

DESIGNING A COMMUNITY-DRIVEN LANDSCAPE VISION

EL ASTILLERO DE TOLA,
NICARAGUA



"OUR ANCESTORS KNEW MOTHER EARTH BEST, THE
WAY OF SURVIVAL IS TO RETURN TO OUR ROOTS.
WE ARE BORN OF THE EARTH, WE LIVE ON IT, WE
TAKE CARE OF IT"

MANUEL CORTEZ,
PRESIDENT OF CASA CONGO

“NUESTROS ANCESTROS CONOCÍAN MEJOR A LA MADRE TIERRA, LA VIA DE SOBREVIVENCIA ES REGRESAR A NUESTRAS RAÍCES. NACIMOS DE LA TIERRA, VIVIMOS EN ELLA, CUIDAMOS DE ELLA”

MANUEL CORTEZ,
PRESIDENTE DE CASA CONGO

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This publication is written as a bid book and landscape vision proposal with the purpose to stimulate discussion, highlight opportunities and weaknesses and finally generate attention for further funding, required to research and implement experimental sites.

ACKNOWLEDGEMENTS

This report is dedicated to the community of El Astillero, may it lay the foundation for a radical imagination of their territory and support a vision for the future inhabitants of this land. Let us also pay our respect to those who have graced these lands before us, their stewardship inspires us to this day.

We would like to thank everyone who has supported Casa Congo since its beginning in 2017, especially Olinyer Palacios, whose dreams for Astillero guide and inspire us to make El Astillero a better place. We would also like to thank Las Tejedoras and many other women in the community, Doña Reyna, and Yirlani, amongst many who look after those who come to Casa Congo like mothers.

We would also like to thank everyone who has been a part of the Casa Congo team since the beginning, those who are still with us and those who have left, you all sowed the seeds for a better future. A heartfelt thank to Marlon Cruz and all the other fishermen who welcomed us into the community.

Finally we would like to thank all of our international Partners who helped finance this project and continue to support the work we do in El Astillero.



"Salvaje no es Quien vive en la naturaleza. Salvaje es Quien la Destruye."

SUMMARY

This document is an important part of four years of research by Casa Congo. It analyses historical, social, abiotic, and biotic elements of the landscape and their inter- action to better understand socio-ecological processes that effect the community of El Astillero.

Its part of a process to engage with the community of El Astillero and municipality to develop a community driven multifaceted approach to Flood mitigation which also addresses, deforestation, soil loss, ecosystem fragmentation and food sovereignty and cultural preservation.

The goal of the report is to set the ground work for a landscape vision, which is 3 things rolled into one:

A PLAN:

made by the community to analyse the landscape and discover where we want to go into the future resiliently.

A DESIGN:

made with everyones cooperation to holistically approach and resolve your challenges.

A TOOL:

made to communication with each other about how we feel and also involve other important stakeholders in our vision to create collaborations and strengthen the communities power.

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Fig: Casa Congo in El Astillero



CASA CONGO

Casa Congo was founded in 2017 and is a School of Conservation based in El Astillero, Nicaragua. Our mission is to grow ecological consciousness through research, knowledge exchange, surf, and as a place of action and change for future generations.

We provide free extra-curricular education to students of the local community in the fields of agroecology, ocean conservation and sustainable construction. Our school is also open to national and international students who can participate in research projects, impact internships and experiential workshops.

We are setting out to support the community of El Astillero in creating a landscape vision which can act as a guide for development and improving livelihoods in the area without destroying the environment or undermining the people who call this place home.

INTRODUCTION

One of the characteristic ecosystems of El Astillero are the dry tropical forests that surround the village. These Forrests covered most of the west coast of Nicaragua, yet due to century long deforestation practices have been reduced to isolated patches (Wilson, 1988). It is estimated that from 550.000 km² of tropical dry forest present in Mesoamerica at the arrival of the Spaniards, just 0.09% is left on the whole continent. The transformation to pasture and introduction of fencerows severely fragmented the ecosystems. The peculiarity of this ecosystem is its capability to withstand periods of up to 7 months of rain free drought. This results in many plant species passing deciduous states from 2-6 months. In this period most of the streams and rivers dry up, daytime relative humidity descends to values between 20-60% and sunlight reaches the

forest floor drying everything up and inhibiting decomposition of litter. This combination of factors results in many cases in forest fires. In this period many animals migrate to humid refuges, either caves or remaining wet-lands, and this has a very big impact on biodiversity. It is also a time span where many species stop vegetative processes and flower, mature fruits or disperse seeds.

The wonderful reserve of Chacocente is a great example of the beauty of this landscape when it can thrive, but much like incredible uniqueness of the mass turtle nesting that occur there, without a balanced and thoughtful approach we are at risk of loosing it all. This is especially the case with the dangerous consequences of climate change which is can have devastating consequences to the way we live here in El Astillero.



Fig: Collecting rubbish with the "El Astillero Surf Club"

THE SCHOOL

The situation at the school of El Astillero Salomon Ibarra is a sad example of the challenges the community of El Astillero face. Built on a floodplain, the school floods every time it rains, infrastructure improvements have only negatively effected the site, blocking the flow of water to the ocean and leaving the water stagnant for mosquitoes and diseases. Deforestation and development up hill has only exacerbated the situation. And the little that has been done by the teachers to prevent flooding has only temporarily solved problems before more rain falls.

But this can change! There is so potential for the community of El Astillero, working alongside the municipality, Casa Congo and other local groups (what we call stakeholders) to transform this landscape into a safe and fertile land that can provide lots of food for the community and thriving economy based on ecological practices that attracts business. Working together with a vision, we can create a thriving community for ourselves and our children!



Fig: The school after a small amount of rainfall



Fig: Working in the school garden

“AQUÍ LOS PROFESORES ESTAMOS ATADOS A ESTA SITUACIÓN Y NO ESTÁ EN NUESTRAS MANOS CAMBIARLO. ES DIFÍCIL IMPARTIR CLASES EN ESA TEMPORADA, HAY QUE VENIR DE BOTAS PORQUE ES UN DESASTRE. CADA MAESTRO CON SU GRUPO DE ALUMNOS TOMAMOS LA INICIATIVA DE CONSTRUIR LOS MURITOS EN LAS PUERTAS DE LAS AULAS, SOLUCIONAMOS UN POQUITO, PERO NO COMO NOSOTROS QUISIÉRAMOS.”

NEIDA YUNIETH, 38 AÑOS. MAESTRA DE PREESCOLAR DESDE HACE 19 AÑOS.

“ES BASTANTE PELIGROSO LA VERDAD, SE INUNDA Y MUCHAS VECES AL AGUA SE METE AL AULA. ALGUNOS COMPAÑEROS PERDIERON MATERIALES O SUS CUADERNOS SE ENSUCIARON Y MOJARON. A MÍ PRINCIPALMENTE ME HACEN MUCHO DAÑO, YA QUE SI ME MOJO ENSEGUIDA ME DA UNA GRIPE.”

GABRIELA, 13 AÑOS

“ABAJO EN LAS SECCIONES (AULAS) EL AGUA LLEGA A LAS RODILLAS, AL PRINCIPIO LA BARRERA QUE PUSIERON ERA EFECTIVA PERO AHORA EL AGUA TAMBIÉN SE FILTRA IGUALMENTE”

URIEL, 16 AÑOS

STAKEHOLDERS



COMMUNITY GROUPS & LEADERS

Powerful collectives of engaged citizens, their voices are important. These are leaders we listen and respect, they understand important processes



FARMERS

Farmers know a lot about the land and are in a great position to produce healthy food, reduce soil erosion and flooding



WOMEN

Women are the mothers of this community, they care a lot about the household and its wellbeing and health



CHILDREN

Children are the future, they will be the next generation to look after all this is, plus they play in places we don't know about.



ELDERS

Our Elders have been around since the beginning of El Astillero, they have important memories about how things used to be.



FISHERMEN

Fishermen spend more time at sea than any of us, they see things none of us see. Fishing is also the biggest income generator in El Astillero.



LANDOWNERS & BUSINESSES

Landowners and businesses are key to a lot of the processes we need to discuss. Without landowners on board, we cannot go anywhere



MUNICIPALITY

It is very important to include the municipality, they have legislative power and can support our community vision.



NATURE AND THE LANDSCAPE

Let us not forget nature and the landscape itself. If we listen and observe, we will find what she is trying to tell us.

OUR APPROACH

Community-driven Vision

Community mapping and participatory land use planning, is informed by and informs our research. This unravels possible socio-ecological pathways and facilitates collective dialog.

Multidimensional Solutions

Agroecology, green infrastructure, mutual aid groups, youth education and farmer-to-farmer knowledge networks are fundamental keys to build expertise in the community and grow autonomy.

Advance Inclusive Land Governance

Community groups strengthen community bargaining power. Building platforms and capacity for these groups with training and technical assistance is essential to fight for recognition of land rights.

A Landscape approach at multiple scales

A landscape approach is essential for confronting problems holistically, and establishing key areas for interventions and ecological restoration and the correct management of water resources.



Fig: A workshop with farmers at Casa Congo

METHODOLOGIES

Diagnostic

1

Our approach has been to gather research in order to create a baseline of data and information and begin to understand key socio-ecological processes occurring in El Astillero: Demographic information, community mapping, water quality and pollution, forest cover and land-use, flood mapping and flood risk.

Vision

2

This information can then inform a community process of visioning. That can begin with problem definitions, establish what is needed and outline potential pathways for the community to be ecologically resilient and socio-economically strong. Providing good livelihoods for all of El Astillero, without destroying the environment.

Strategy

3

Then it is up to us, the community of El Astillero to develop a strategy, collaborating with all the relevant stakeholders and with the help of data and experts to make that vision a reality for the future generations of El Astillero. Set out clear goals and equitable participation.

CURRENT CHALLENGES

Flooding

Flooding causes severe damage and loss of life almost every year. Working with the municipality and land holders around El Astillero, green infrastructure and smart design can reduce the impact of flooding and its deadly effects on the community.

Water Pollution

Polluted water runs onto the streets, infiltrates the groundwater and flows into the ocean, affecting water quality and fish health. Grey water filters, and bio-digesters are key to reducing pollution.

Landscape Degradation

Deforestation due to cattle ranching has caused a lot of soil erosion and fragmented an already vulnerable tropical dry forest ecosystem. Creating biological corridors and conservation areas is key to preserving biodiversity.

Food Security

Food is imported into the community, despite once rich and fertile soils. Agroecology and a Food Sovereignty drive can promote local production of food for local consumption.

Fig: After the hurricane, 2017



Fig: Erosion defence



Education

Education is key to raising future generations. It is important that the community invests in healthy and safe education for their children, reducing the flooding that occurs by the school and creating safe outdoor spaces for an active education.

Displacement

Tourism has led the commons around El Astillero to be bought and fenced off due to real estate speculation. We are working with farmers and the community to resist this displacement and promote cultural heritage.

La Costanera

The coastal highway will have an impact on the community of el astillero and the landscape. The large road will make access to El Astillero easier but it can also fragment the ecosystem and could effect water flows and flooding.

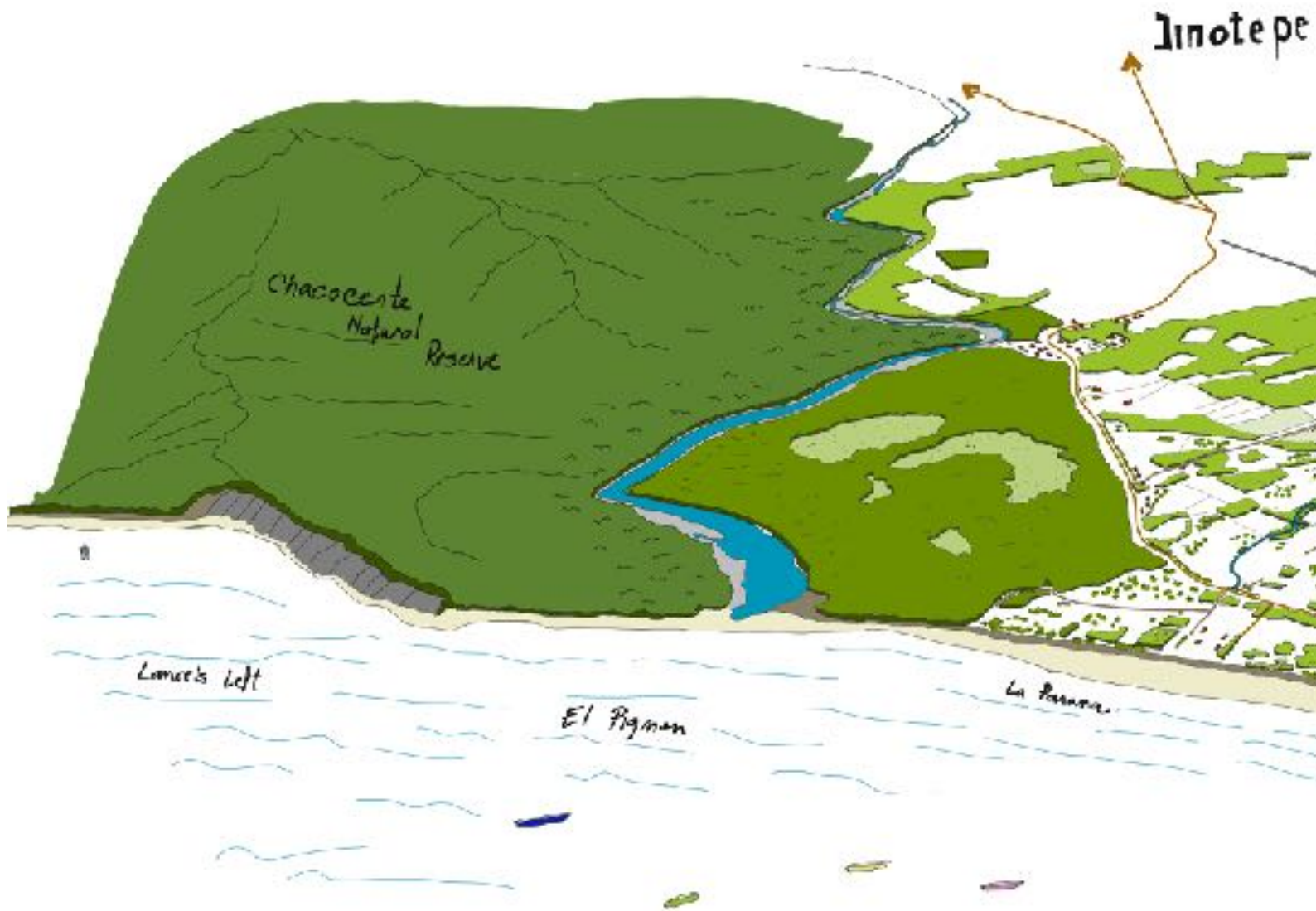
Fig: A new hotel under construction



Fig: Land for sale



WHY A LANDSCAPE VISION?



Working with the Community to develop a landscape vision important for us to tackle, not only the environmental challenges we face but also the socio-economic challenges we have.

By creating a space for dialogue and collective action, we shall connect different initiatives with a common vision to create impact and address regional challenges, such as flooding, food security and a just economic development that does not displace people or destroy the environment.

What follows is some research that Casa Congo has done that help us see many of the challenges we face as a community.





EL ASTILLERO

LANDSCAPE ANALYSIS

The following chapter features a landscape analysis of El Astillero and surroundings, highlighting the important layers composing this coastal landscape and their interactions.

A topographic map showing contour lines in shades of green and grey. The map features three main place names: 'EL CANGREJAL' at the top left, 'LAS CAÑAS' at the top right, and 'EL ASTILLERO' at the bottom left. The central part of the map is dominated by a large, irregularly shaped area with dense contour lines, indicating a mountainous or hilly region. The contour lines are more widely spaced in the lower elevations and more closely spaced in the higher elevations. There are also some smaller contour lines in the bottom left corner. The background is a light grey color, and the contour lines are thin and dark green.

EL CANGREJAL

LAS CAÑAS

EL ASTILLERO

OCCUPATIONAL LAYER



Fig: A view from El Astillero beach

DEMOGRAPHICS

Our work has mostly been focused on the community of El Astillero, although we do include the communities of El Cangrejal, Las Cañas, and its surrounding landscape, as these communities have close ties with El Astillero and remain important to the landscape.

In 2019 Casa Congo conducted demographic research by surveying over 15% of the population. The purpose of this research was to create a clearer picture of the population of El Astillero to understand the communities socio-economic challenges better. Here are some interesting findings:

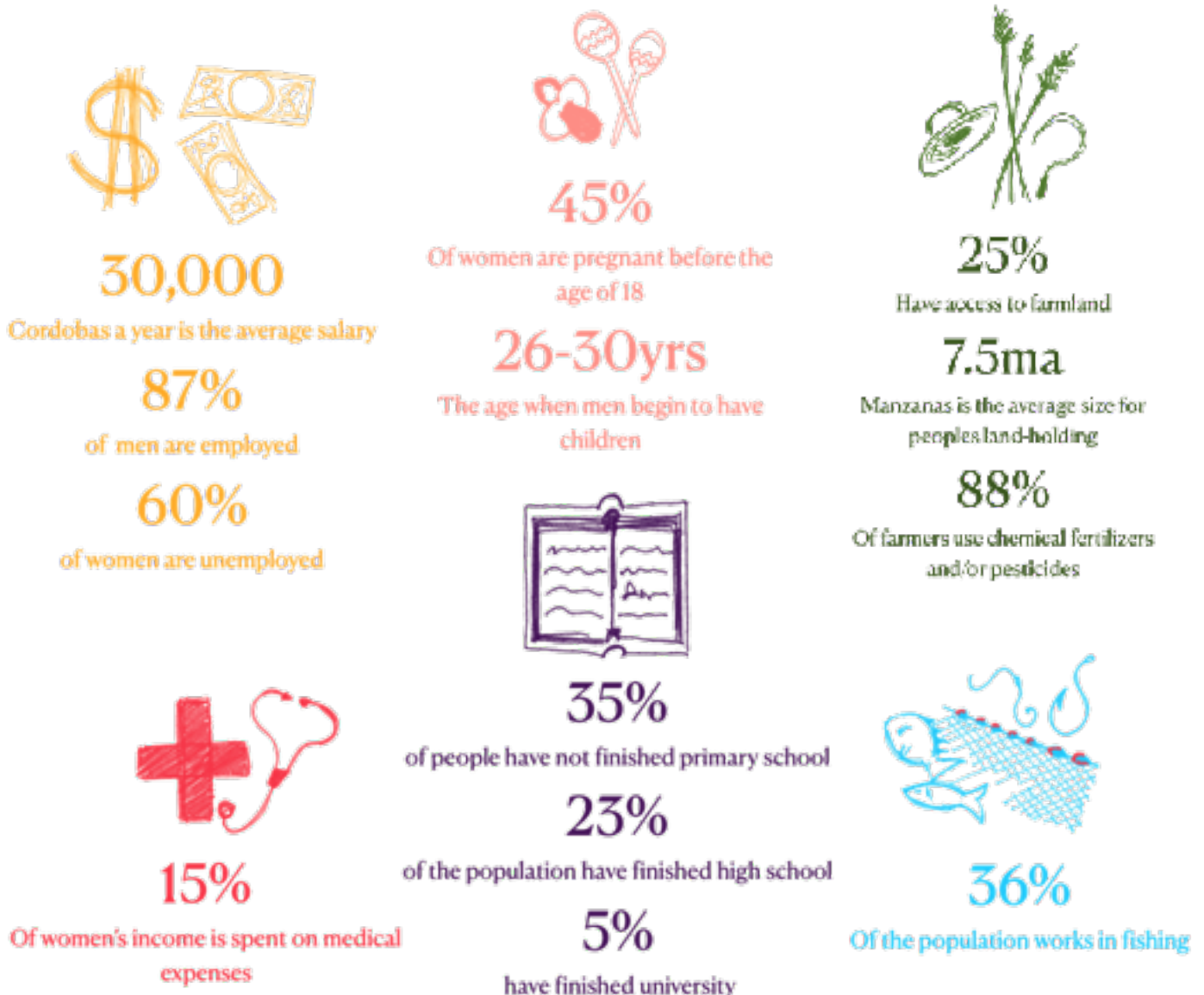


Fig: Statistics from Casa Congo's demographic research

HISTORICAL CONTEXT

This small beach is located to the north of the town of Tola. The name Astillero was given to this place because the first settlers used to build their small wooden boats called boats or cayucos. This work was carried out on the shore of the beach and the wood residues, known as splinters, were left on the shore, thus giving the name Astillero.

People also say that tribes settled here in the past and that they lived near the beach and survived by fishing, which is why we are close to indigenous

villages such as Salinas de Nagualapa, Virgen Morena and Nancimí in Tola.

The first settlers tell that in Astillero, there were only 5 families and they were Los Guadamuz, Los Chávez, Los Bonilla, Los Villagra and Los Moya. Over the years Astillero has begun to grow as more families come to the village. The whole area of Astillero belonged to the landowner Cornelio Hueck who owned more than 7,000 manzanas of land from Abejónal, San Martín, Montecristo, Las Cañas, San Ignacio and Astillero.



Fig: An aerial photo of El Astillero

1975



1990



2020



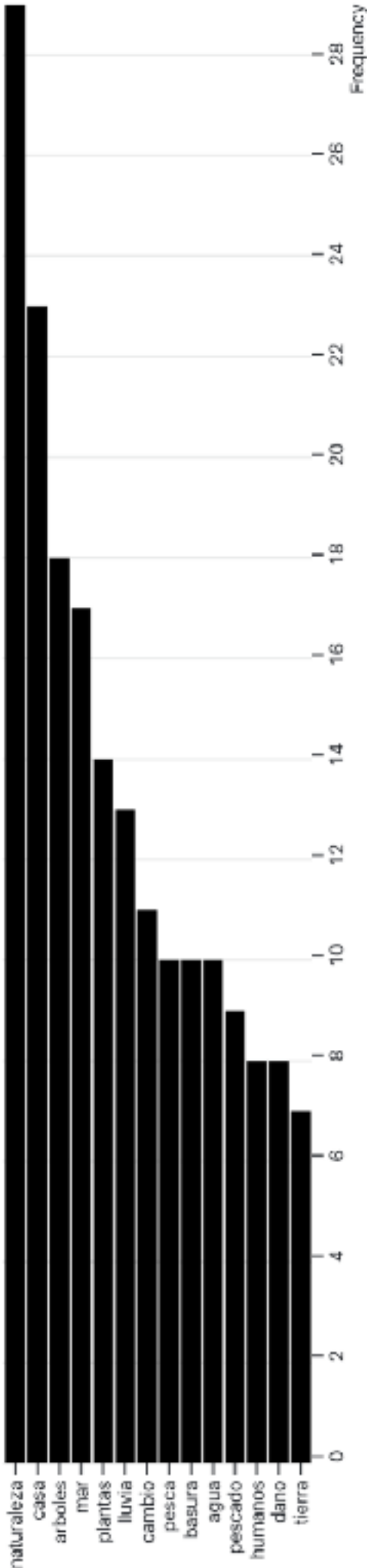
SOCIAL PERCEPTIONS

In an effort to understand how community members of El Astillero experience and understand human-nature interactions, the Photo Voice Project was conducted. Photo-Voice is a research methodology that uses cameras to capture the perspective of people in the community in a new way.

Once the photos are taken those with the cameras are interviewed. We collected 9 cameras and managed to interview 8 people. In an effort to scientifically quantify how El Astillero understands and experiences human-nature interactions, we analysed what was said during the interviews.

Rain (lluvia) is mentioned quite a lot. Rubbish (Basura) and Damage (Dano) are mentioned quite a lot. Change (Cambio) is also mentioned quite a lot. Sea (Mar) and Fishing (Pesca) and Fish (Pescado) are mentioned a lot.

We then used a method that calculates the relationship between words to see if people have a positive or negative attitude towards nature and the results showed that they do.



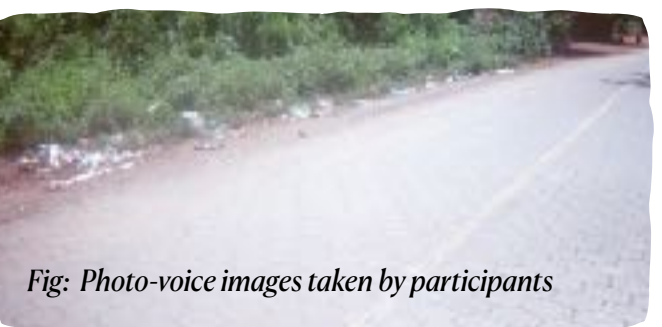


Fig: Photo-voice images taken by participants

INFRASTRUCTURE

Roads connectivity

Road connectivity to Tola and Jinotepe is quite difficult and often during the rainy season access to these towns are cut off due to the rivers flowing quite high. There is construction underway to build a faster route to Masaya/Grenada and Managua via Ochomogo as well as plans to build a highway along the coast, called la Costanera. These new roads will change the landscape of the region. Not only can roads fragment the ecosystem and create flooding in new areas, but it will also bring in a lot of investment which may benefit the local community a lot or it could displace a lot of the community.

Sewage

There is no sewage or drainage system in el astillero and these creates huge health problems for the population

Infrastructure

Slowly more and more infrastructure is getting built in el astillero, the new road to the Centro de salud is a good example of this, as is the drainage that they installed along that road.



Fig: A road in El Astillero



Fig: A road in El Astillero

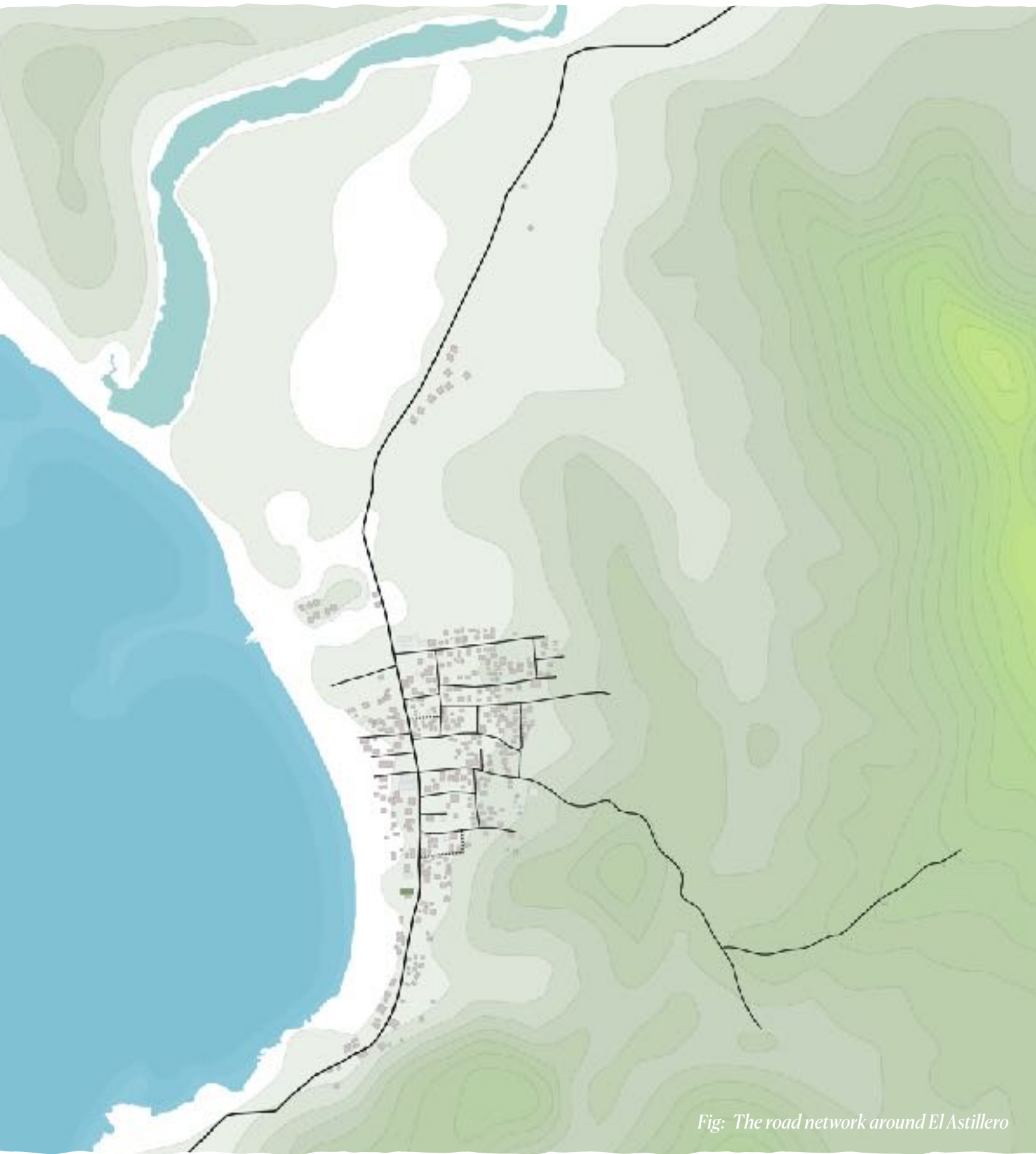


Fig: The road network around El Astillero

LAND USE

Fishing

The majority of the El Astillero's economic activity revolves around fishing. Fish populations are declining and climate change is not making things easier. Fishermen face many challenges to foster better management measures that can benefit the fisheries as well as the local community. The health of the ocean is also very connected to the health of the land.

Agriculture

Farming as an activity is more important outside of El Astillero and for the community of Las Cañas. Mostly people plant corn, beans, sorghum and sesame and cattle ranching is also extremely important for the farmers of the area. Climate change is making it harder to farm and the chemicals used in farming run off into the river, causing pollution. There is a lot of potential for farming to provide healthy food for the community and play an important role in regenerating the ecosystem.

Livestock

Although the unused surface around the village is quite considerable, cattle farming is not a large scale activity. From the field visit it seemed more practical to raise pigs, which are part of the village landscape. Their maintenance is less

intensive and they roam around the village free

Tourism

The Tourism industry brings money into the region and can be an important income generator for the communities in this area. More and more services are being provided to tourists and we are seeing more foreigners come to hotels or hostels, eat at restaurants in the area and buy products from local businesses.

Surfing

The surfing around El Astillero is world class, people come from all over the world to El Astillero and nearby beaches to surf. It's also a healthy exercise for children, keeping them fit, active and connected with nature.

Conservation

The Chacocente Nature Refuge is a special place and its protection is important for the ecosystem and the community of el Astillero. As a nesting ground for sea turtles (which are extremely important animals for protecting fish population) and a haven for biodiversity Chacocente, not only helps maintain the ecosystems health, but it also has the potential to become an important tourist attraction. This can generate income for the communities around it.



Fig: Land use in El Astillero



Fig: Biotic ecosystems

BIOTIC LAYER

El Astillero is located on the Pacific coast of Nicaragua in one of the most unique terrestrial ecosystems, the dry tropics. This ecosystem is capable to withstand extreme weather conditions ranging from extended periods of drought to heavy rainfall during the wet season.

Historically the whole landscape occupied by the village used to be covered in forest, descending from the highland peaks and transforming gradually into wet tropical transition forests and eventually mangroves. Following a natural topographic gradient the ecosystem features differences in species composition and density.

In addition to this, centuries of land use and forest clearing have transformed the natural landscape reducing the natural forest surface and replacing it with pastures and agricultural fields. Besides this, the introduction of infrastructure led in the lower parts of the landscape to obstruction of water flows and creation of swamps.



Fig: Farming Maize in El Achotal



Fig: Dry tropical forest

ECOLOGICAL FRAGMENTATION

For this phase of the landscape vision we did not enter in a deeper ecosystem and vegetation analysis due to time and financial limitations. For an optimal result of this landscape vision it is important to have a deeper analysis of the biotopes and correlate it to potential ecosystem services or conservation approaches. Therefore the next steps to be taken will aim a deeper analysis of this layer.

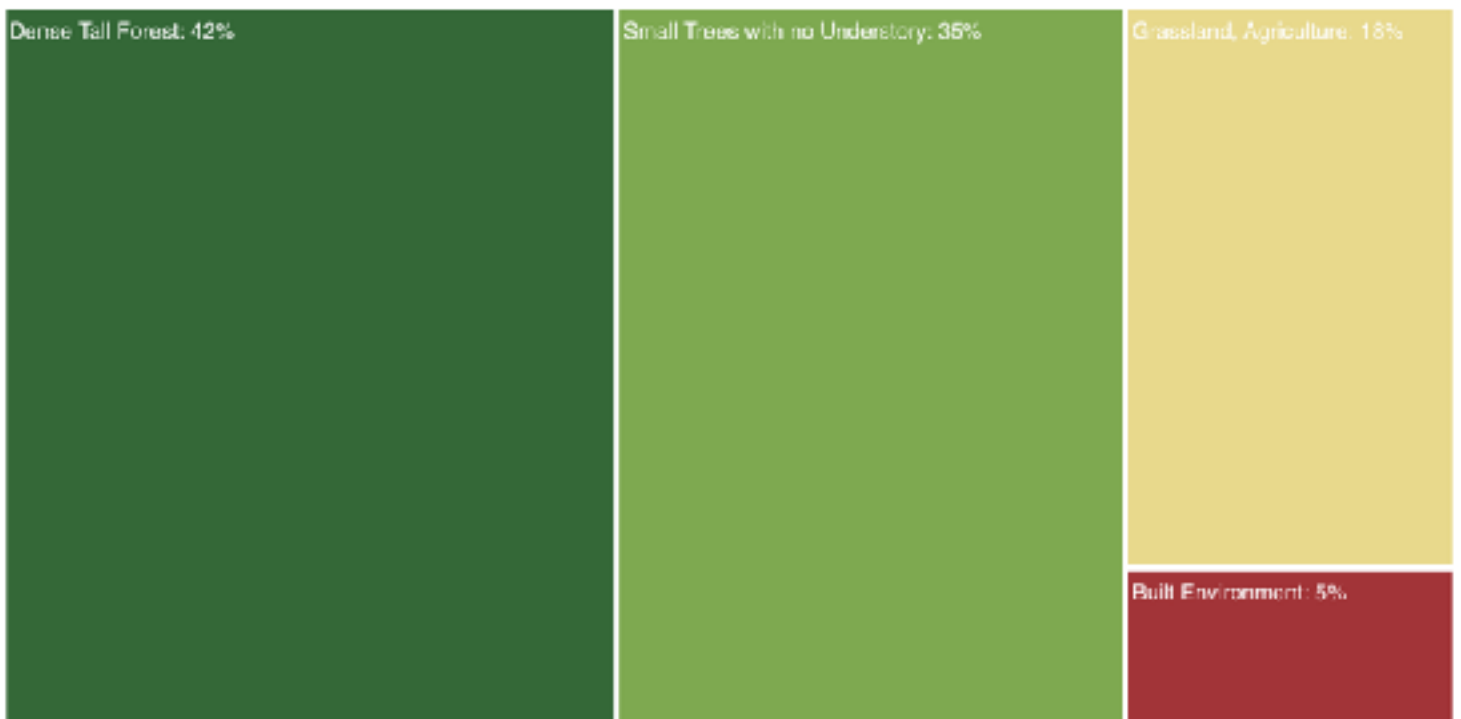
Using Satellite imagery around El Astillero we are able to use computer models to calculate how fragmented the landscapes ecosystems are.

The good use is that there is quite a lot of forest around El Astillero and it is in some quite big patches and not very fragmented. However, when you look beyond the data at how forests are connected to the river it's quite a different story. As we mentioned earlier in the report rivers are extremely important for wildlife during the dry season as they can be the only source of water.

It could be wise to connect the forests around el astillero to the River Escalante and the Chacocente Nature reserve, this way animals can access the river and the reserve to survive.

Proportions of Land Cover Classes in El Astillero

% area coverage for each land cover class found in El Astillero and its adjacent natural areas.

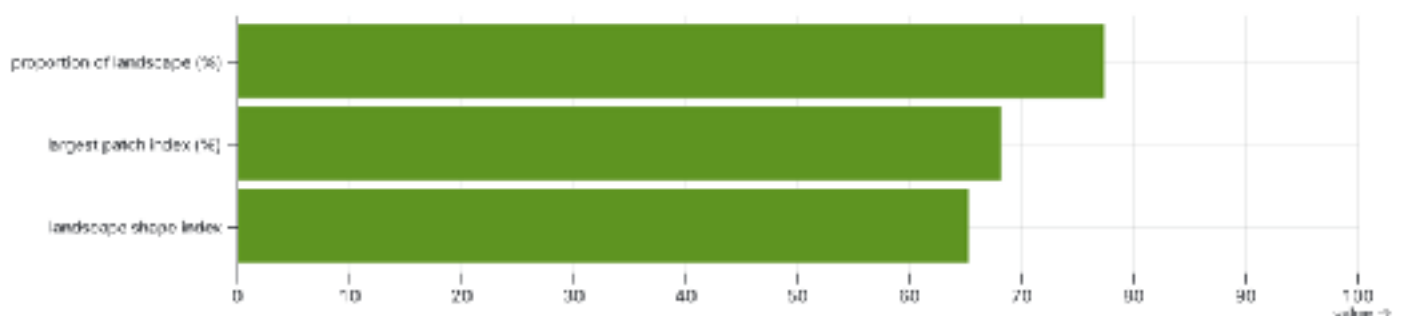




Landscape Fragmentation Metrics for Forest Ecosystems in El Astillero

Ecological health in the El Astillero area is quantified through a series of landscape indicators:

- 1) proportion of landscape (i.e., % of the total landscape that is made up by forest ecosystems)
- 2) largest patch index (i.e., % of the total landscape that is made up by the largest forest patch)
- 3) landscape shape index (i.e., a measure of landscape fragmentation: LSI increases without limit as landscape shape becomes more irregular and/or as the length of edge within the landscape increases)



ABIOTIC LAYER

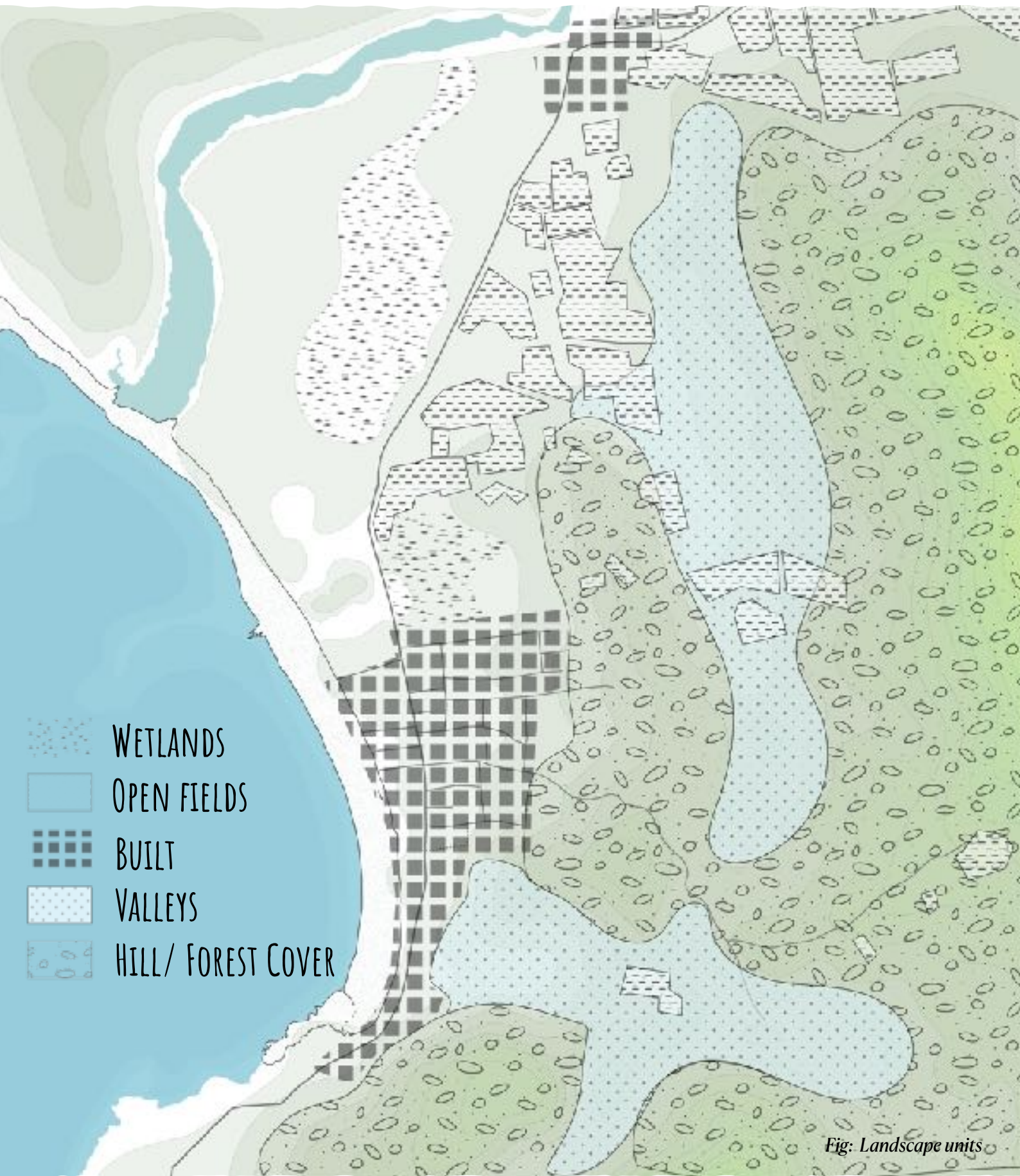


Fig: Landscape units

Landscape formation

No other geographical region in the world features such a high magnitude of geomorphic diversity like Central America and this on such a small surface (0,4 % of Earth's total land surface). This is the result of highly variable tectonic, lithologic, and climatic conditions which shaped Earth's last emerging strip of land. The landscape diversity of Central America ranges from impressive volcanic peaks (>4000 m elevation) to rugged tectonic shorelines, alluvial lowlands and coastal lagoons.

The physiographic structure of Central America resulted from the interaction of the north-west-trend of the Middle America Trench and the Central American Volcanic Front. These major morphotectonic features were formed by Cenozoic subduction of the Cocos oceanic plate, beneath the western margin of the Caribbean plate (Ill. 3.6).

Landscape typologies

The typology of the coastal landscape systems in this area of Nicaragua is characterised by small valleys descending abruptly to the beach. In some situations floodplains have been formed as a result of sedimentation and in other cases the floodplains descend even lower.



Fig: View of 'el Peñon'



Fig: a swamp near the road



Fig: a road in EL Astillero



Fig: Dry tropical forest



Fig: Hydrological layer

WATERSHED

The hydrological layer of this landscape system is linked to the climatic conditions of the region. Therefore we distinguish a rainy and dry season.

During the dry season most of the streams are dried out with most of the water flowing through the underground. Even in the moments with intense drought these valleys are recognisable due to the green vegetation surrounding them.

During the rainy season the streams are carrying considerable amounts of water during peak rainfall and become a dangerous place to be.

Within this landscape we distinguish 2 different watersheds influencing the hydrology of the area. Each one of these watersheds is located in a different valley separated by a higher topography. Eventually, both of them unite in the lower parts of the landscape in the vicinity of the river “Escalante” forming seasonal swamps while discharging into the river.



Fig: Streams during the dry season



Fig: Streams



Fig: Artificial wetland by the school

FLOODS

During the rainy season the village struggles with seasonal floods caused by aggressive runoff flowing through the village.

The main cause for these floods is attributed to unplanned development conducted without acknowledging the topographic and hydrological conditions. Therefore, the development of the village with disregard to streams is only amplifying the issue. In addition to this most of the roads act as artificial streams collecting water and directing it to the sea.

Without a proper canalisation system these roads witness heavy erosion and pose a real threat to humans and households. Houses located in the

vicinity of streams get regularly flooded or even destroyed. Eventually these houses get rebuilt or in some cases even relocated.

One particular case is the school, constructed in a low part of the village at the confluence of a stream which would discharge in La Cangrejal, a former natural wetland neighbouring the coast. due to infrastructure development the run off was obstructed, resulting in regular flooding of the school

Besides the aggressive runoff flushing large parts of the village, the agricultural areas located north of the village also get flooded for a longer period of time making cultivation impossible during the rainy season.



Fig: The flooded school after a short rainfall

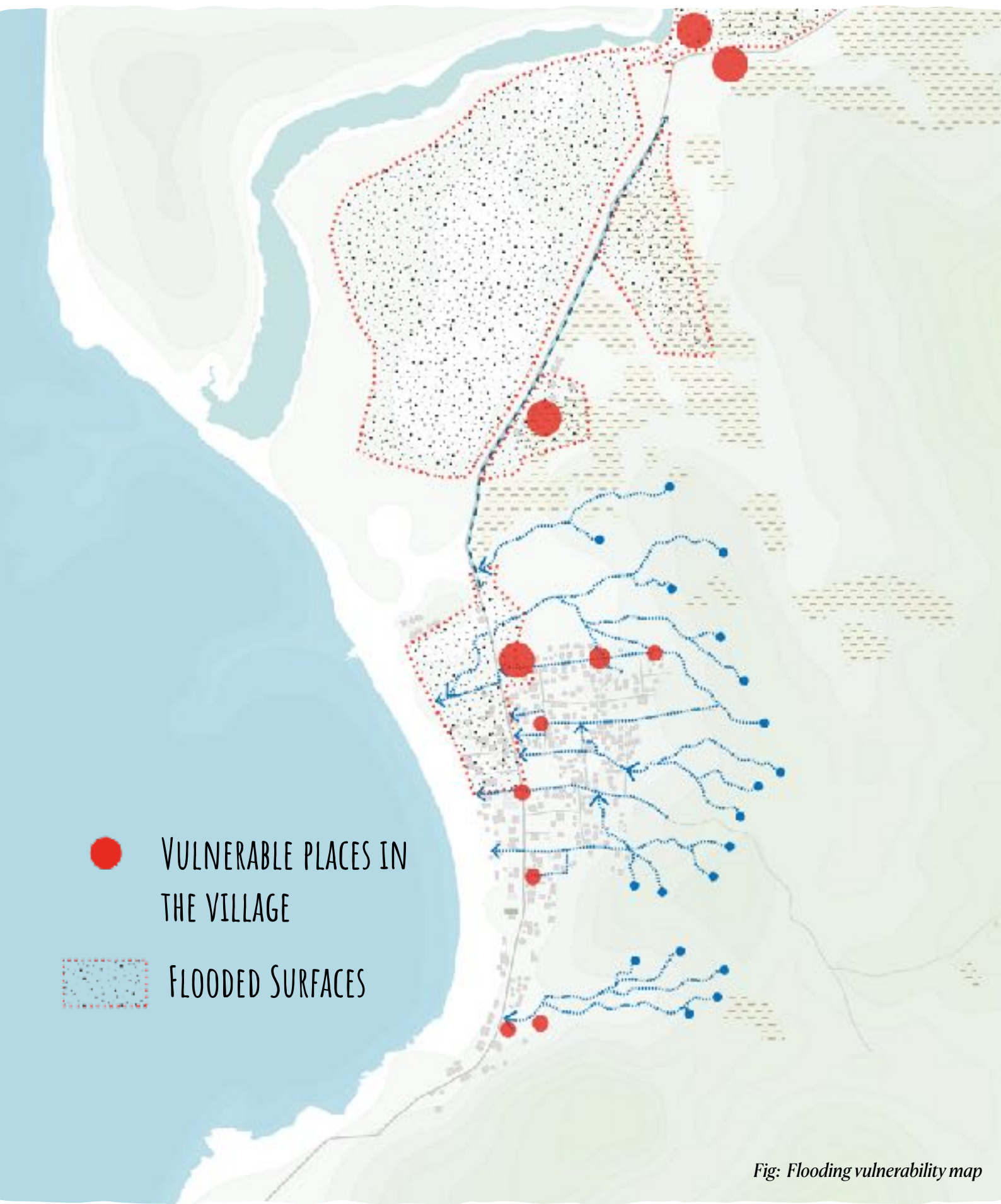


Fig: Flooding vulnerability map

Participatory Flood Risk Mapping

Casa Congo conducted participatory flood risk mapping workshops to get a better understanding of where flooding occurs and what are the risks which the community perceive with regards to flooding. The information gathered during these workshops, some maps and interviews are extremely insightful and can become the foundation of further discussion.

"AS A FARMER I PERCEIVE THAT FLOODING AFFECTED US BECAUSE OF THE DAMAGE TO CROPS WHEN THE HARVEST WAS ALREADY THERE, READY TO BE COLLECTED. WE DID NOT MANAGE TO HARVEST ANYTHING OF OUR MAIN CROP (BEANS) AT OUR LAND."

"INFRASTRUCTURES DEVELOPMENT, SUCH AS BRIDGES AND ROADS, WOULD REALLY HELP ESPECIALLY IN PROXIMITY OF RIVER ESCALANTE AND RIVER LIMÓN."

"THERE IS A LOT OF PLASTIC, DEAD ANIMALS, TREES, AND OTHER WOODEN OBJECTS WHICH END UP IN THE SEA."

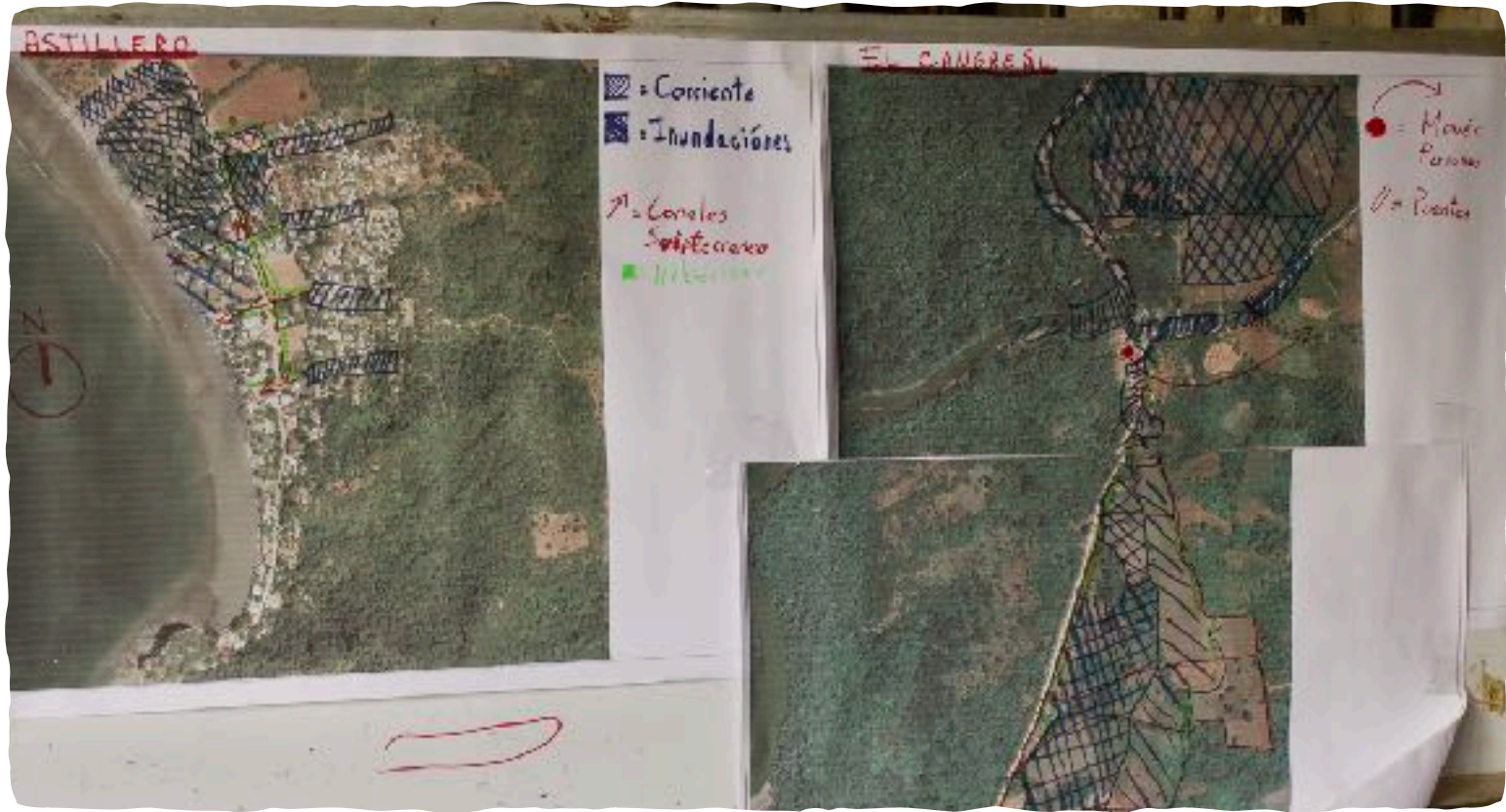
"ONE OF THE SOLUTIONS COULD BE REFORESTATION IN THOSE SPOTS WHERE WATER CANNOT INFILTRATE INTO THE SOIL AND THUS BECOME A THREAT FOR MANY AREAS OF THE COMMUNITY."

"HUMAN HEALTH IS ALSO VERY AFFECTED BECAUSE OF THE LOW QUALITY OF WATER AND MUD THAT FLOWS DURING FLOODS."

"A SOLUTION COULD BE TO BUILD CHANNELS TO LEAD WATER TOWARDS THE SEA WITHOUT AFFECTING THE HOUSES IN THE LOWER PART OF TOWN."

"AS A MEMBER OF THIS COMMUNITY I THINK THAT WE NEED OTHER SOURCES OF INCOME DIFFERENT FROM FISHING AND FARMING BECAUSE THESE 2 ACTIVITIES ARE NEGATIVELY AFFECTED BY THE RAIN SEASON."

"THERE IS THE NEED OF ORGANISATIONS WHICH COULD SPEAK TO THE MUNICIPALITY TO STIMULATE THEM TO ACT IN CRITICAL POINTS."



Village developed without a planning and did not consider the streams and the danger these pose during the wet season, especially during peak rainfall moments.

The large volumes of water, the dense built environment and the lack of proper canalisation transforms the roads descending from the peaks in real streams.

Village infrastructure does not fulfil to minimum standards of water safety discharge water. Without a proper ditch system the road erodes and creates real gullies, which require refill after every season.

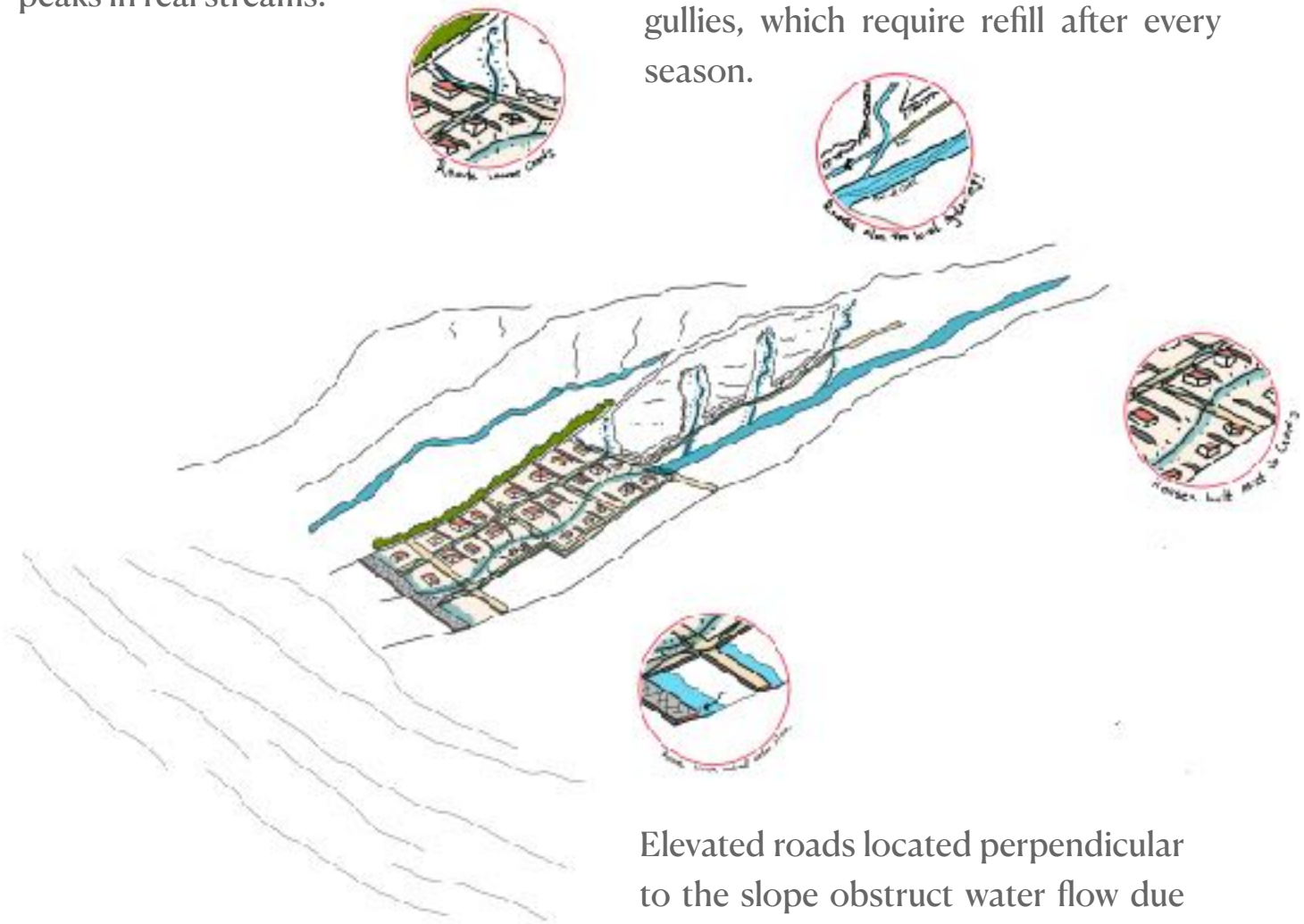


Fig: Schematic analysis of village flooding

Elevated roads located perpendicular to the slope obstruct water flow due to constant elevation with gravel. Besides this, households remain at a lower height and get easily flooded.



Fig: Makeshift defence to flooding



Fig: Erosion



Fig: The Road which blocks water flow



Fig: Erosion

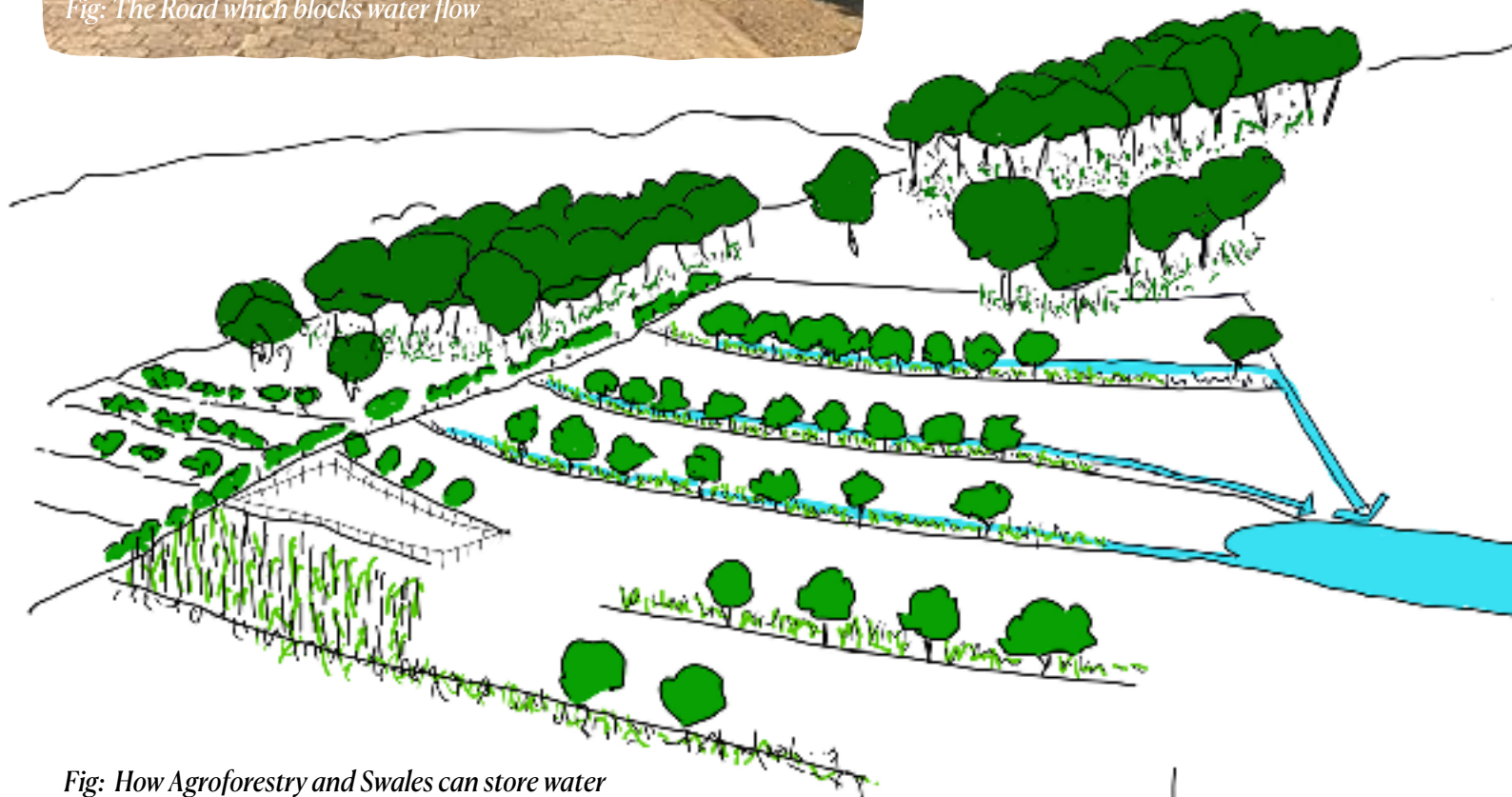


Fig: How Agroforestry and Swales can store water

WATER QUALITY

Water is one of the most important resources on our planets as it sustains life itself. Safe and clean water is one of the basic rights any human should have access to. In 2019 Casa Congo conducted a study regarding the water quality and safety. The Brigada Ecologica are still collecting data on water quality to see how it will change over time.

The water of the wells was analysed, as well as of the river Rio Escalante and of the grey water outlets of several households Overall water is saline in most points, PH is quite good and dissolved oxygen is low in some places yet doesn't affect too much water quality.

Results

1- The wells are contaminated with Nitrate 16 ppm over the recommended limit of the WHO. 50 ppm threshold– 66 ppm measured on average. (figure 1)

2- The River Rio Escalante is in an hyper eu- trophic state according to the Trophic State Index with 6 ppm of phosphate on average above the recommended limit of the WHO. 10 ppm threshold - 16 ppm measured.

3- Grey water spills present all around the village contained coliform contamination in 100% of the samples tested.



- LESS DISSOLVED OXYGEN
- MORE DISSOLVED OXYGEN
- NO DATA



Fig: Map showing well dissolved oxygen

- GOOD LEVEL OF PH
- POOR LEVEL OF PH
- NO DATA



Fig: Map showing well PH

- ELECTRICAL CONDUCTIVITY

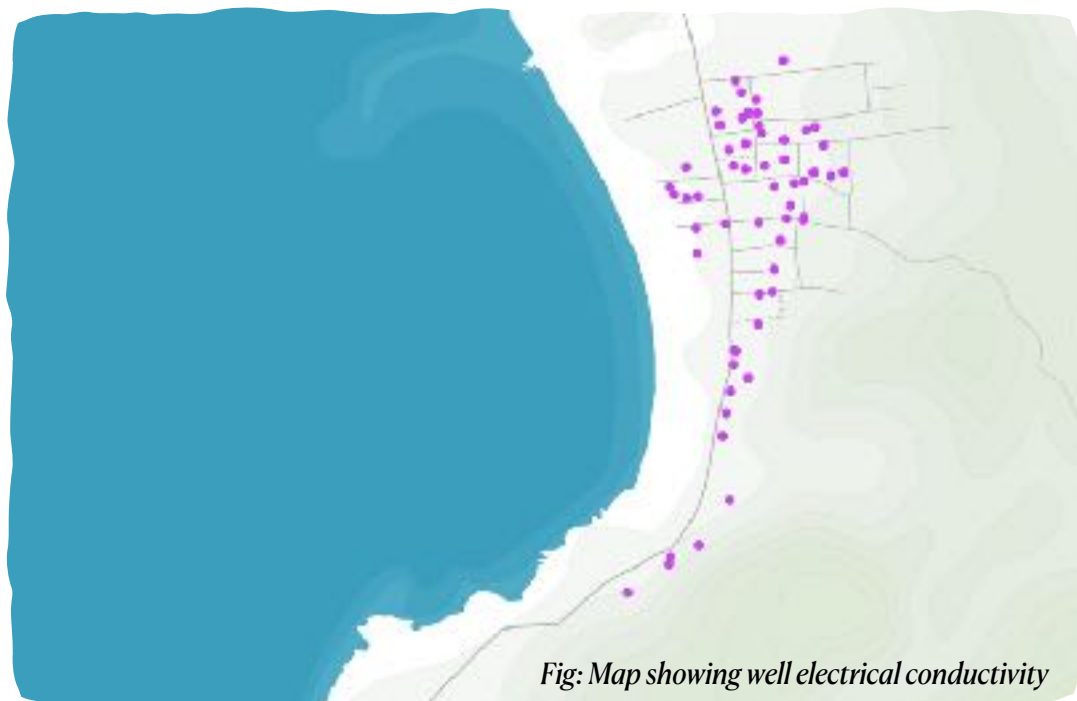


Fig: Map showing well electrical conductivity

Potential reasons

More research is needed to be certain, yet with the information we have we can begin to think about what are the potential reasons for this pollution?

Soaps and bleach being used to wash dishes and clothes and then flowing into the streets or the gardens are the main reason for grey water pollution. 100% of the samples also contained manure which would most likely be from pigs, cows, chickens and even humans.

The pollution of the wells is due to the toilets being pits which are dug up in and then filled with human manure. This then leaks into the groundwater, polluting the wells, which many of us use to wash clothes, cook, or even drink.

The river is most likely polluted because of the chemicals used by farmers being washed away into the river as well as lots of animal manure running into the river.

Fig: Fertilisers and Pesticides run off into the water system



Fig: A Grey Water Filter Called a Banana Circle (Source: Internet)

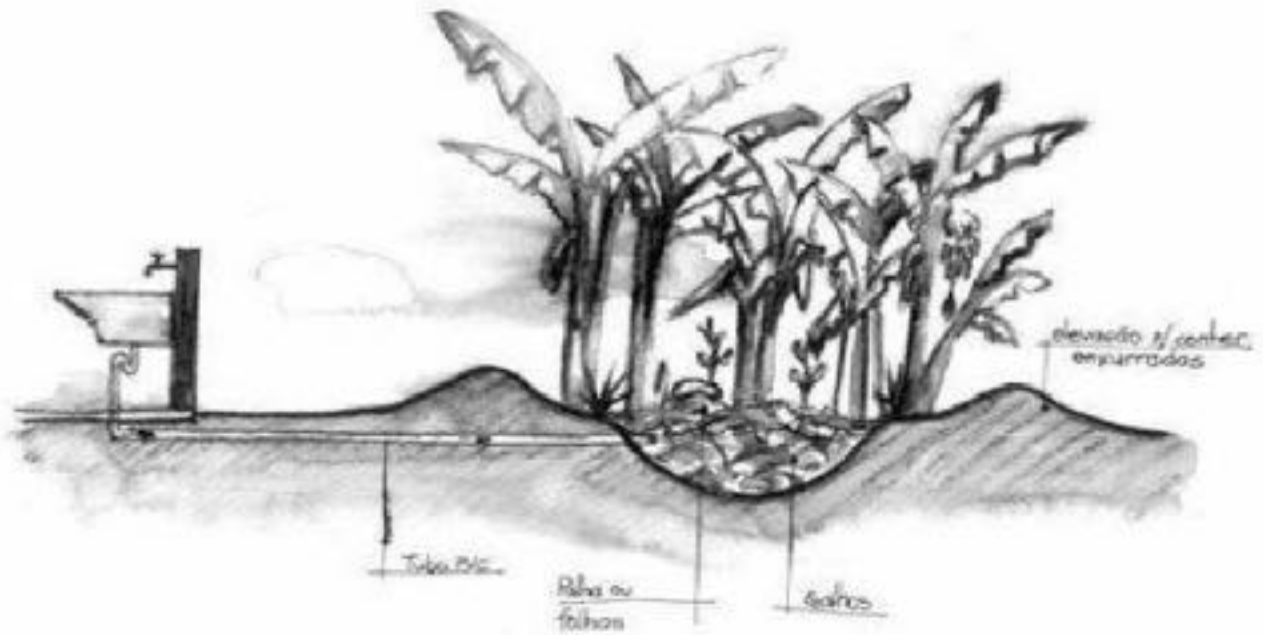


Fig: Grey Water Pollution in the streets of El Astillero





Fig: Olive Ridley sea turtle in Chacocente



NEXT STEPS

This booklet contains information gathered by Casa Congo and their researchers over the past five years. It aims to provide you, the community, with lots of information about the state of the environment as well as analyse what is occurring in the region.

Our aim is to bring together various stakeholders (Community Groups & Leaders, Land- owners & Businesses, Municipality, Farmers, Children, Fishermen, Women, Elders) So we can collective analyse the challenges and opportunities that the landscape presents us with and begin to collective strategies and envision solutions which can provide flood protection, grow food for the community, protect nature, be a healthy place for us to grow old and our children to grow up and be a resilient local economy and empowering space for everyone who calls this place home.

OPPORTUNITIES

So what is the purpose of this landscape vision?

We have mentioned it before in this document however we want to be clearer about the opportunities that a landscape vision can help harness for all.

Astillero and the surrounding area is a wonderful place, with a unique ecosystem. There are many opportunities for the community to thrive by embracing the resources and potential of the area. La Costanera road will be built soon and this will attract visitors and improve business. Chacocente is a Nature refuge unlike many others and this can also attract many visitors. The Surf and fishing in the ocean is also plentiful and the tropical climate means that lots of good food can be grown.

With a landscape vision there is an opportunity for the community and the various stakeholders to come together and plan how the community can benefit as much as possible from all of the potential that the region has as well as tackle some of the challenges that may prevent that, such as pollution, flooding and landscape degradation.



Fig: Surfing in El Astillero



Fig: Spider monkey in Chacocente

WHAT THE EARTH PROVIDES



Before we begin to think about what we want El Astillero, and the valleys around it to become. Let's take a moment to acknowledge what the natural world does, these are some- times called 'ecosystem services'. The ability of certain ecosystems to provide goods and services is as well depending on the health of the ecosystem as well as the degree of exploitation.

In simple terms ecosystems can provide:

1. Ecological value; genetic material, pest control, pollination
2. Socio cultural value; crucial source of non-material wellbeing and indispensable for a sustainable society
3. Economic value; Direct economic impacts, Mainly applicable to goods but as well functions; Growing food, cleaning water, sea surge protection (dikes). And Indirect market valuation, avoiding the cost that would have been paid in the absence of those services, or enhancing the economic value being able to be used, like healthy fishing grounds, fertile soil.

To summarise, with a healthy environment, we can have clean water, cleaner wells, fertile soil, less plague and pests, building materials, spaces for healthy activities, flood control and good fish populations.



