community. In the case of the construction of the Tren Maya, for example, which is an initiative of the government, the community would be directly affected. Lastly, there is the United Nations.

Non-governmental organizations: Refers to the non-governmental organizations that are involved with the communities. WaterFinns is a Finnish NGO which applied for funding from the ministry for Foreign Affairs of Finland. Moreover, Design Your Action (DYA) is an NGO that provides funding to sustainable initiatives including the Aalto Lab Mexico. Lastly, the Consejo Regional Indígena y Popular de Xpujil is an intercultural organisation that aims to contribute towards a participatory democracy, autonomy and integral management of nature and implementation of projects that supports the *buen vivir* of the inhabitants of the region of Calakmul. This organisation is involved, for example, in representing the voice of the local communities in regard to the construction of the Tren Maya previously mentioned.

Non-human: Accounts for the local flora and fauna of the community. As preserving biodiversity is an important value for the community of El 20, we decided to name it as a stakeholder to be taken into consideration.

Ecotourism: Refers to the projects Visit Calakmul and Rutopia, both of which promote ecotourism in the community of El 20, among others.

Others: Includes the tourists of El 20 and adjacent communities.

5. Project experience

Implementation of ALM 21 was done by dividing the broader upper project into subprojects that were more specified. The Finnish team was working on three subprojects in a close collaboration with the Mexican team. There were many stakeholders involved in the projects of which most were in Mexico. Since this year travelling to EI 20 was not possible, it was crucial that communication within a team and between other teams worked well. It also had to be kept in mind when defining the final outputs, that those needed to be achievable remotely.

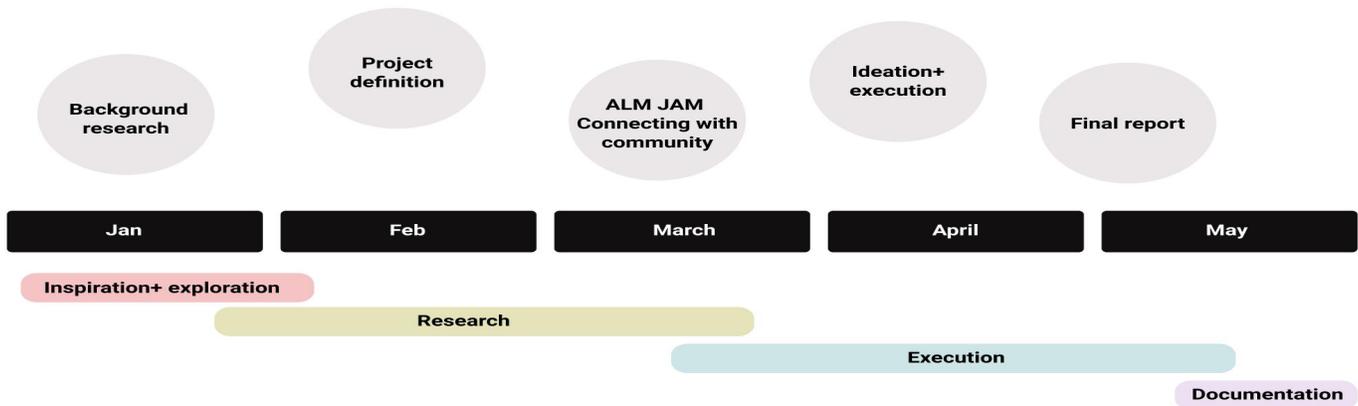


Figure 17 Timeline of ALM 2021 project (ALM 2021)

5.1. Inspiration and exploration

First part of the project included a lot of background research and understanding what the project is about, what has been done previously and what could be done next. When the research stage was done, workshops with experts helped us shape the projects and the desired objectives and outcomes.

5.2. Working in sub-teams

After the objectives and outcomes were set, started more in depth research within the working teams. This included workshops within the teams and expert interviews. Every team established their own way of working, their specific project timelines while still adhering to the larger project timelines. Time to time, the team members communicated to look at any cross team dependencies or sharing skill sets. There were five sub teams, each of which was catering to their individual project goals but also keeping in mind the larger goal of providing autonomy EI 20.

5.3. Intensive camp

Because it was not possible to travel to EI 20 due to Covid-19, it was decided to replace it with an intensive weekend. Main purpose of the weekend was to be able to have dedicated working time together with consideration of time difference. The students in Finland started working before students in Mexico woke up and continued working together until it was time for Aalto students to go to sleep. Every team had their own set objectives, which included interviews of EI 20 residents and alumni. The jam also gave the team an opportunity to collaborate and discuss ideas amongst themselves with some dedicated and focused time.

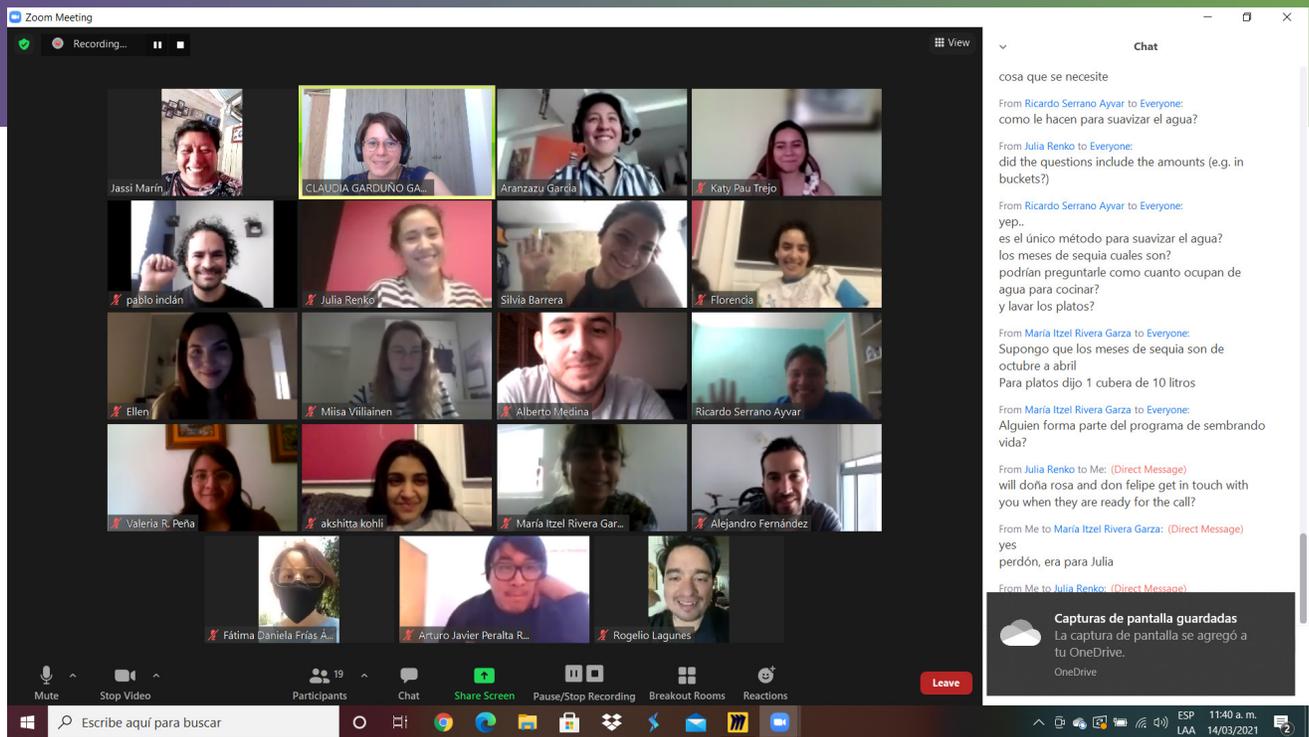


Figure 18 Interviewing Ofelia, a lady from El 20 (ALM Jam 2021)



Figure 19 Interview notes (ALM Jam 2021)

5.3.1. IDEO

The afternoon kicked off with a really inspiring talk by Gregory Perez, the managing director of IDEO. The afternoon inspired us to think about our role as designers and the challenges of designing for social change. Our most inspiring moment was the discussion around optimism and how it can inspire change. As Gregory Perez said, “It is crucial to be optimistic as a designer, as only optimism can inspire you to see the solution in a crisis and inspire you to facilitate the change you want to drive.” The talk inspired us to reimagine ourselves as not just problem solvers but also changemakers who can inspire people to envision innovative solutions to crucial problems.

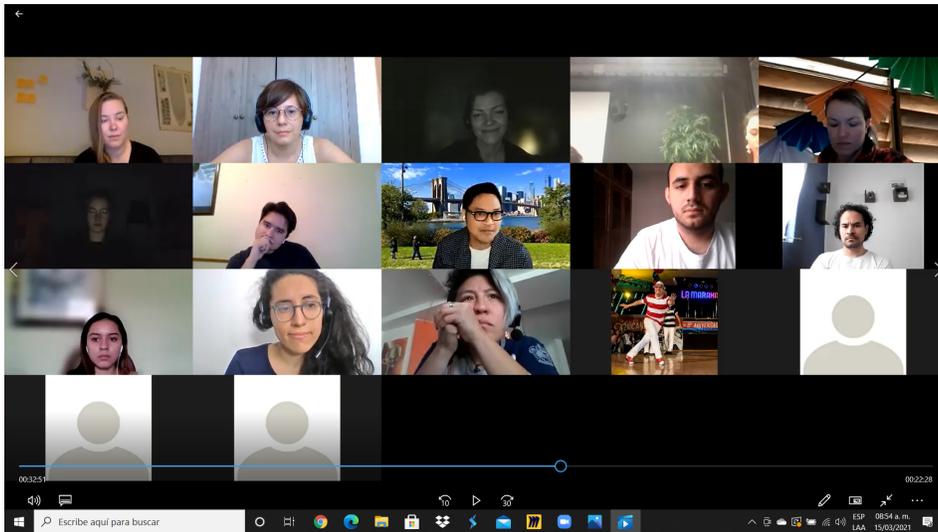


Figure 20 Talk with Gregory Perez, the managing director of IDEO (Picture taken at ALM Jam 2021)

5.3.2. Dance class/lifting team spirit

Thanks to Ricardo, we were lucky to get a private dance lesson from him, which was really nice! Even though we were far away from reaching his level of perfection, we thoroughly enjoyed ourselves and it helped us energise ourselves.

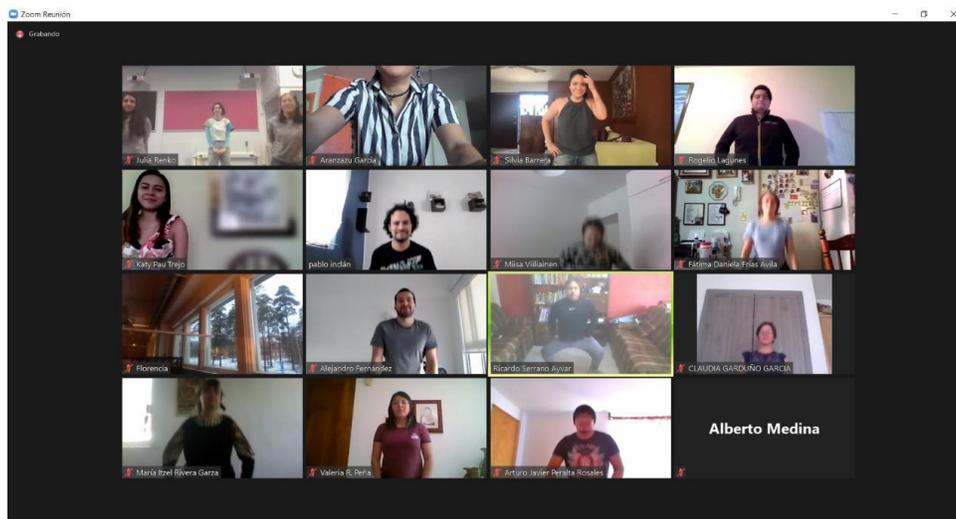


Figure 21 Dance lesson by Ricardo (Picture taken at ALM Jam 2021)

6. ALM 2021 Projects

6.1. Water project

Water project was chosen as one subproject because it has been part of ALM for many years but was not included in ALM 2020. Now with a water engineer in the Aalto team, it was brought back to be one focus of the project.

Initially the water project was planned to focus on fixing the Aljibe and rainwater collection system in La Casita, a water laboratory and making a water strategy document. Later on, the artificial lake design came to be part of it and the rainwater collection system at La Casita was postponed.

6.1.1. Water Strategy Document

The focus of the water project changed quite a bit during the planning phase and eventually was broadened to establish a water strategy in EI 20. This included gathering and writing a water strategy document which now has information of all water related projects that have been part of ALM in the past.

The process of gathering all relevant data required reviewing all previous ALM final reports and finding water related information, reading other ALM documents, interviewing current and previous ALM participants, gathering and analyzing weather data, and interviewing EI 20 residents.

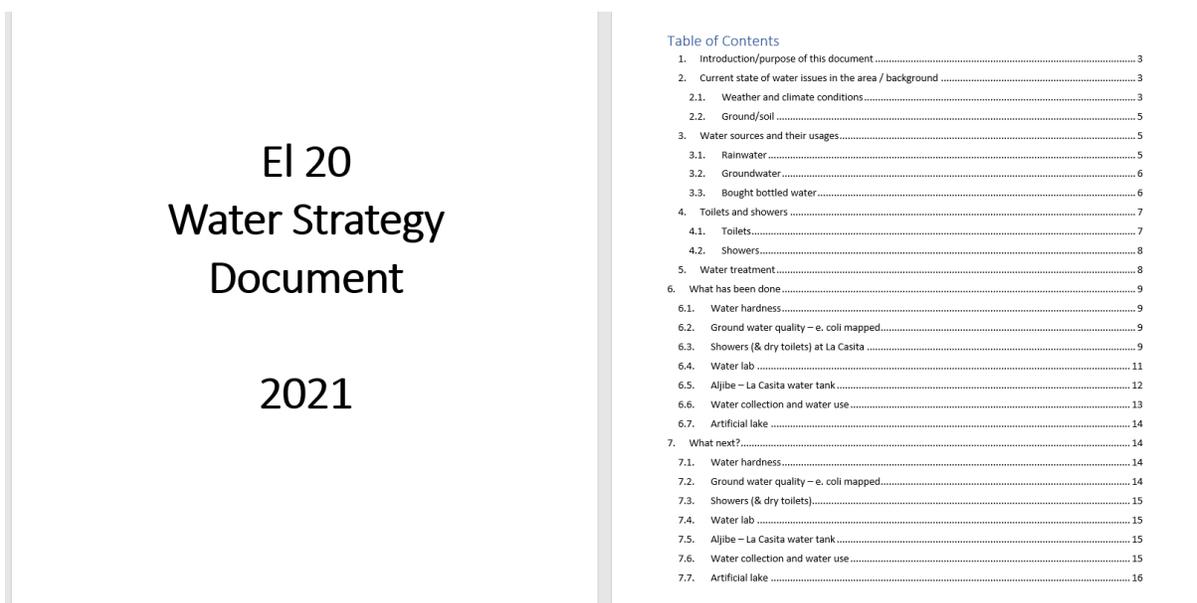


Figure 22 Cover and content of EI 20 water strategy document (EI 20 water strategy document, 2021)

The document's main purpose is to work as an introductory document for new students joining the project so that it is easier for them to find all relevant information from one place rather than reading many documents before finding what they are looking for. The water strategy document presents all previous water projects that have been part of ALM previously and also includes suggestions on what could be done next and how the water projects could be taken forward. The idea is that the document will be updated after every year so that the information stays up to date and it can serve as a background document for the next students. Hopefully, this will also help to keep the water project as a one main subproject of ALM in the future as well.

6.1.2. Water laboratory design

Purpose of the water laboratory is to give the EI 20 residents an opportunity to test the water they are consuming and to make sure it is suitable for human consumption. The laboratory building will be part of the La Casita Complex which ensures that the laboratory is achievable for the whole community. The planned tests

include pH test to test the water hardness and a bacteria test to make sure there are no E. coli in the water. To carry out the water laboratory design, we interviewed Juho, who is an alumni and a water expert who made experiments in EI 20 in 2018. He told us the following requirements and needs for a water laboratory in EI 20.

Requirements:

- no harsh environmental conditions needed
- A place for storage of laboratory material and instruments is required.
- An area for washing equipment.
- An oven for the cultivation of petri dishes.
- Space for a microscope.
- Tables are required for the handling of instruments and the application of laboratory tests.
- A refrigerator is required for storing samples.
- Local people should be encouraged and trained to make samples.
- There is the possibility of linking the laboratory with local universities.
- A room of at least 3mx4m in area can be solved in the laboratory.
- Wastewater requires special treatment that cannot be disposed of in a septic tank.

Equipment:

- glassware:
 - beakers from 50 ml to 2000 ml
 - measuring cylinders from 5 ml to 1000 ml
 - glass plates, diameter from 5 cm to 20 cm
 - filtration equipment (water suction, bottle with a nose, clamp, filter holder, filter papers)
 - burettes for titration (plus necessary support structures)
- pipettes, pastor pipets may be enough but proper ones to measure from 100 ul to 5 ml are also a good idea
- magnetic stirrer + magnet
- microscope to see what's in there
- oven/temperature controlled space for bacteria growth analysis (agar plates and such to go with them)
- fridge (maybe not necessary)
- sink
- table which is stable and an electronic scale (from 0.1 g to 2000 g for example)
- chemicals
- vacuum pump
- waste disposal system

Based on this information, the spatial requirements were complemented and contrasted by the Architecture Team to provide a solution that solves other problems such as cleaning and hygiene regarding the building materials, security, complementary activities, and aesthetics.

The water laboratory is part of a building which will allocate La casita Complex’s administration and a Room, which the architects call “La casita’s” evil twin.

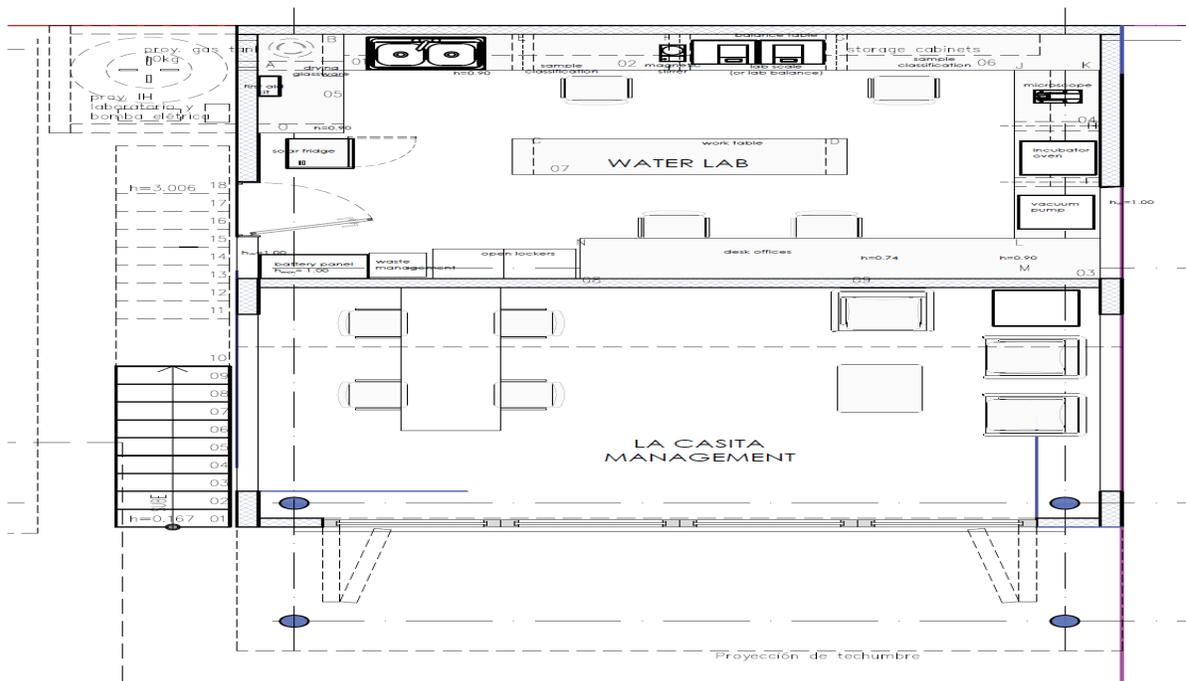


Figure 23 Blueprint of the designed water laboratory (ALM 2021)

Additionally, with this new information, a budget for the laboratory was made for the executive project which the phasing of its Work Breakdown Structure is summarized in the following Table.

Table 1 Budget for water laboratory

Work Phases	Mexican Pesos	Euros (25MXN/Euro)
Preliminary	\$31,803.24	€1,272.13
Foundation	\$41,631.77	€1,665.27
Masonry walls and Civil works	\$165,042.19	€6,601.69
Masonry ground floor	\$18,617.60	€744.70
Masonry slab.	\$47,305.44	€1,892.22
Plafond and ceilings	\$12,520.35	€500.81
Finishings	\$25,510.41	€1,020.42
Worktables and workstation bars	\$26,488.79	€1,059.55

Carpentry: Wooden Roof	\$71,113.13	€2,844.53
Carpentry: Walls	\$18,403.03	€736.12
Carpentry: Doors and Windows	\$38,128.48	€1,525.14
Steel and smithy work	\$18,695.00	€747.80
Stair	\$30,000.00	€1,200.00
MEP: Hydraulic Plumbing	\$13,034.35	€521.37
MEP: Sanitary Plumbing	\$12,000.00	€480.00
MEP: Gas.	\$8,000.00	€320.00
MEP: Electric	\$18,000.00	€720.00
MEP: Lighting.	\$1,500.00	€60.00
MEP: Security system	\$15,000.00	€600.00
Furniture: Administration	\$30,997.70	€1,239.91
Furniture: Lab	\$88,382.21	€3,535.29
Lab Equipment	\$240,409.60	€9,616.38
Glassware, and simple lab tools.	\$104,176.77	€4,167.07
Consumables and lab supplies.	\$8,792.81	€351.71
Material deliveries.	\$4,972.00	€198.88
Building Dump truck voyages.	\$1,950.00	€78.00
Site Cleaning and Sanitation	\$10,138.73	€389.95
10% of unforeseen situations	\$72,763.06	€2,910.52
5% overrun costs.	\$36,381.53	€1,455.26
TOTAL	\$1,211,758.19	€48,470.33
Note: The costs include Materials and labor, it does not include architects and engineers' fees, indirect costs, profit, and taxes.		

6.1.3. Water use analysis

The water use habits of EI 20 residents were analyzed in order to better understand how long their rainwater reservoirs last and how they need to change their water use during the dry seasons. For this, Ofelia, a local lady from EI 20, was interviewed remotely and calculations and scenarios made based on her family's water use. Of course, every household is different and uses water differently and needs to be kept in mind that these scenarios are estimates.

In the first scenario rainwater was used for drinking, cooking, showering, washing dishes and laundry. The water use was assumed to stay constant throughout the year.

Ofelia also mentioned that they have to start using other water sources in dry seasons in order to have enough

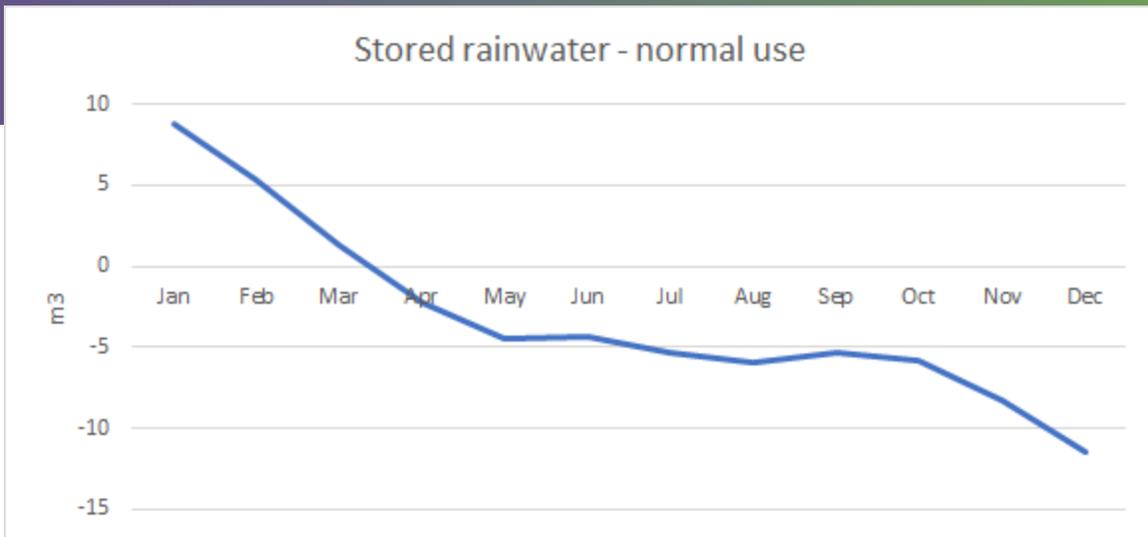


Figure 24 Amount of stored rainwater with constant use (Water use analysis, 2021)

rainwater for the most important purposes. In the second scenario the rainwater use was assumed to be different during the dry season, from November to April. During the dry season rainwater is only used for drinking, cooking, and washing dishes.

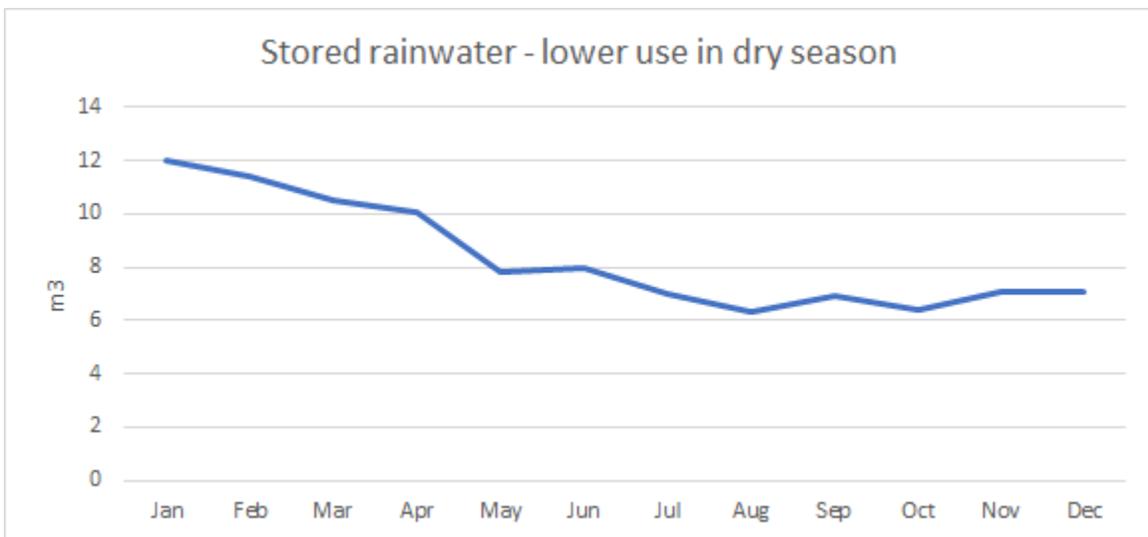


Figure 25 Amount of stored rainwater when water use is lower during dry season (Water use analysis, 2021)

As it can be seen from the second scenario, with altered water use habits during the dry season the stored rainwater can almost stay at a constant level through the year. However, this means that the residents need to rely on other, not so good, water sources to meet the demand.

6.1.4. Artificial lake design

The artificial lake is planned to work as a backup rainwater source during the dry seasons when the residents' own rainwater storages are already used. This way the people can use better quality water throughout the year, and they don't need to use the bad quality groundwater or to buy water. The lake project will enhance the autonomy of the community by having their own water source and not having to buy water from outside of the community and not having to consume bad quality water and thus decrease waterborne illnesses and possible doctoral needs.

The calculated annual rainwater deficit in EI 20 is 5 200 m³. This number is obtained from the water use analysis which is described in the previous chapter. However, since the population of EI 20 is assumed to grow in the future, the lake should be able to provide a bit more than the calculated annual deficit.

Table 2 Numbers for lake volume

Total annual rainwater use at EI 20 houses	13 000 m ³
Total annual harvested rainwater at EI 20 houses	7 800 m ³
Annual deficit	5 200 m ³

In Mexico's case it is important to consider the evaporation of a lake because it can be really high in this climate. It was calculated that if there was nothing controlling the evaporation the volume of the lake would need to be almost double. Therefore, it was decided that there should be some kind of cover.

The lake is going to be located uphill near the bird watching outpost, as is shown in figure 26. Despite the volume calculations and the location, the spatial requirements need further study and other studies in the site like soil mechanics. There are also alternative approaches like bio pools that are needed to be considered to understand and have a better project.

However, in a traditional approach, the preliminary work breakdown structure is considering the following phases: Preliminary works includes tree cutting, leveling terraces and. The second one is containment walls, dams. The third involves the installation of the flooring made with a geotextile, a concrete slab, and a waterproofing geomembrane. The fourth involves the MEP installations and a 1.1Km Pipeline required to grant water supply to La Casita's Aljibe, and a shading protection system to slow down evaporation rate. These phases also require more study to refine the project. The preliminary estimated cost is approximately \$4,000,000.00 MXN (€160,000.00).

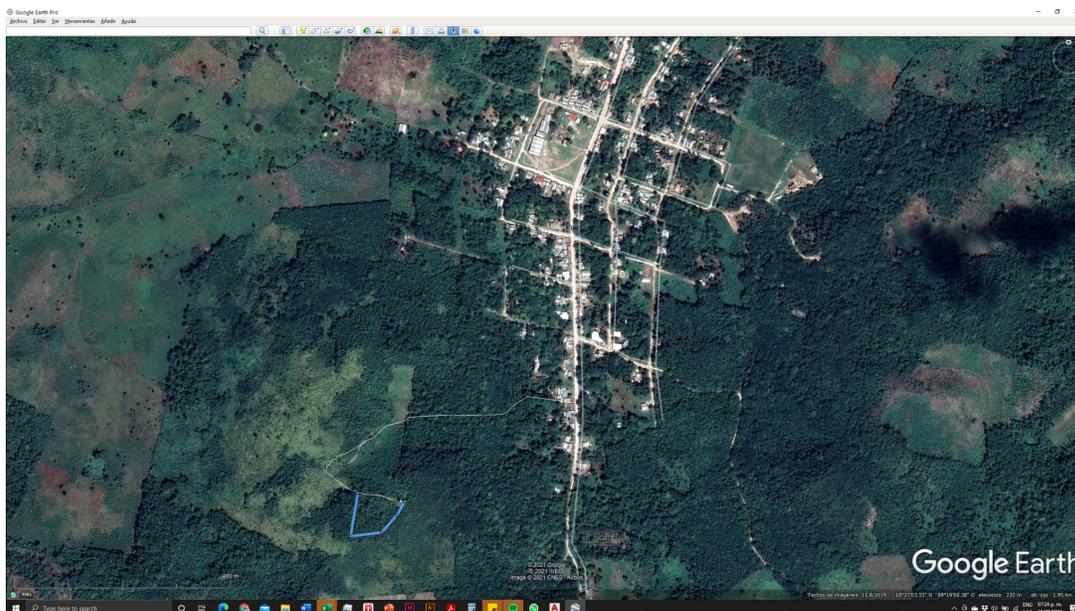


Figure 26 Map of location of the artificial based on coordinates provided by Daniel

6.1.5. Plan to fix the Aljibe

The Aljibe is a large water tank located in the center of the La Casita complex and its purpose will be to provide water for the La Casita kitchen where school lunches are cooked and for the tourists and other people using the complex. At the moment Aljibe is cracked and it needs to be fixed from the inside and outside to be fully operational.

The Work Breakdown Structure establishes 5 main phases: The first phase is called preliminary, includes a cleaning, tracing and leveling, retrieval of metallic roof, demolition of small walls and trench excavations. The second one is the repair jobs from the inside, this includes hole, cracks and fissures fillings, corrective works to reshape the slope, a concrete chamfer with sealant and a 3 layered coating of concrete sealers. The third phase, the jobs are located outside the tank, works includes the collocation of a vulcanized waterproof rubber roll membrane, a gravel drain sustained with a geotextile from the side, and a fully perforated pipe with 12" in diameter. The fourth phase are new concrete and masonry works, these include, a floor perimeter, and a self-supporting slab, beams and columns that cover the 10m in diameter in span and waterproofing coating, and finally, the fifth phase is site cleaning and sanitation. However, the works do not include water supply installations to buildings, which will be considered to the buildings separately.

In figure 27, expresses the technical requirements in detail to get the aljibe operational. And in table 3, the budget is summarized with these main phases of the work breakdown structure.

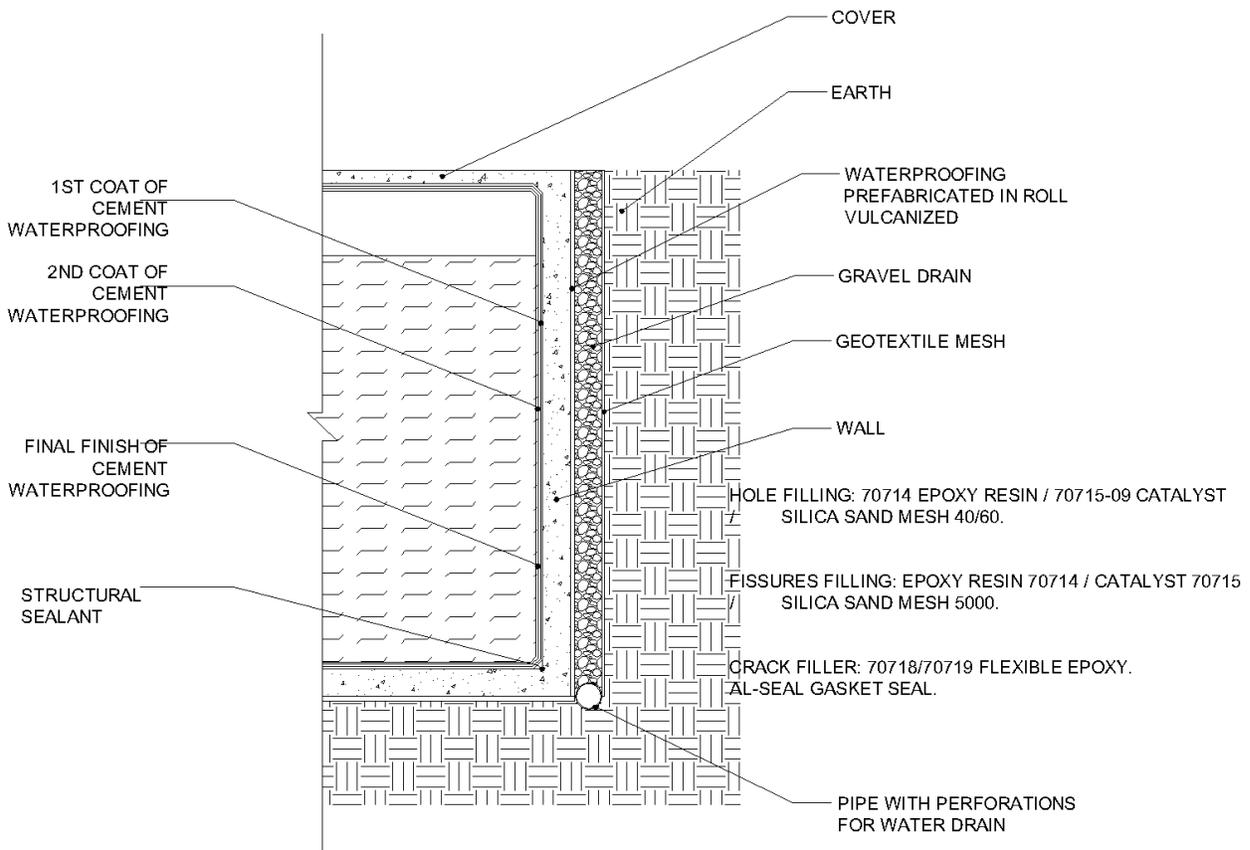


Figure 27 Plan how Aljibe will be fixed (ALM 2021)

Table 3 Budget for repairing Aljibe (ALM 2021)

Work Phases	Mexican Pesos	Euros (25MXN/Euro)
Preliminary	\$57,891.24	€2,315.65
Repairing jobs inside the Aljibe	\$73,503.97	€2,940.16
Repairing jobs outside the Aljibe	\$80,295.25	€3,211.81
New concrete and masonry works (Slab)	\$401,216.67	€16,048.67
Site Cleaning and Sanitation	\$10,138.73	€405.55
10% of unforeseen situations	\$62,304.59	€2,492.38
5% overrun costs.	\$36,381.53	€1,225.81
TOTAL	\$721,731.98	€28,640.81
Note: The costs include Materials and labor, it does not include architects and engineers' fees, indirect costs, profit, and taxes.		

6.1.6. Gonzalo Río Arronte fund application

The team found Gonzalo Río Arronte application funding for water issues. The work was divided to fill the documents, the budget, work breakdown structure and phasing, material takeoffs and stakeholders in the project.

And for framing the problem-solution strategy the team made a logical framework, a problem tree, an objective tree, and alternative seeking, shown in the Appendix 1.

6.1.7. Beneficiaries

Direct beneficiaries of improving the water availability and quality are all the inhabitants of El 20, which includes around 500 people. Since the La Casita building is used for cooking lunches for the school children, repairing the water tank next to it would especially benefit the children and their mothers who do the cooking.

By increasing the quantity of drinkable water in the community, the families will benefit by saving money from not having to buy water and also from having fewer water borne illnesses. This way money will be saved for other unexpected expenses.

Direct beneficiaries of the water strategy document are especially the students joining the Action Lab Mexico project in the coming years. They benefit by having a document combining all water relevant information into one place.

One group of final beneficiaries are the tourists visiting the community. It is planned that the tourists will be accommodated at the La Casita complex, but at the moment the infrastructure does not yet allow it because there are no toilets and showers. Also, the locals who do the cooking for tourists would save their own water sources when not having to use those.

Finally, the water project can act as a pioneer and provide good knowledge for the other 81 communities in the area and potentially other projects executed in similar settings.

6.1.8. Sustainability

The first subproject and establishing a water strategy for EI 20 has a clear link to financial sustainability, since by improving the current water situation the community does not need to rely on bought water as much and will help them save money. The future rainwater collection system and artificial lake will be working autonomously meaning that it will continue working on its own without costs once the project is done. The planned collection system with a filter will require some maintenance that might cause some expenses, but in the long run will be more financially sustainable than buying water.

It has been reported that once collected rainwater runs out, some families rely on bought water and others have to use the lower quality groundwater, maybe due to financial reasons. By improving the availability of higher quality water in the community, it would help bridging the social equity gap between families.

The water project is planned in a way that will function autonomously with some maintenance needed. When the system is constructed, the process will have participants from the community who will know how it works and will also introduce it to the other members of the community. The same people can also be taught how to do the maintenance work; hence no outside support is needed.

By increasing the accessibility to good quality water in the community, the need to buy water from outside the community will decrease and therefore also the generated transportation emissions are lower. Also, since the materials and technology that will be used in construction are local, there are less emissions transporting them. For example, the rainwater collection system that has already been planned initially for La Casita complex is provided by a Mexican company.

6.2. Honey project

Apiculture constitutes as a primary source of income for the community as 50% of the community population is involved in apiculture in one way or another. The goal of the project was to create better livelihood opportunities for the apiculture community of EI20.

The first outcome of the project was focused on providing solutions for organic honey producers to get fair wages for their labor. In most cases, the honey was sold to middlemen for really cheap prices for instant cash. The great quality of the organic honey enables these middlemen to sell it to bigger corporations at high prices. The end goal is to eventually enable the honey producers to be able to cut the middleman out and directly sell to the customer.

Another important part of the Melipona apiculture product is the women who work tirelessly to create these products. Strengthening the role of these women and rewarding the labor they put into the handicrafts is an important part of the cultural identity of EI 20.

6.2.1 Research

To kickstart the project, it was crucial for us to get a deeper understanding of the community culture, sources of income and the production and functioning of the apiculture system. Our entire research phase took about 1.5 months. Our research approach was a mix of secondary and primary research methods where we explored literature as well as spoke with various stakeholders and experts.

6.2.1.1 Secondary research

Our secondary research consisted of primarily reading about the community online and going through all the relevant literature that was available on the web. Our primary source of information also came from past years project reports which gave us a good understanding of the community culture, traditions as well as some pain points and opportunities. Another important research area was websites which cater to tourists in regions in and around el20. The information in these spaces gave us a good understanding of the current situation of tourism, and the key attractions.

6.2.1.1 Primary research

We conducted 1:1 quantitative research interviews to get deeper first hand insights about the community, their day to day activities, culture, traditions and current pain points. We primarily spoke with community members, primarily people working with apiculture, experts who have assisted the community in the past on honey projects, and ALM alumni who gave us an honest picture of their experiences of visiting the community over the past few years.



Figure 29: Overview of all the people we spoke with as a part of our quantitative research.

6.2.2 Insight analysis

After we gathered all the interview data, we started analysing it and putting it into common themes and problems that emerged as a part of the honey proces. Another important aspect was to make sense of all the data that we had gathered by putting it into a more consumable format. Some of the key insights that we gathered around production and selling of Organic and melipona honey are as follows:

Organic honey (Apis Melifera) :

Selling honey at low prices to the middleman.

The honey producers are forced to sell their honey at low prices to the middleman as they don't have many options to sell directly to the customer. The transportation to and from the community does not attract many dealers and competition to choose from. Transporting the honey jars to the city takes longer and is more expensive.

Lack of financial stability from the honey income. Selling assets for health emergencies

The community has to resort to selling their assets like land and honey hives to make up for unexpected expenses, especially healthcare emergencies. We heard many stories during our interviews and in the past where families in the community have sold their jabones (honey hives) to pay for healthcare emergencies at home.

There is no proper support to upgrade skill sets for honey production and sale

The honey producers in the community do not have any support or way to upgrade their skill sets and hence have to resort to selling at cheaper prices to the middlemen. Providing opportunities to expand skill sets or selling techniques could enable them to expand their consumer market.

Low awareness about the community and honey leading to low sale

There haven't been many outreach programmes to generate awareness about the community and the high quality honey produced in EI20. Most information spreads to tourists through word of mouth which leads to some sales in the community.

Low money leading to low or no maintenance of hives

As the income from the sale of honey is not consistent, there is a problem ensuring constant maintenance of hives.

No tourists visiting the community and purchasing honey due to the pandemic

Due to the pandemic, tourism in the community has taken a huge hit and the honey sales have drastically reduced, leading to lower incomes.

Remote location of the community and poor transportation leading to the community.

The location of EI20 affects tourism and restricts the middlemen who visit the community to buy honey. Due to this, not many dealers visit the community, which in turn reduces competition for the producers and forces them to sell the honey to the middlemen at low prices.

Melipona honey :

Low income: There is very little economic profit from the sale of melipona honey and honey based **cosmetics**. **The number of women working with Melipona honey has reduced over the years as they don't see much value in continuing with the process due to really low incomes. The women who work with Melipona also don't have access to markets where the honey can be sold for really low prices.**

Jabones are sold for health expenses/ emergencies

Similar to organic honey, the melipona hives are also sold for health emergencies as the community does not have spare savings to support these unexpected expenses.

No money for melipona preservation

There is no spare money to work on the preservation of the melipona bee, which is a huge part of mayan culture and tradition and is nearing extinction. Taking care of melipona requires the carer to plant specific plants, and to protect them, which requires the right tools, skill sets and some economic capital.

Bee health

Keeping the Melipona bees healthy is a huge problem currently as it requires the right skill sets. At the moment, the bees aren't healthy and don't have strong hives, which results in less honey being produced, eventually leading to lower incomes. In the past, there have been some NGO's who have supported the women with the right skills to produce honey , but the support eventually stopped and women then found it difficult to keep the bees healthy without any skill support.

Lack of marketing / sale support

There is a need to help women with more marketing and sales support in order to sell cosmetics made using melipona honey. Women working with melipona seem to be more interested in selling cosmetics as it requires less honey production and might lead to more income.

Dependency on the season for growth

Jobones are dying over the years and its extremely hard to grow them. There are lesser and lesser jobones over the years and one of the biggest reasons is the weather. There has been a dry season, which has made it difficult for the right flowers to grow and hence not much honey has been produced. Another issue is with the plaque mosquito, which is really difficult to control and affects the flora responsible for honey production.

6.2.3 System mapping

After our research phase, it was important to start making sense of all the information gathered and start plotting the honey system in a map that enables us to see the relationships between different parts of the honey ecosystem. We got together as a team and plotted a system map on Miro to understand these relationships and find opportunity areas to solve for. Fig 30 shows a picture of the system map, and the circles in yellow show pain points that can be leveraged as opportunity areas to solve for as a part of the honey project.

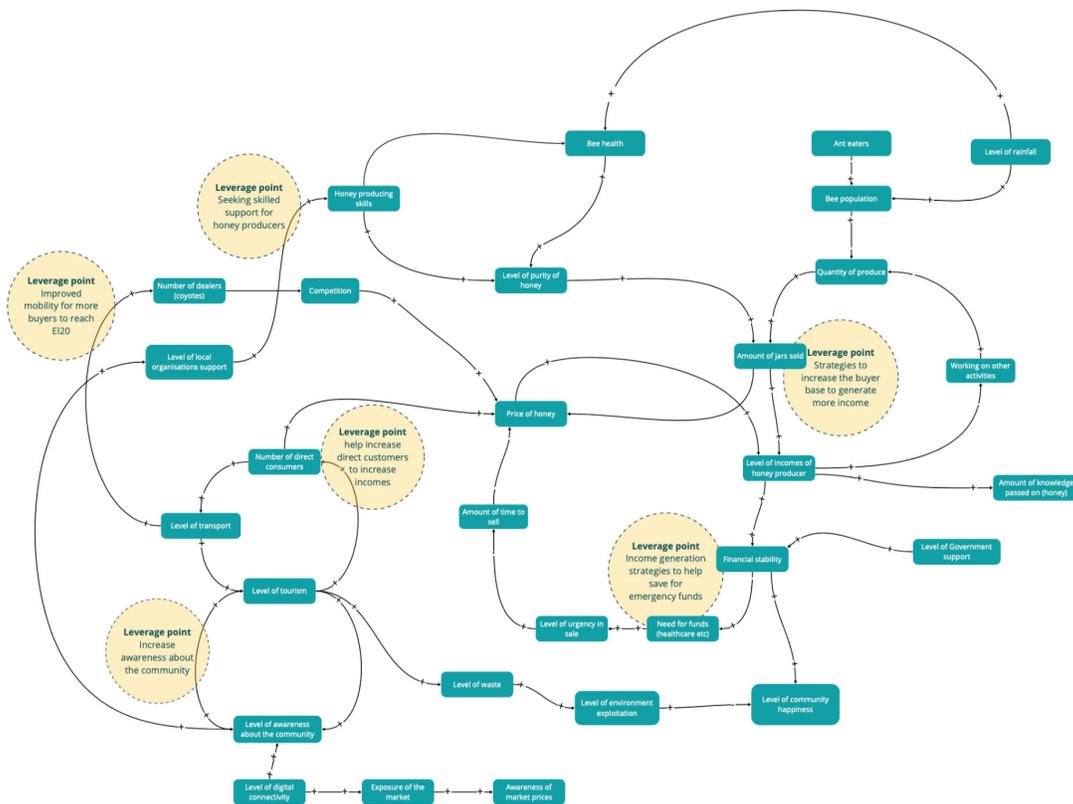


Figure 30: System map of organic honey ecosystem exploring various relationships in the system

6.2.4 Ideation workshop

After the system map, we held a workshop within the design team to narrow down our problem statement and brainstorm ideas on the focused pain points. The workshop primarily focused on ideation and refinement for **organic honey project**.

Step 1: Exploring all problem areas

We started by writing down all the problem areas that came out from our research and system mapping. Everyone in the team took 5-10 mins to review the problem areas and add their own (if required).

Step 2: Shortlisting problem areas

Once all the problem areas have been listed, every member in the team takes 10 mins to individually review the pain points and vote to shortlist the ones to focus on. Every member votes by putting a red dot on the problem area. The voting is done on the basis of the impact of the problem and the feasibility to fix it as a part of the project.



Figure 31: Problem areas listed by the team and then dot voted by everyone.

Step 3: Refining the problem statement

Based on the dot voting, we prioritized 3 problem areas that we wanted to go after. We took 5-10 mins to expand on each of the problem areas and then refined our final problem statement.

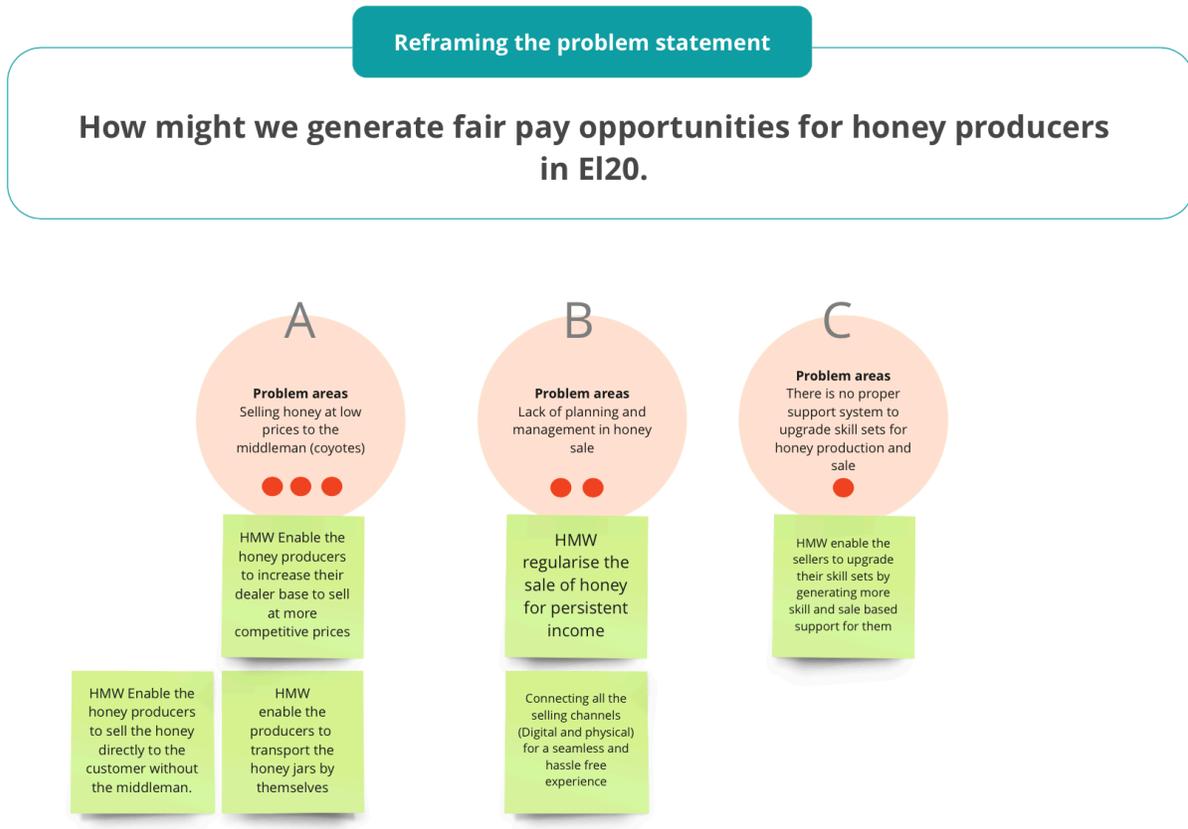


Figure 32: Refined problem statement

Step 4: Brainstorming ideas

After refining our problem statement, we took 15 mins to brainstorm as a team and added all our ideas on one common MIRO board. Every member presented their ideas to the team and then we then took 5 mins to group all similar ideas together in order to start voting on them.

Step 5: Dot voting on ideas

After grouping the ideas, we started dot voting on the ideas with the most potential by placing a red dot next to the idea post- it. Every team member got 2 votes to place them against the idea with the most potential.



Figure 33: Idea brainstorming board

Step 6: Detailing out selected ideas

After this, we took the shortlisted ideas and started to prioritise them. We took the top 3-4 ideas and detailed them out further individually by placing green post-its under the selected yellow ideas.

Detailing out selected ideas

Take the final ideas and start to prioritise them. Take the top 3-4 ideas and detail them out further. Voting round 2 after.

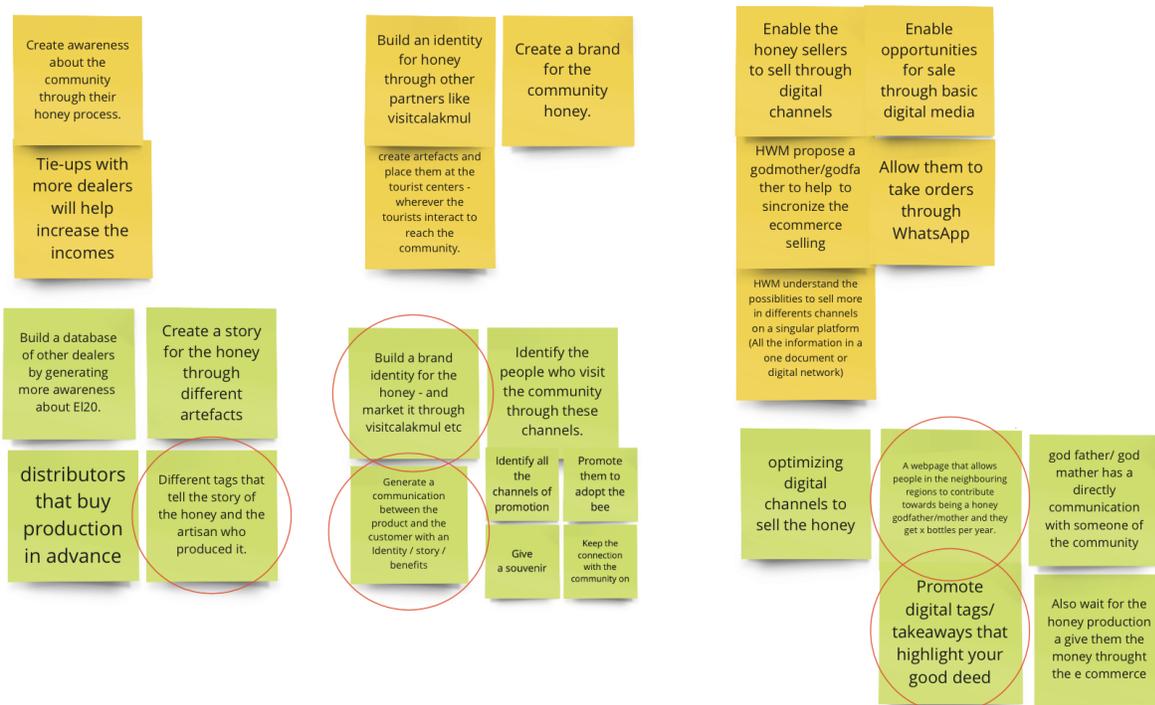


Figure 34: Miro board with the selected and detailed ideas.

Step 7: Finalising details

Once the ideas were detailed out, everyone presented their ideas to the group and we decided on the final details to take ahead as a group by circling them with mutual group consent. This was possible since it was a small group of 4 designers and hence allowed us to achieve at the end of the discussion much faster.

The workshop took 2 hours and enabled us to focus on our problem areas, brainstorm ideas and detail them out together as a group. It was a highly productive session that led us to our next steps and enabled us to proceed in a more focused manner for the project.

Melipona honey

For Melipona honey, we were pretty clear about the problem areas we wanted to close on as a group. We decided on the key areas we wanted to focus on and brainstormed on key solutions to target the problem. Fig 35., shows the key pain points we focused on and the solutions to target them.

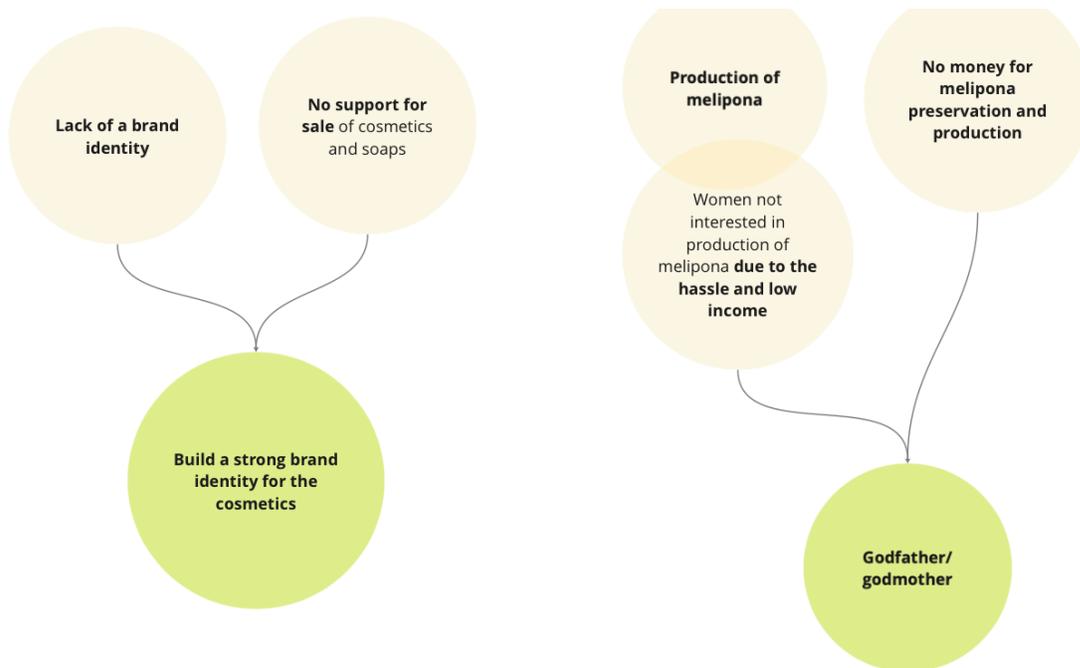


Figure 35 Key pain points and solutions for Melipona honey

6.2.5 Final output proposal

Fig36. Shows an overview of our proposed strategy for the Honey project. The primary proposal consists of a platform (marked in a blue circle) which consists of both physical and digital components. A platform is looked at as a bridge between the community and consumers. We imagine the platform to be a space that is digital and connects the community to various stakeholders and consumers by the means of physical and digital touchpoints.

Our proposal connects both types of honey, organic and melipona to one common space.

Figure 36: Proposal diagram for honey project

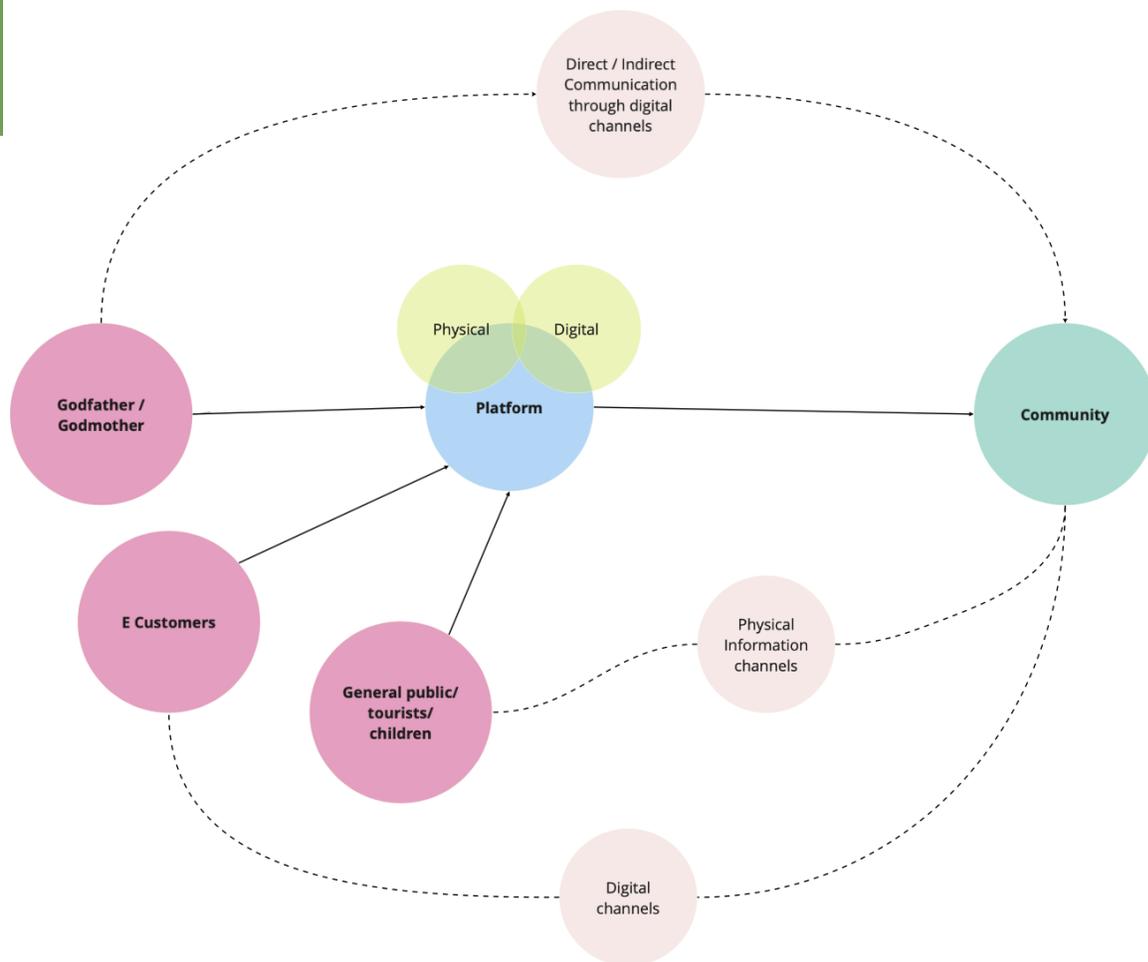


Figure 36: Proposal diagram for honey project

6.2.5.1 Organic honey solution

For organic honey, our long term goal is to connect consumers directly with the beekeepers of EI20 to generate fair commerce. We aim to do this by starting to generate awareness about the community through physical and digital channels. Our focus is to connect the general public, tourists and children with the community by learning about the culture, traditions and the craft of honey making in EI 20. Fig 37. shows a strategy map created for organic honey where we have plotted various ideas along the journey of the sale of honey. These ideas are primarily plotted with the aim to eventually cut the middleman out and allow the honey producers to build their own customer base and connect with them. For every stage of the honey sale process- from discovery of the honey to selling, we have listed the ideas, how they can be executed, the key beneficiaries and target users for each idea, as well as the platform of idea execution.

The circles marked in green are ideas and activities which will have to be directly conducted with the community in order to achieve the desired end goal.

We decided to pick a small part of the strategy and implement it as a part of the project. The discovery of the community as well as the honey craft was the most crucial and initial step in order to build on the customer base and get people aware of EI20 and the hard work behind the honey produced in the community. Focusing on the discovery part will not only help us promote the community but also also open up doors for multiple collaborations.

Our main concept is a game, inspired by the children of EI20. The origami game called “Vente al Veinte”, directly translates to come to EI20 and is created to raise awareness about the community through an interactive learning experience. Every flap of the game opens up new illustrated information about the

community. The 4 key information buckets built into the game are - El20, tradition and culture, melipona honey and organic honey. The game will be placed in different tourist places like tourist meeting points and bookstores in cities surrounding El20. This game folds into a postcard and opens into a map of the community. The form enables it to be placed on regular postcard shelves in bookstores and also serves as a way to spread community art. This product will also have the link for a community website platform which will allow people to read more about the community and their practice of honey and even donate to the community through the digital platform. Fig 38 shows some images of the game concept.

Strategy ideas for organic honey

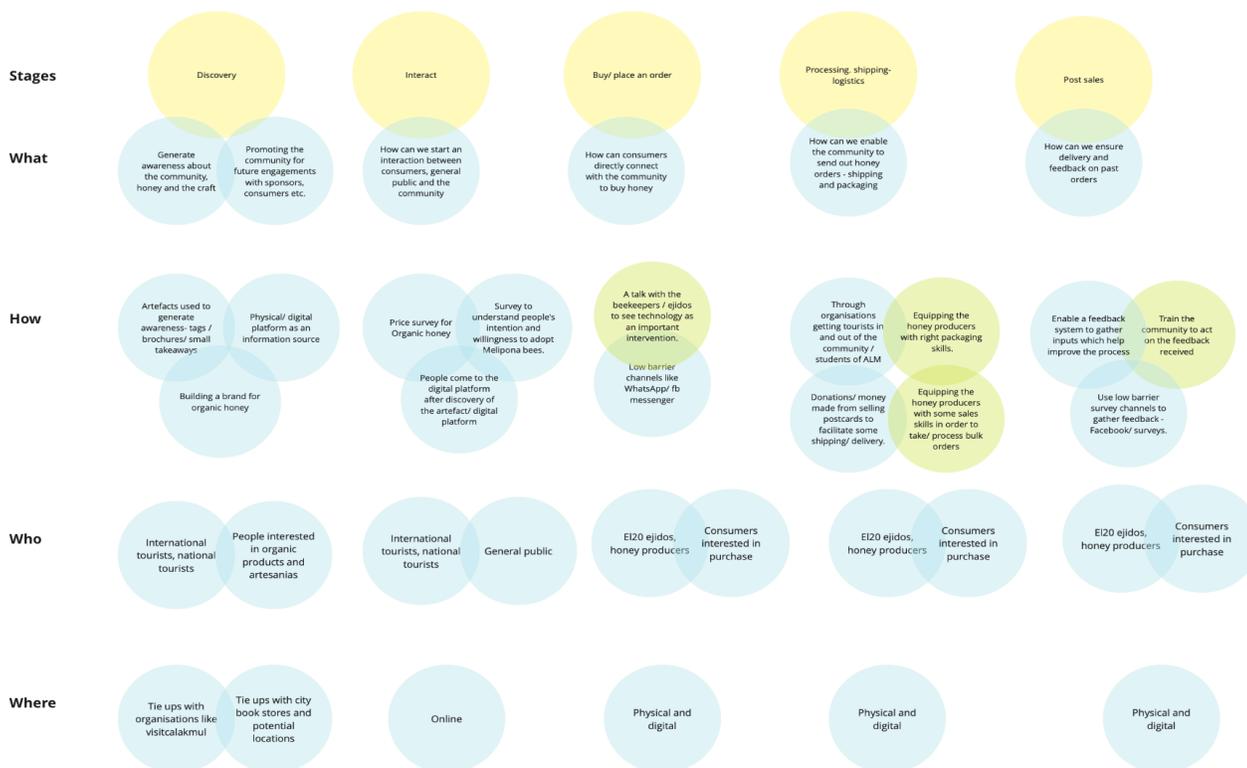


Figure 37: Strategy ideas for organic honey

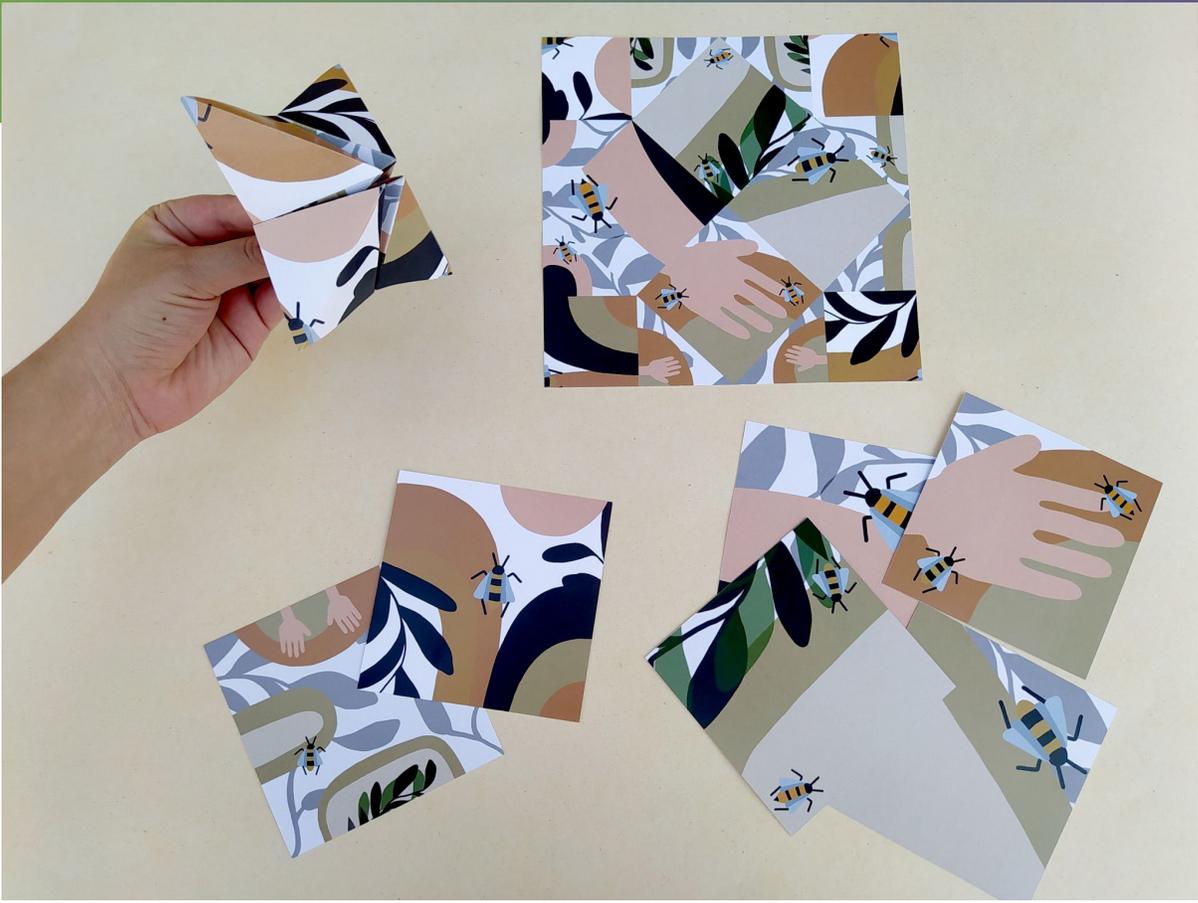




Figure 38: “Vente al Veinte”, an interactive game inspired by the children of EI20.

6.2.5.2 Melipona honey strategy

For the preservation of the Melipona bee, we propose a platform that will enable people to become godfathers and godmothers for the melipona bee by adopting a Jobone which is a traditional beehive. With this contribution, the women of EL20 working with melipona will be able to have a regular income so they can focus on taking care of the preservation of the Melipona bee. The contribution that comes from the adoption of the beehive will be a part of the melipona preservation fund, which will be setup to take care of all melipona related activities. Fig39, shows the journey map for melipona from discovery of the platform till successful adoption of the hive. The future plan is to connect the godfathers and godmothers to the community women who work with Melipona and this can be done by progressively updating digital channels in the community. The map also represents a communication plan with possible current and future digital channels that can be explored for this communication.

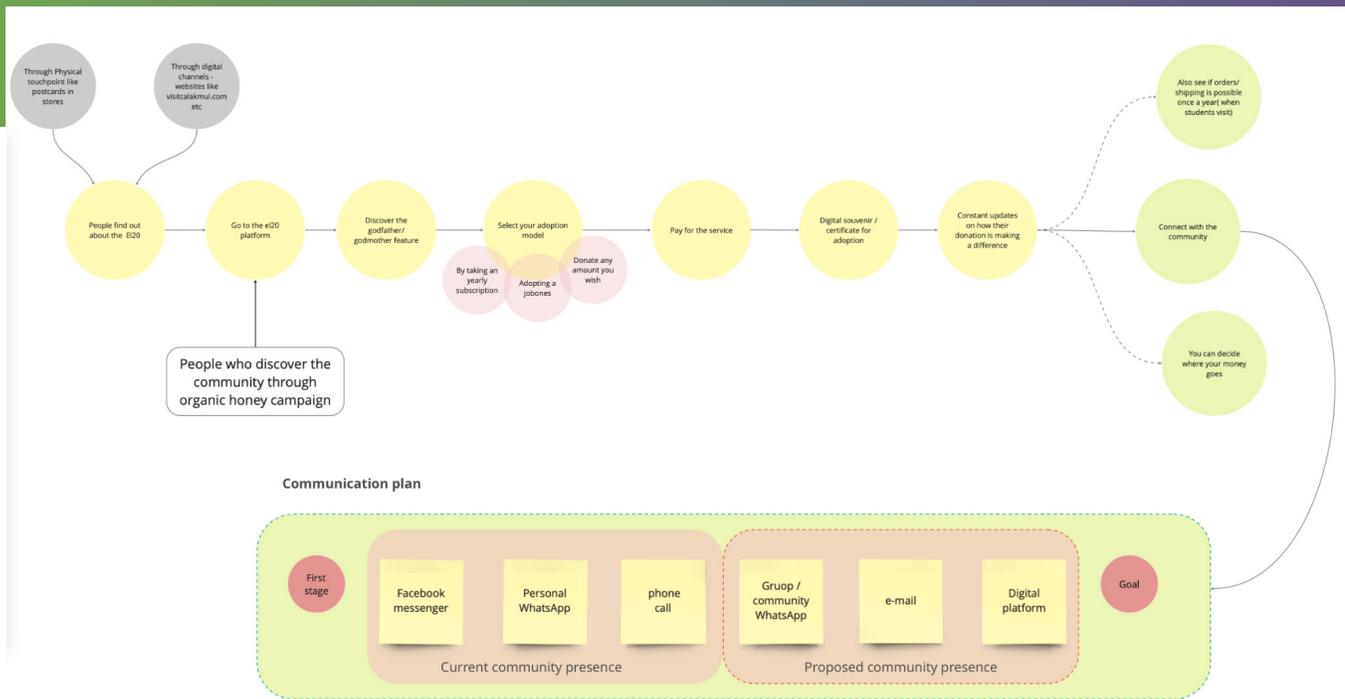


Figure 39: Strategy map for Melipona honey depicting the godfather / godmother project adoption.

6.2.6. Sustainability

The second subproject of strengthening the apiculture identity of the EI 20 community will directly have an impact on the financial condition of the community as apiculture serves as a primary source of income for many in the community. We will start by plotting the apiculture system and identifying various loops to understand the impact of one aspect of the system on another. The map will help us identify pain points and opportunities which will help us arrive at solutions to cut the middle man and allow the producers to reap direct cost benefits from the sale of honey. This will enable more financial sustainability. Strengthening the brand identity of the melipona honey will flourish more tourism and enable the apiculture community to flourish.

The apiculture project focusing on Melipona honey will also directly enable the community to look at the role of women in their society as well as preserve their cultural identity by keeping the Melipona tradition alive. It will enable the community to preserve their local traditions and practices of creating Melipona honey. Enhancing the brand identity of the melipona honey will enable more income generation or the melipona preservation fund, which will help the community to keep producing more Melipona honey, which is a crucial part of their cultural heritage. The promotion of Melipona will also be done through the lens of women who are behind the preservation and creation of melipona honey and cosmetics. This will also help bridge the gender inequality gap within the community and make the women feel more empowered.

6.3. Cookbook

The third outcome is related to the creation of a book about the community of EI 20 and to create a strategy to commercialize it in order to create revenue to be invested in the community.

The idea of the book was originated by last year's team. The idea proposed is to narrate the experience of women, with a strong focus on portraying the role that women have in the community of el 20. The skeleton of the book are the ingredients that are grown in the lands of the community, and around these ingredients the stories gathered from women would be narrated, as a way of making a tribute to the local kitchen and Mayan culture.

Also, now that our focus was the practices related to gastronomy that allowed for food sovereignty, the seed crafts project Neek Ich Che, which was put on the table by the 2020 team, was brought up once again as an excellent example of sustainable and autonomous practices. Though it may sound very simple, the concept and philosophy behind this project is amazing; for once, the seeds they use to make the jewelry are only the ones not suitable for sowing, so instead of throwing them away, they make something beautiful and representative of the community with it. On the other hand, the seeds that actually are fertile, are used to repopulate the trees and plants of the area, in an effort to conserve the endemic species of plants but also animals; this is why they take such good care of the seeds; they know they are the most important aspect of the chain that sustains life in El 20.

Another aspect that came out of the conversation with Midael and his family (the people who started Neek Ich Che project), was that the mayan heritage is being lost within the members of the community, because nowadays, the only people who speak Mayan for example, are some of the elders, the grandparents of El 20; the same is happening with the medicinal plant knowledge, and he believes this is because the youngest people don't want to stay in the community and prefer to go live in a big city.

This is when we came to the idea that in order to also show the value of El 20's way of life and practices within the youngest population of the community, we could involve them in this project that was actually gathering proof of all these cultural and social virtues. So we decided to plan an activity that would allow us to know more from El 20 from the perspective of the people who will actually be the future of the place, in the context of the COVID pandemic, which doesn't allow us to visit the community physically. We came up with the idea of asking children to be our field researchers, telling us what they love about their home, regarding all of the topics shown in the proposed index: food, kitchen, agriculture, social connection, etc., all through photos, drawings, texts or even sending voice messages. In exchange, they would be included in the book as co-authors, thus motivating them to really engage with the activity, and be honest and true to the task.

6.3.1. Sustainability

The third subproject which was related to the development and commercialization of a book that aims to contribute to financial sustainability by providing a direct impact to the community, as the profit generated would be for the community. Is still under discussion the allocation of the profits, and if weather would be assigned for a specific investment for the community, for example, to improve the water situation. In this case the financial sustainability is in relation to an investment that would make the community more independent in terms of for example water supplies or to keep their food sovereignty.

The third outcome could have a direct impact in the community as it aims to provide an income that could be implemented to reduce inequality. The allocation of the profit is going to be discussed during the project. Some of the proposals are that the revenue would be allocated for La Casita and/or to improve the water conditions. In this sense, the revenue could be beneficial in that it contributes to their ability to be independent in regard to the food the community consumes. This could avoid the necessity to spend money on bringing food from outside the community and could help reduce inequality. The improvement of La Casita Complex could improve the situation of women as it could provide an income for them. For example, when used as a place for cooking for tourists.

The book project would be developed alongside with the community. The content of the book will be consulted with women and farmers of El 20. Moreover, the allocation of the revenue would be discussed with members of the community in order

6.4. Funding strategy

A good funding strategy must look at all the different axes of the project to nurture the necessary resources that are required to fulfill the long term expectations that are regarded in the objectives of ALM. Yet this strategy should look at the overall objectives and the particular ones as well, to figure out the best routes to follow for making available the assets demanded for each team and at the most proper time.

6.4.1 Overall funding strategy

One of the main things that has been observed by the Funding/ Healthcare team, in this semester, is that the amounts required for the goals (such as the water subproject, la casita complex, the book, the honey sub-project) of ALM project are huge, even to accomplish the apparently modest objectives for a small sized economy like that of EI 20. For the inhabitants of the village, in first place, and also for external independent potential patrons and donors would be very hard to gather even some 50 000 American dollars (1 million of Mexican pesos) for a single project with different instances and in a country whose middle class average income is well below the 35 000 dollars per year line. Right now, it is difficult to establish a starting budget for all the different axes of the project, but it's clear that the sum of them all could easily be atop the amounts formerly mentioned.

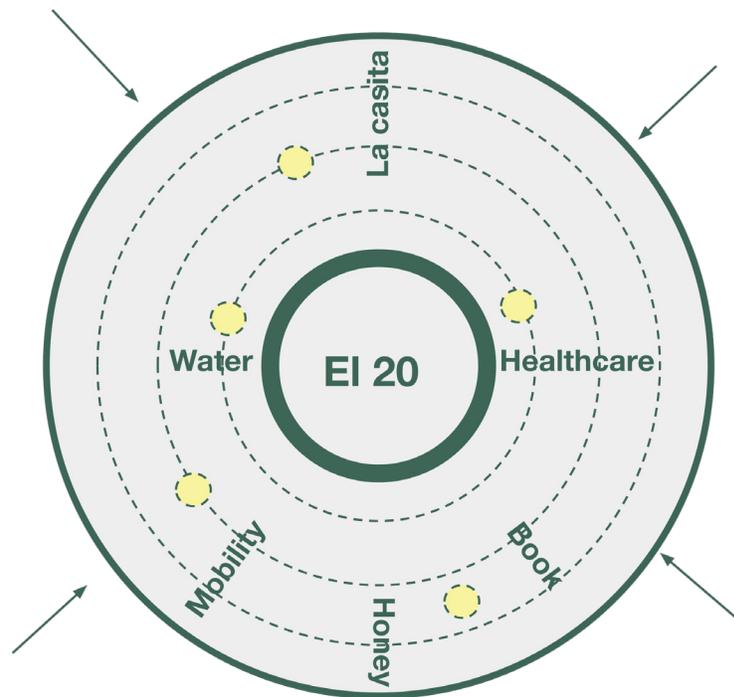


Figure 28 The funding strategy with all the sub projects in their own orbit around EI 20, but balanced. Sometimes borrowing resources among orbits, like an incipient atomic model (ALM 2021)

In accordance with this initial analysis, the team has been discussing to think in a single strategy that can look at the whole project, but without discouraging different funding approaches for every section of the project and according to the needs of the different sub-projects involved in their development. But at this point it is also needed some information of all the areas of the whole project and their most basic needs.

6.4.2 Health funding strategy

Former labbers Carolina Kansikas (2018), Adrian Lopez Martinez (2019) and Pedro Diegez Chavez (2020, legal aspects of health strategy) made some econometrics about one of the issues that has been identified as a poverty trap and this is one of the main reasons that are stopping EI 20 to avoid the loop that returns them over and over to a starting point in terms of economic possibilities. They arrived at the conclusion that the inhabitants would need at least 250 000 Mexican pesos (some 10 500 euros) to capitalize a common fund to help them face the health problems that literally drain all their economic resources when they occur. Most of the families cannot afford the expenses of hospital attention that must be forcibly searched outside the village and because of this they spend lustrums to recover economically from these issues when they happen. Because of all of this, it has been pointed out that the health issues are maybe the main and the more immediate subjects to face, for its economic impact, within the axes of the whole project.

The idea is to establish a fund that once achieved could be made growth with small sums of money that the people within the community can add periodically. But as it was mentioned before, to gather such sums of money required is not an easy task in México, because that reason, during our discussions, it was suggested to approach the problem from two different directions. One with a 'high ceiling' that would point directly to the amount of 250 000 Mexican pesos (10 500 euros) and another one with a 'lower ceiling' that potentially could be achieved easily. The latest consist in calculate the basic resources for them to have essential goods to face the most common, and less severe, health problems that could be preventable and treated inside the community (see section 3.7) with the idea of reducing the possibilities that most of them can reach a point in which can be more dangerous and must be treated forcefully outside the village with all the consequences described above.

The strategy of pointing to a lower ceiling aims to gather a basic community stock of medicines that can be managed by members within the community, maybe forming a special council for this matter that can guarantee even distribution and access for the resources when they are needed for any person. This was discussed very briefly in the March intensive camp with Ofelia, but it will need further development in the next months. Additionally, we've been discussing the possibility of providing access to remote professional attention and some health awareness campaigns using resources that could be obtained within the academic programs themselves. For the medicines stock it has been thought that with only a small fraction of the budgets required for the 'high ceiling approach' could be achieved an important supply for preventive medicine. And also, this could be obtained via donations in kind and not necessarily with money donations that are always harder because of tax related issues and not only for the total sums that are pointed as final goal for funding campaigns.

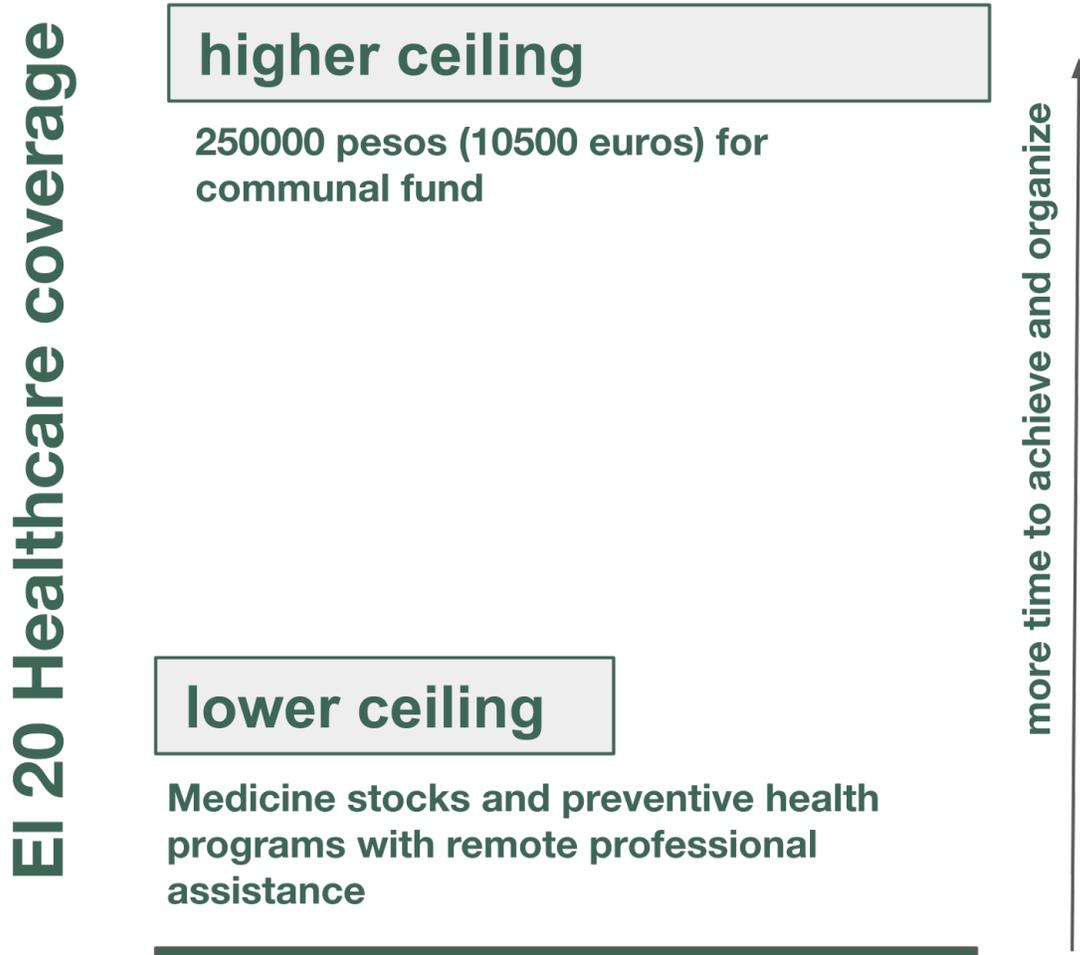


Figure 29 Diagram of the proposals for healthcare coverage

To achieve this general goal in a midterm, the team is proposing to create some informative documents about ALM sub-projects (like the water project, the book project, the honey project, la casita project) and especially about the health poverty trap that is impeding El 20 to develop a sound development cycle. Some type of basic information in brochure or infographic format and that could be easily sent to potential donors and patrons.

At the same time, it will be needed to start the identification of ideal organizations and philanthropists that could fit the economic goals of the project without compromising the autonomy of the community. In other words, to not sell the soul of the community to the devil.

FUNDRAISING ALM

La Universidad Nacional Autónoma de México, Aalto University, en Finlandia, La Universidad Modelo, en Campeche y la A.C., Design Your Action, en México, tienen un programa de desarrollo para la comunidad de El Veinte, que se ubica en una zona maya de Campeche. Tiene como objetivo mejorar su bienestar, fortalecer y sostener su autonomía



OTROS EJES DEL PROYECTO

Aunque se ha detectado que el tema de la salud es la principal trampa de pobreza de la comunidad, el programa de Action Lab también tiene otros ejes de desarrollo que necesitan recursos para ser realizados.

EJES

1. Medio ambiente/naturaleza
2. Asegurar la salud
3. Seguridad económica
4. Patrimonio Cultural

SALUD EN EL VEINTE

La comunidad carece de los servicios más básicos en el rubro y, cuando se presentan problemas que requieren atención especializada, esto origina una excesiva derrama de recursos que les cuesta mucho trabajo de recuperar alimentando el ciclo de las trampas de pobreza.

Cuando tienen problemas de salud urgente tienen la necesidad de conseguir dinero. Muchas veces deben vender sus tierras a personas ajenas de la comunidad.

Esto origina no solo trampa de pobreza que impiden que satisfagan todas sus necesidades, sino incluso que entre el crimen organizado a la comunidad.

FONDEO PARA LA SALUD INTEGRAL DE LA COMUNIDAD

El proyecto de fondeo para la salud ve una relación entre la salud humana y la salud del territorio de la selva que la comunidad habita.

Es por ello que el dinero recaudado servirá como un ingreso extra para los habitantes de El Veinte para que conserven su territorio y no lo vendan por necesidades económicas

La salud de la comunidad = protección del bosque y del territorio

DISTINTAS PERSPECTIVAS PARA EL FONDO

En el tema de salud creemos que se puede abordar desde dos perspectivas, una con un techo bajo y en la que se podría hacer donativos en especie, incluso. Y otra que implica un fondo capitalizable a futuro, que se ha calculado en unos 250 mil pesos mexicanos o 12500 dls estadounidenses. Se han echo cálculos econométricos por especialistas que apoyan al proyecto para afirmar que este es el punto base que permitiría que la comunidad no persista en la trampa de pobreza cuando se presenten problemas de salud a alguno o algunos de sus miembros.

EJIDO EL 20 DE NOVIEMBRE

NECESITA DE TU AYUDA

Para más información visita :
(poner un sitio en el cual se describa el proyecto)

Figure 30 Proposed sample of an informative brochure for funding the project

For all the reasons above exposed, we also discussed that could be useful a digital platform allocated in one of the official servers of the universities. This could help to gather essential information from the academic institutions involved and broader information of every aspect of the project for the people that received the brochure or a digital infographic by email. There they could also find the conditions of collaboration with the Action Lab Mexico program. And this also could help to make symbolic links of trust, because of the renown of the institutions involved, and boost further possibilities for getting resources.

6.4.3 Health of the inhabitants and the jungle

The funding strategy sees a relationship between human health and the health of the jungle territory that the community inhabits. People in EI 20 know the importance of the land that their ancestors gave them to protect, and all the resources nature provides. In some cases, they have been forced to sell their territory to afford medical needs, which is a problem because people outside the community do not see the importance of taking care of the jungle.

Due to EI 20's relationship to their surrounding environment, we are proposing that the money collected through our funding strategy be given to the inhabitants as an extra income so that they can conserve their territory and not sell it for economic necessity. This way, the donors will be helping the health of the inhabits and the jungle and be an extra motivator to donate.

In the next editions of ALM we propose to look for external donors who contribute a monthly or annual amount for the conservation of the jungle. EI 20 inhabitants can participate with ejidal lands or with family / private lands. Part of the money will go to a community fund (possibly for health but can be used for other projects for well-being), and another part will go directly to the people of EI 20 who participate in the program of protecting the land. The team talked about this idea with some of the inhabitants during the intensive camp of March and they seemed excited about this possibility.

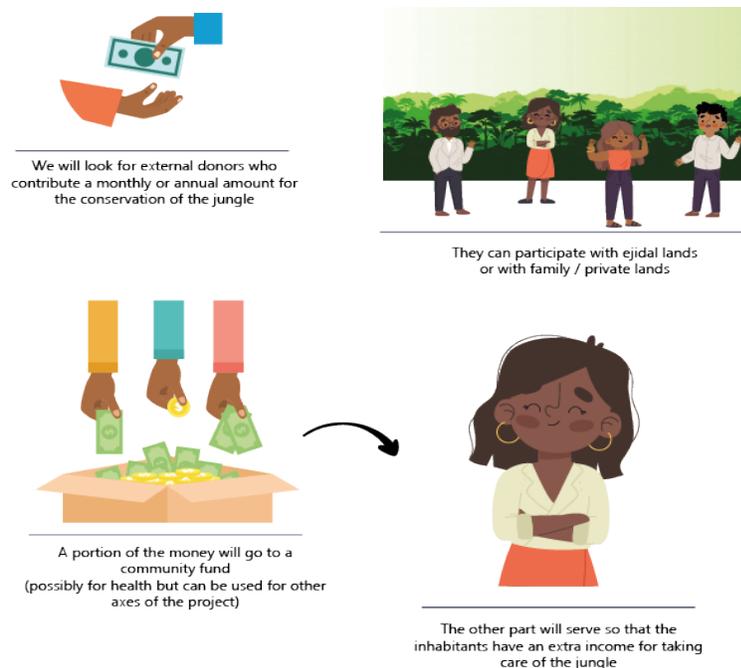


Figure 31 Graphics of the proposals made during the Intensive camp (ALM 2021)

6.4.4. Sustainability

The funding subproject aims to improve the economic autonomy of the people living at El 20. Its goals are to search for resources for the whole project, but especially for the health issues that put the people of the community under a dangerous poverty trap.

In searching for solving these particular problems, it can be tackled a parallel environmental problem related to the selling of their lands when they face complications of debt because they have health problems that they cannot afford and the only available resource they can use are their lands.

To establish a link between the preservation of the jungle and the human health issues within the community could be a milestone, because as is true as it is in other places, preserving their natural landscapes will benefit their own health, and not only for monetary reasons. As we've explained in the background section, there are already health problems related to the quality of water and there are also asthma symptoms in the children of the community. Erosion related to misuse of the sold lands could aggravate these situations. The health of the community is also closely related to the health of the jungle. And this must be a link that should not be broken in the further development of the ALM project.

6.5. La Casita architecture

La Casita complex has been on a large process to its consolidation. Last year, in the ALM 2020 the first proposal for an integrated approach was made that focused on the inclusion of several technologies while rescuing the previous designs that other ALM labbers did, and at the same time design it with the purpose to serve as a showroom to have these solutions that the community could apply to their homes as is shown on Appendix 2

In this year, ALM 2021's architecture team changed the approach to discuss not to open a set of possibilities but try to close to the best solution. So, the work was divided into the following groups as is shown on Figure X and Table X. Also, it was necessary to merge La Casita project with the water project, so both projects are intertwined.

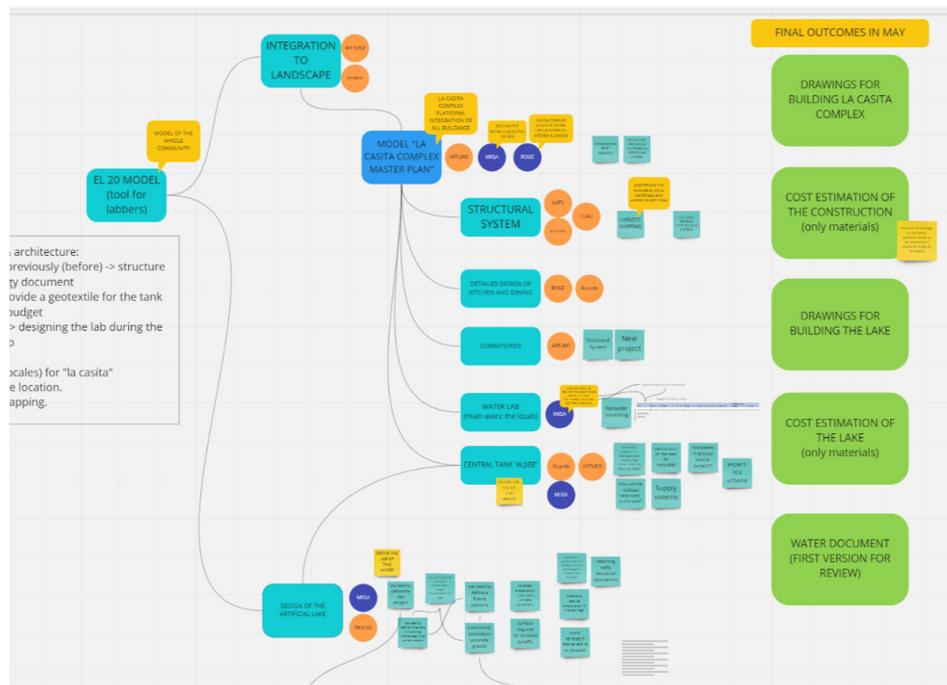


Figure 32 The mapping of the works done from the Jam

Table 4 The division of work according to Figure 32

Topics and General Work Breakdown Structure (WBS)	Labber
Landscape integration	Arturo, Ricardo
Structural systems	Alberto, Clau, Arturo, Silvia
Dorms and Bathrooms	Arturo, Alberto, Katy
Water Lab	Miisa, Ricardo.
Central water tank "Aljibe".	Miisa, Ricardo, Arturo
Artificial Lake	Miisa, Ricardo

In the Jam, the architecture team hoped to close the project. However, in the last days of May, in the integration of the project for the SGT Aalto team presentation, the team found some observations regarding the dorms and escalated to the showers and dry toilets, in which the architects found some possibilities that led to a heated discussion without getting a final resolution. And as a consequence, the design phase is still open and it needs to be closed in order to advance to the executive phase. Those design options were drawn afterwards as is shown in Figure 33 to 36



Figure 33 Site of La Casita Complex

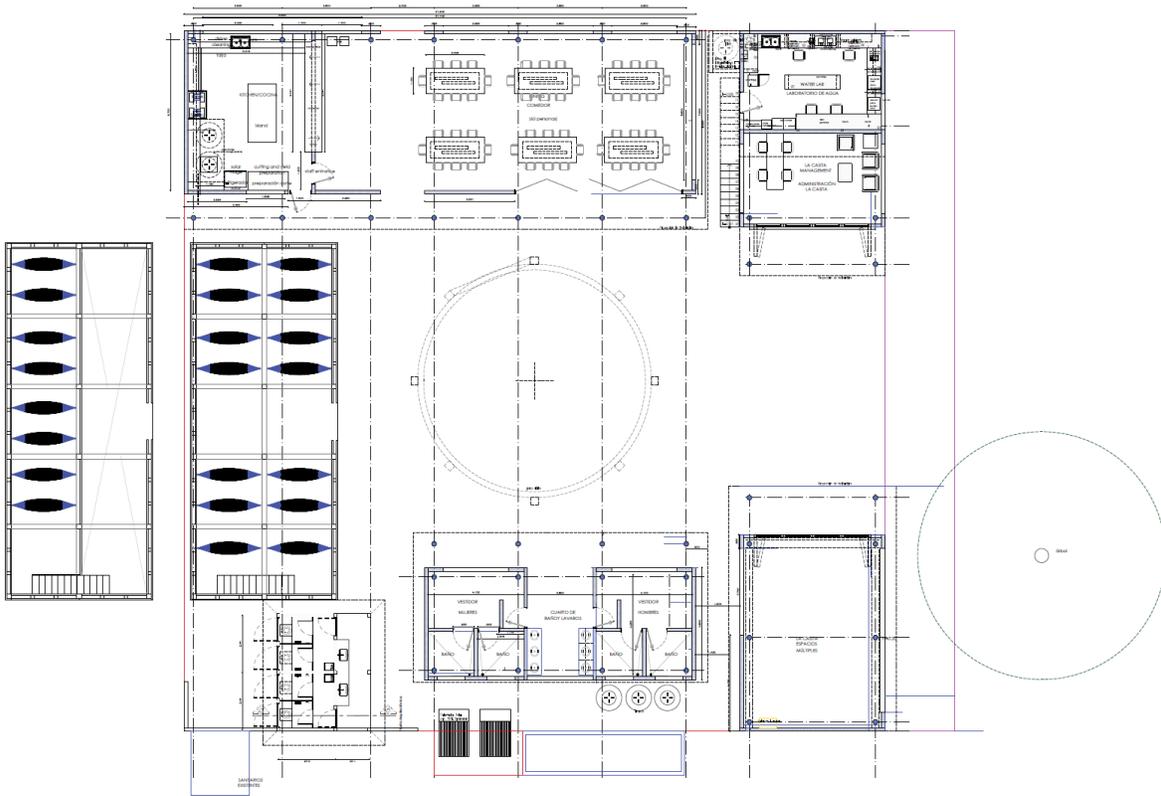


Figure 34 La Casita Complex master plan - Option A

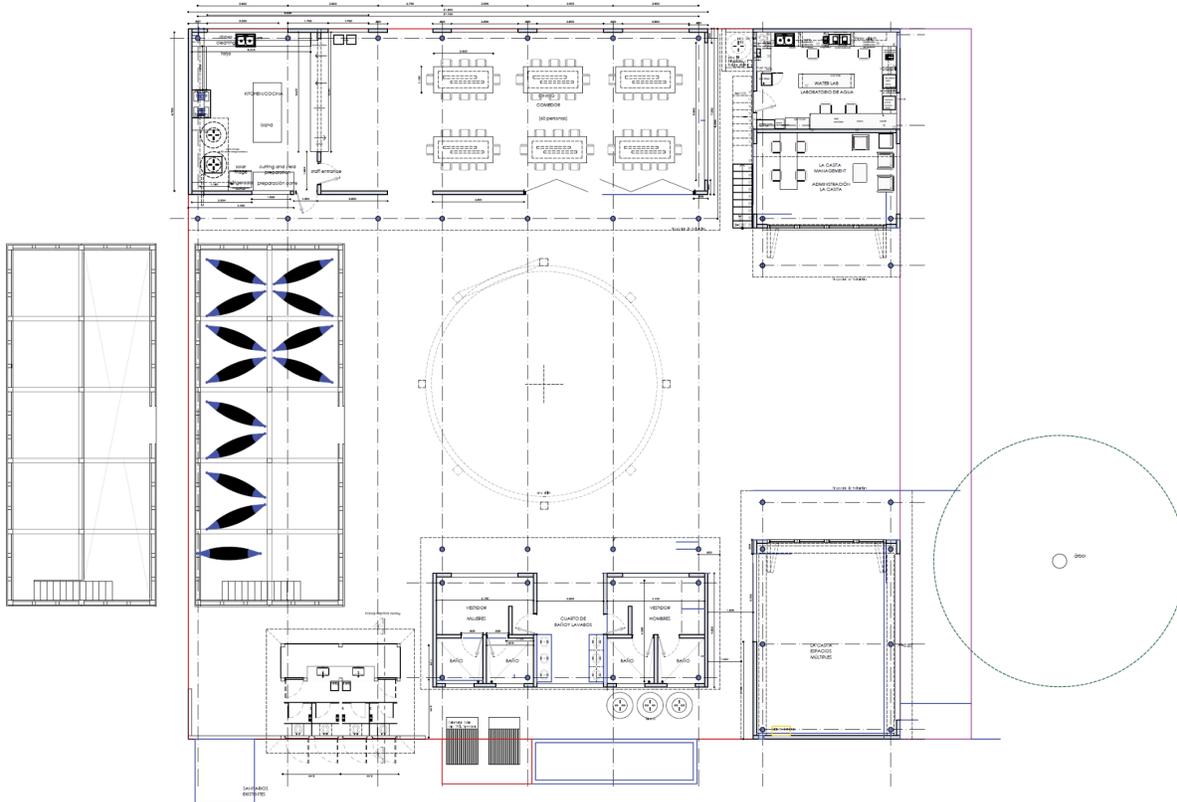


Figure 35 La Casita Complex master plan - Option B

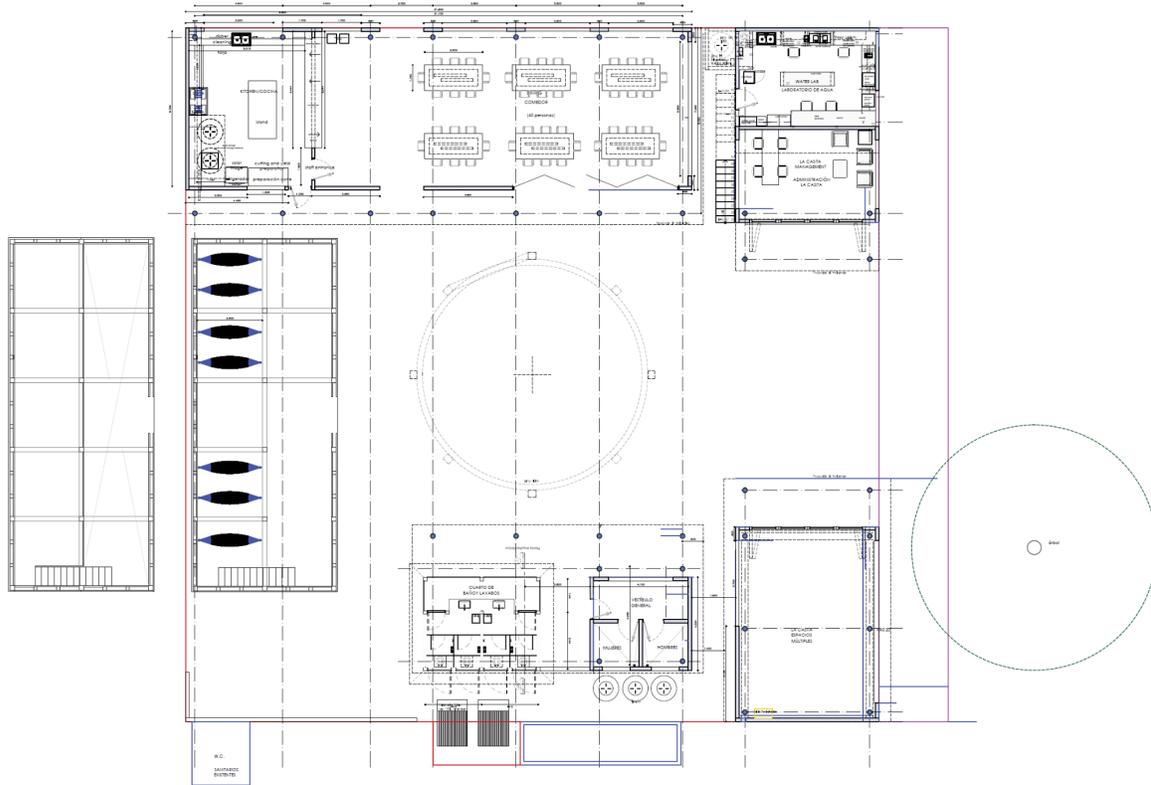


Figure 36 La Casita Complex master plan - Option C

However, in the period after the Jam and before the SGT presentation, Claudia found out Gonzalo Río Arronte's fund application. With this new situation, the whole ALM team was motivated to keep working on the project and it helped out to get to the material takeoffs, and budget of most of the buildings.

this fund application the water laboratory, the aljibe and dry toilets were included. While the water lab and the aljibe were shown previously on this document on the water project section. The redesign of the toilets is shown in Figure 37.

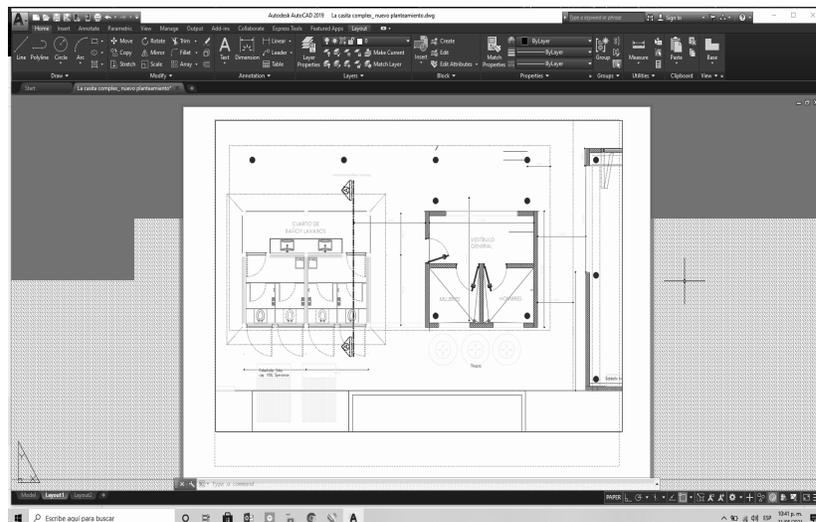


Figure 37 Dry Toilets' new proposal

After the fund application deadline. The architecture team took advantage of this work inertia to develop the project budget for the Kitchen and Dining building, as is shown on Figure 40 and Table 5.



Figure 38 Kitchen and Dining JAM work

Table 5 WBS - Main Phases of Kitchen & Dining

Work Phases	Mexican Pesos	Euros (25MXN/Euro)
Preliminary	\$52,105.35	€2,084.21
Foundation	\$131,223.26	€5,248.93
Masonry walls and Civil works	\$162,455.37	€6,498.21
Masonry ground floor	\$53,367.21	€2,134.69
Finishings	\$19,314.65	€772.59
Kitchen Tables and bars	\$27,000.00	€1,080.00
Carpentry: Wooden Roof	\$309,785.31	€12,391.41
Carpentry: Doors and Windows	\$128,894.02	€5,155.76
MEP: Hydraulic Plumbing	\$14,000.00	€560.00
MEP: Sanitary Plumbing	\$12,000.00	€480.00
MEP: Rainwater collection system	\$25,000.00	€1,000.00
MEP: Gas.	\$8,000.00	€320
MEP: Electric	\$30,000.00	€1,200.00
MEP: Lighting.	\$3,000.00	€120.00
Furniture: Dining	\$49,600.00	€1,984.00
Furniture: Kitchen	\$24,043.81	€961.75
Material deliveries.	\$4,972.00	€198.88
Building Dump truck voyages.	\$2,400.00	€96.00
Site Cleaning and Sanitation	\$13,994.67	€559.76
10% of unforeseen situations	\$106,207.49	€4,248.30
5% overrun costs.	\$53,103.75	€2,124.15
TOTAL	\$1,231,829.00	€49,273.16
Note: The costs include Materials and labour, it does not include architects and engineers's fees, indirect costs, profit, and taxes.		

Moreover, the team worked on a rapid integration of the modeling for the STG presentation which is shown on Figure 39.

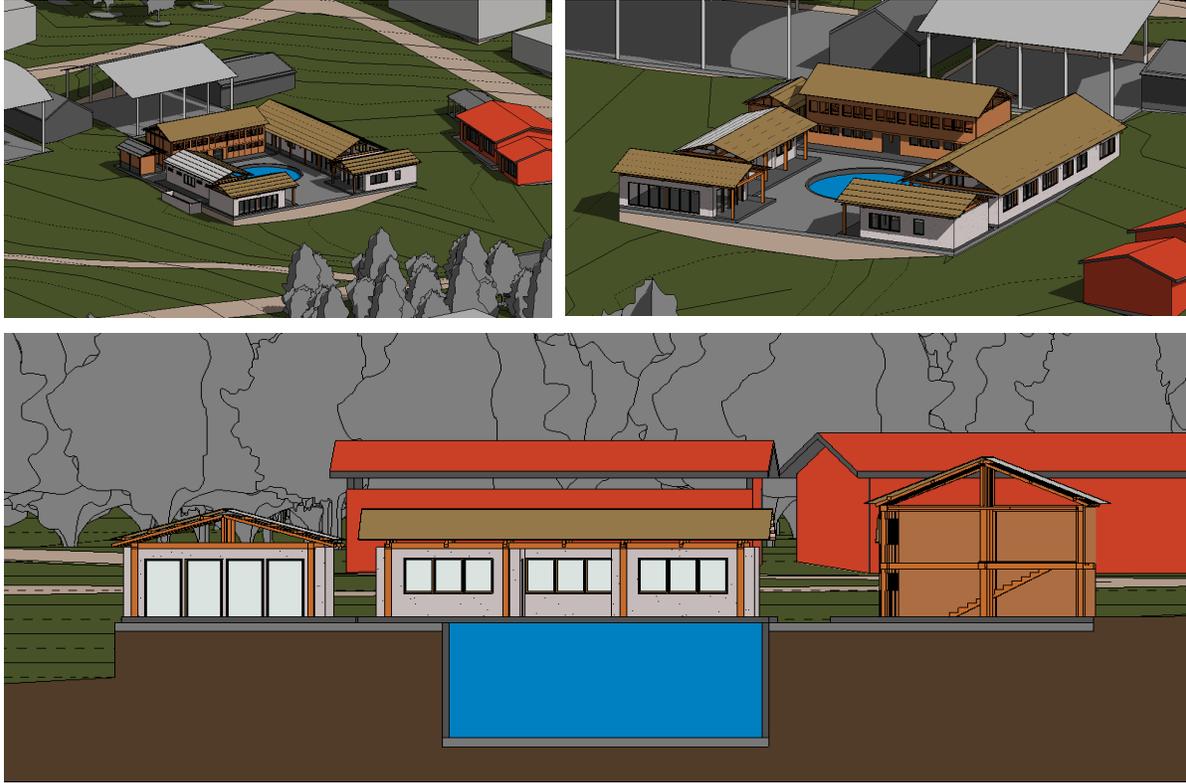


Figure 39 Views of La Casita Complex Model

La casita architecture is closer to the deadline. With the heated discussion of the dorms, dry toilets and showers, the project needs rework on those issues, then to enter a revision phase to complete the 3D models and plans; and determine the WBS, CPM, and Gantt charts before seeking funding.

6.5.1. Sustainability

The fifth subproject is the design of la casita complex, as is explained before, la casita is one of the most matured projects of ALM which encompasses the ideals proposed by Claudia's PhD dissertation. aims to develop individual and community capacities that will lead EI 20 to better living conditions.

La casita has a lot of projects intertwined, from the economic dimension as a future eco hostel with community functions where other productive and tourist economic activities prevailing in EI 20 (crafts, honey, bird watching, and Río Bec) can also be linked; from the social dimension of welfare, it will contribute to the health program with economic contributions, it will serve the elementary school that borders to the north of the complex; and from the level of water, as a point of provision of this resource. Likewise, due to its spatial location, it can be a link node for the mobility project. And from the natural level as a showcase of available and affordable technologies for the community to take back to their homes, from their sustainable construction procedures that rescue the Mayan tradition (the Mayan house); and eco-technologies such as rainwater harvesting technologies, ventilation, natural lighting, toilets, and less risky cooking technologies that lead to respiratory problems.

The fifth outcome outlines a concept of integral development that fits the natural, socio-cultural, economic needs of the community in a sustainable manner. Showing evidently the scope of the potential benefits of La Casita Complex, which beyond its formal and aesthetic conceptions, represents a sustainable master plan which is a means for the construction of knowledge through complexity just as Claudia envisioned.

7. Next steps

7.1. Water

Funding application for the water projects was sent in May and hopefully will help to get the made plans into practice. If the funding is received next steps are closely related to developing the projects mentioned in the water strategy document.

If the funding is not received, for the next step it would be beneficial to gain a better and broader understanding of El 20 water use. More data should be gathered with a larger sampling size and to update it to the water document.

Since the water laboratory and water systems will be run by the locals, they need some training. The training needs have to be identified and thought of how it will be arranged.

7.2. Honey

As the honey project was divided into two sub projects, we see the project spreading out in two different directions. For the organic honey project, the next steps would be to refine the game - *Vente al Veinte (Come to El20)*, and work on the strategy around deploying it in different locations. The ideal step would be to work on the costing of the game and then find collaborators to showcase it.

For the melipona honey, we would like to start by gathering more information about consumers and their approach and thought process around the concept of adopting the jobones (bee hives). After validating the concept, we would like to start building a concept digital platform - like a webpage which could allow us to test our concept in a more refined manner and help us gather insights on the next steps.

7.3. La Casita architecture

Due to Rio Arronte's fund application, the team wasn't able to produce the final technical and financial documents. For this reason, the current budget and design proposal needs to enter a revision phase before approving them with the objective to find other funding campaigns to build this project. Moreover, it is necessary to sketch the phasing schedules in Gantt chart and Critical Path Method in order to have the phasing periods to define the early and remote construction deadlines.

Additionally, the following ALM work needs to find the full integration to the other ongoing projects like women & artesanía, mobility, water strategy, tourism, healthcare, and patrimonial management. And seek other projects that compliment La Casita Complex.

Also, it is important to point out that the heated discussions about the dormitories, dry toilets, and shower

building, exposed unexpected needs that are required to be assessed to ensure a good solution that will help the funding and health strategy, and economic development and tourism. To do so, in the next years, the following inquiry and analysis must be made:

1. A Future Study with different scenarios must be developed,
2. Persona analysis, probable groups and tourism demand.
3. Co-design a touristic user experience that rescues and respects the ways of living in EI 20.
4. With steps 2 and 3, make an analysis to conciliate cultural differences that ensure a sustainable touristic proposal that will promote tourists to come back.
5. Architecture programming with area analysis, includes furniture, circulations, and anthropometric measures.

With these enlisted works we will approach the best and definitive solution that avoids space wasting in relation to the numbers of room vacancies and people, dry toilets, and showers.

An alternative approach to these works could help consolidate the dormitories, dry toilets, and showers by conducting an experiment with a sales funnel with visit Calakmul webpage and social networks. The study will be conducted to attract tourists in the summer, winter, and spring break vacations. It will be carried out a whole year to determine how much tourists can be attracted to have a more accurate demand per year and study their profiles to make a Persona analysis and study the average type of group and number of individuals to predict the tourism demand in the following years. However, this alternative approach has its risks; first, it needs to wait until COVID-19 has passed because it can put EI 20's population at risk; second, it will delay La Casita Complex completion.

7.4. Funding strategy

The next step of the funding is to define the strategy and a first amount of money to raise. Having these two data very clear, a pilot campaign can be started in which learning can be used for future campaigns so they can be increasingly larger and successful.

Also, we see that in health strategy, there are some projects that don't need a lot of money to be started; like the possibility of projects that make people of EI 20 aware of habits that can improve and prevent health problems and with a campaign of doctors constantly attending the community, maybe remotely. Another strategy could be to look for donors in kind, such as medicine or food.

Also, it will be needed to make some kind of 'census' of potential donors and patrons that can fit the project needs in all its dimensions, not only in economic terms.

We observe that it would be useful to have some reference points of the project in the websites of at least one of the academic backing institutions (UNAM, Aalto, or Modelo Universities). This could help to draw a lot of trust in the funding campaigns given the public prestige they have. And this could be also achievable in the short term.

8. Reflections and Learnings

This year the communication with the community was a bit challenging, and interviews did not go as expected. We learned how to improvise as some of the members of the community were joining in order to make most of this project. While working in a diverse team we learned to address the projects in a cross disciplinary way. We also learned how to work remotely in order to keep everyone engaged and on the same page. But at the same time many things that felt a bit frustrating at times during this year, can become opportunities in the future, for example balancing fieldwork with remote work with the community.

“In my personal experience, individually and as a group, it is necessary to have a clear idea of what we have to do in order to have a fluent design process (problem definition, inquiry, analysis, design proposal, execution and construction). In the earlier phases, it is necessary to balance skills and have agreements between the different points of view, personal interests, and personal values of each team member; and with the help of the investigation insights team members will understand what are the problems that need design intervention. Also, communication between members and jobs does not happen if there is no personal responsibility. Moreover, soft skills are required to have a better understanding of the team, having patience, listening, having empathy, being considerate to others, and giving care to solve the problems in front of you. And, if these things do not happen, the teamwork will struggle to solve problems effectively and efficiently and, as a result, the projects will have major setbacks, and this will lead to heated arguments as well the loss of respect of/to others. That’s why interdisciplinary teams are hard to manage and transdisciplinary is almost impossible to achieve. Finally, a set of rules for work processes must be announced to avoid conflicts between team members. For example: at least must have a quorum percentage of team members to work on something, if no minimum quorum is met, the team will suspend the works” – Ricardo Serrano Ayvar

“This experience was one of learning and solving difficulties of distance due to the pandemic. The members of this team are new to the project, so we did not have the chance to meet the community or the inhabitants in person. Even with the obstacles of the pandemic, it has been a great learning opportunity to contribute our knowledge to improve the lives of El 20 and the ALM project. Participating in a project other than my master’s research project has been refreshing. Finally meeting people from different parts of the world wanting to improve this world has been a pleasure.” – Itzel Rivera

“This edition of the project was a challenge due to the conditions imposed by the Covid 19 pandemic. We couldn’t go to the community and neither meet in person our schoolfellows from Finland or even our teachers in México. At times this made a little difficult the organization of several issues of the project, like this report itself. However, I think that the issues that were troublesome this year could be used in next editions to extend the scope of the project.

Perhaps this totally remote experience could show that the teams can work fine with some physical distance with the phenomenon of work and among them. Maybe in future editions this could help to make more than one trip to El 20 with part of the teams working remotely and part of the teams in the village, changing positions in a second trip of the same course, for instance.” – Pablo Inclán

“The importance of research based on the possibilities presented by the community, from artisanal work to construction methods, was decisive for the projects to be relevant to the community and create a rooting that favors the care and appropriation of spaces.

Given the current situation we are living through the pandemic in the world, the resilience of the team was tested, where I had the opportunity to experience learning methods and tools that helped me understand the context, the community and collaborators.” – Katy Trejo

“In this edition of the project one of the things that struck me the most was the way in which the community of El 20 learned to develop new methods of construction and assembly with wood, applied in their homes. The adaptability of the construction system in the ceilings could also be taken and applied in the new proposals of the other spaces in the development of the complex “La casita.” – Alberto Medina

“The opportunity to participate in this project taught me how to handle and overcome uncertainties with limited background information. I also learned that it is always good to have at least a plan b and c ready when designing this kind of project.” – Miisa Viiliäinen

“The project started off on an ambiguous note as it was crucial to connect with the community but due to the pandemic , there were many constraints around travel. Remote working brought its own challenges, but it also provided us with many opportunities to be creative with our way of working and ensure a great result. The most insightful moments for me were the interviews with the community, and collaborating with the team. The remote team work allowed me to break out of my comfort zone and work on creating new possibilities in a remote setup. Overall, it has been a learning experience and something I would love being a part of in future as well.” – Akshita Kohli

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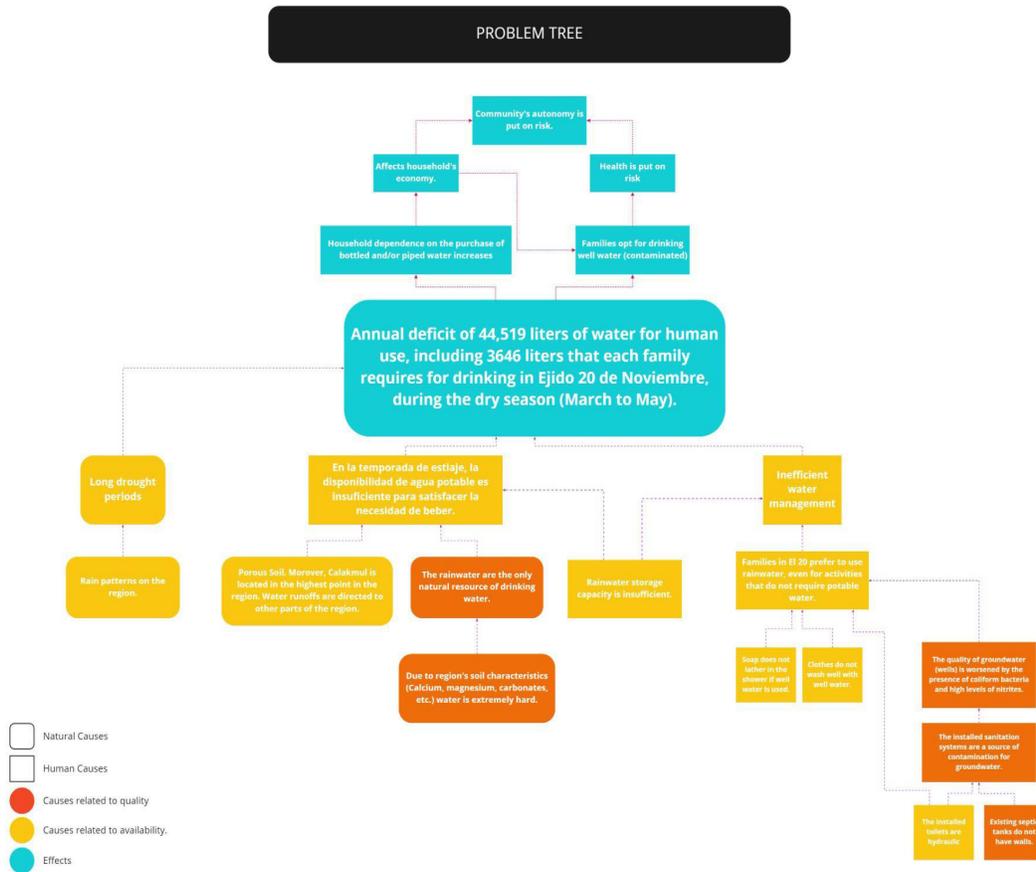
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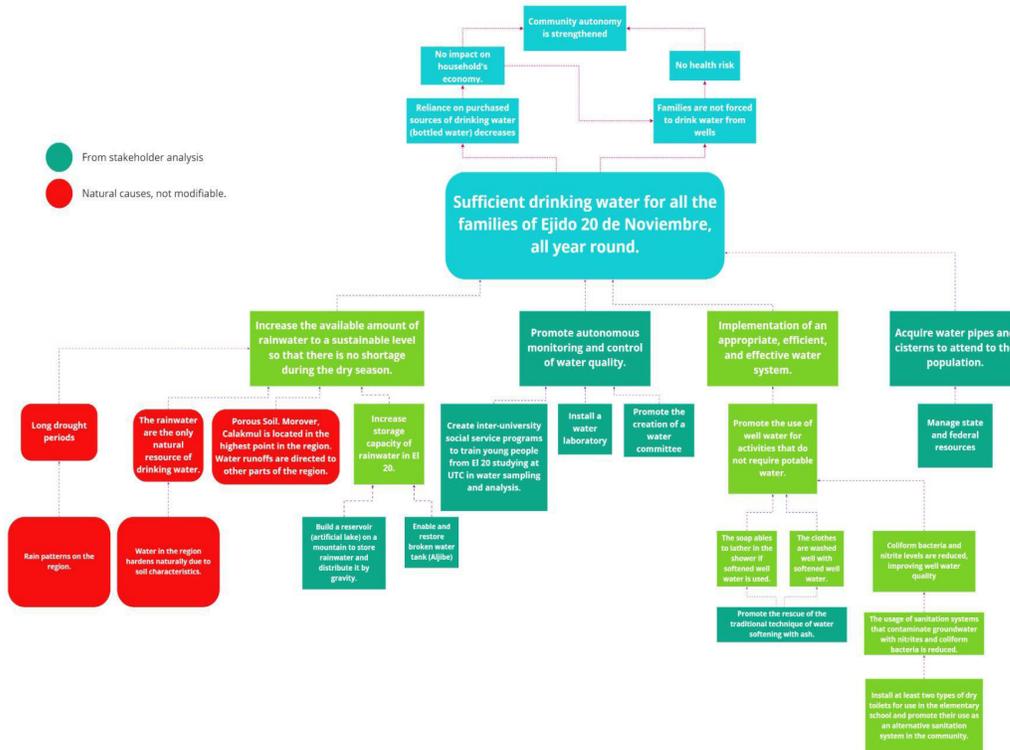
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10. Appendices

Appendix 1 - Río Arronte's problem framing diagrams



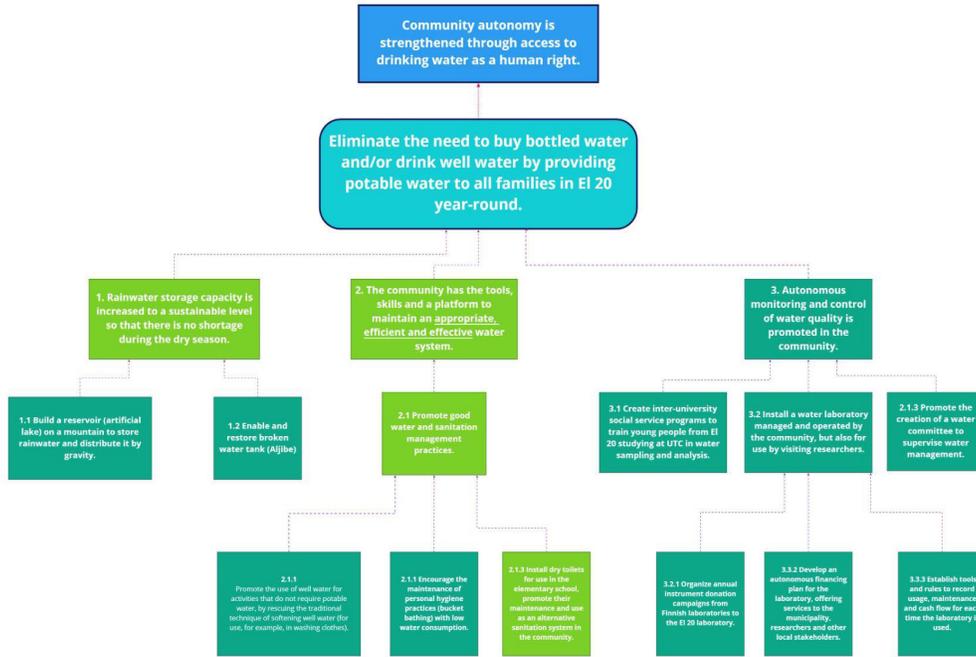
OBJECTIVE TREE



ALTERNATIVES ANALYSIS

		ALTERNATIVES			
		Increase STORAGE CAPACITY FOR the amount of rainwater available during the dry season.	Implement a CONTEXTUALLY appropriate, efficient and effective water system.	Promote autonomous monitoring and control of water quality.	Acquire water pipes and cisterns to attend to the population.
CRITERIA	Strengthening community autonomy	3	3	3	1
	Allows Participación to the group objective.	2	3	3	1
	Possibility of inter-institutional collaboration	2	3	3	2
	Possibility of public support	2	2	2	3
	Cost to the implementing organization	2	2	1	2
	Innovation Level	2	3	1	1
	Coverage	3	3	3	1
	Time required to view results	2	2	3	1
	Expected social impact	3	3	3	2
	Sustainability	2	3	3	2
	Feasibility	3	2	3	2
	Viability	3	3	2	1
		29	30	30	19

ANALYTICAL STRUCTURE



Appendix 2 - La Casita Complex ALM 2020 first integrated approach.

