# "Community Incentives for Mangrove Protection"

**Rincón del Mar, Sucre, Colombia**

**E2E Foundation**

## 1. Context: Rincón del Mar

Rincón del Mar is a coastal village on the Colombian Caribbean of approximately 4,000 inhabitants in the San Onofre municipality, department of Sucre, Colombia. Enclosed between the Caribbean Sea and approximately 70 hectares of mangroves, Rincón del Mar's main economic activity is fishing. The majority of local residents—referred to as *Rinconmarenses*, are Afro-Colombian, and reside in nationally protected Afro-Colombian territory. The Rinconmarenses are hardworking, positive and invested in preserving the natural environment and their rich cultural heritage.

## 2. The Problem

Regardless of their desire to protect the local culture and environment, the absence of infrastructure such as waste management and sewage systems; inadequate access to transportation--and therefore other basic services like trash collection and ability to transport appropriate construction materials; a lack of regulation on a growing urban population and a poor understanding of the negative environmental impacts of the population's behavior have all combined to create a serious threat to the survival of Rincón del Mar. All these problems have severely damaged the town's most important resource—the surrounding mangrove forest.

*Image 1: José, Evaluating Project Area with E2E's Program Coordinator*

*Source: E2E, 2017.*

*Image 2: Perished Mangroves to the East of Rincón del Mar*

*Source: E2E, 2017.*

Currently, almost all the town's sewage water and grey water is flushed into the mangrove or the beachfronts. For over 40 years, the town has been dumping all their trash into the mangrove, unintentionally causing expensive and sometimes irreversible damage. Several initiatives have evolved over the past decade to manage trash and recycling in the town, yet have had little success in protecting or restoring the mangroves. As most of Rincón del Mar lives below the poverty line and does not have access to appropriate construction resources due to both economic and infrastructural barriers, most of the townspeople use mangrove wood to build their homes. As the townspeople cut down the mangroves, they use trash and other debris to fill in the mangroves to build the foundations for their homes. Between cutting down mangroves and uncontrolled urban expansion, the resulting deforestation has magnified the contamination in the estuary waters by cutting off essential oxygen flows from the ocean inlets and caused severe sedimentation which contributes to the drying up of nearby forest.

## 3. Geographical Scope of the Project

There are roughly 72 hectares of mangrove wetlands directly adjacent to Rincón del Mar. E2E intends to protect and monitor the 45 hectares to the east of the village (light blue, Figure 1), not including the 27 hectares to the north, shown in light green in Figure 1.

This project does not include the 27-hectare northern portion of the mangrove (light green area in Figure 1). The Northern portion is slowly drying out due to the various anthropogenic changes to the hydrodynamics in the area. Nearly 20 hectares have already been removed or are dead. Without a hydrological restoration similar to that being done with the southern mangroves, these mangroves will continue to die out. Due to these high external risk factors, E2E will not include this area in monitoring and protection activities unless further action is taken by the State to protect and restore the northern 27-hectare portion of mangroves.

**Figure 1: Map of Mangroves around Rincón del Mar.**

The light blue area to the South includes approximately 45 hectares which are included in the project, and the light green area to the North is not included in the project.

In March 2017, CARSUCRE began a hydrological restoration project, which will open 1.5km of hydrological channels in the mangrove forests to the East of Rincón del Mar which are currently under threat. The project will last for 6 months (1). At present, the main water source for all of the mangroves in the area is the tidal inlet at the northern end of Rincon del Mar. Previously there were at least four tidal inlets between Rincon and Punta Seca (a settlement to the South of Rincon) and a number of fresh water streams which also provided water to the mangroves. However, as the population of Rincon del Mar grows, an estimated 20 hectares of mangroves have been chopped down, and sand and solid waste are used to fill in areas of the mangrove swamp for urban expansion. Much of the waste used for filling in mangroves for construction --especially plastic, ends up trapped in the roots of the mangroves, impeding further growth. To make things worse, the large amount of sewage being dumped into the lagoon causes algal blooms (eutrophication), which drastically diminishes the mangroves' oxygen supply. These influences have combined to severely reduce the depth and flow of water in a *self-reinforcing cycle*, causing the the mangrove forest to dry out, and, if nothing is done, eventually die.

Without the intervention of E2E, the hydrological restoration of the mangroves will only lead to short term improvements in mangrove health. The process of sedimentation will most certainly repeat, contamination will continue and the mangroves will continue to perish. This will have a number of severe negative impacts on the local population, as their wellbeing and livelihood is directly connected to the mangrove ecosystem.

## 4. Negative Impacts of the loss of Mangrove Ecosystems in Rincón del Mar

Mangroves are critical ecosystems that connect terrestrial and marine ecosystems. They are fundamental for regional fisheries, coral reefs and other marine biome survival. Mangroves function as filters for sediments that, if they enter into a marine ecosystem, can cover and suffocate corals, sea grasses and other marine biomes. Furthermore, mangroves are the breeding grounds for most of the marine fish species in the region, as well as crabs, shrimp and lobster. The villagers of Rincón del Mar often tell stories of the bountiful fish populations that used to be found in the mangroves, and on the village shores. Now, village fishermen struggle to feed their families. If the fish populations are completely deprived of these crucial habitats, income and food security from the ocean and mangroves may disappear completely.

If degradation of the mangrove forest continues, its ability to filter nutrients from terrestrial ecosystems will disappear. If this happens, nearly all of the sewage from a village of approximately 4,000 people; sediments, chemicals and harmful nutrients from nearby cattle farms; mud, dirt and other debris will flow directly into the ocean. Coral reefs, sea grasses and other marine biomes in the region are already under severe threat from the tourism industry, overfishing and of course, climate change. Any further damage may result in the town's coastline becoming entirely lifeless.

Finally, mangroves provide extensive ecosystem services to coastal communities, including flood prevention, erosion control and other coastline defenses. For the past several years, the inhabitants of Rincón del Mar have suffered from increased flooding during winter months, damaging already precarious housing conditions and increasing public health risks through the spread of already contaminated water from the lagoon. Largely, this is due to increased sedimentation in the mangrove lagoon. Without mangroves to hold sand and sediment in place, long stretches of the beach to the North and South of the village cannot be maintained naturally. Without mangroves to absorb the energy of storm surges, nearby coastal settlements will suffer from increased erosion and flooding.

The people of Rincón are becoming increasingly concerned with preventing the loss of the mangrove. They

now understand the damage that has occurred. They are repentant and actively looking for solutions and partners to save their town and livelihoods, *which they know depend on the mangrove*.

## 5. Why Protect Mangroves? Examining the Economic Evidence

Beyond the inherent value of the biological diversity that exists within a mangrove forest, mangroves provide a host of important ecosystem services to nearby populations, which the Colombian Government has valued at $3,590 per hectare annually--equivalent to $5,365 USD today (2).

The most well-documented value of mangroves comes from mangrove forests' function as a hatchery for commercially important fish species, as a direct relationship exists between the presence of mangroves and the abundance and variety of fish in coastal ecosystems (3). The WRI estimated that mangrove supported fisheries in Belize (4) were worth more than $14 million USD per year. Another study from Asia suggests up to $16,750 per hectare annually (5).

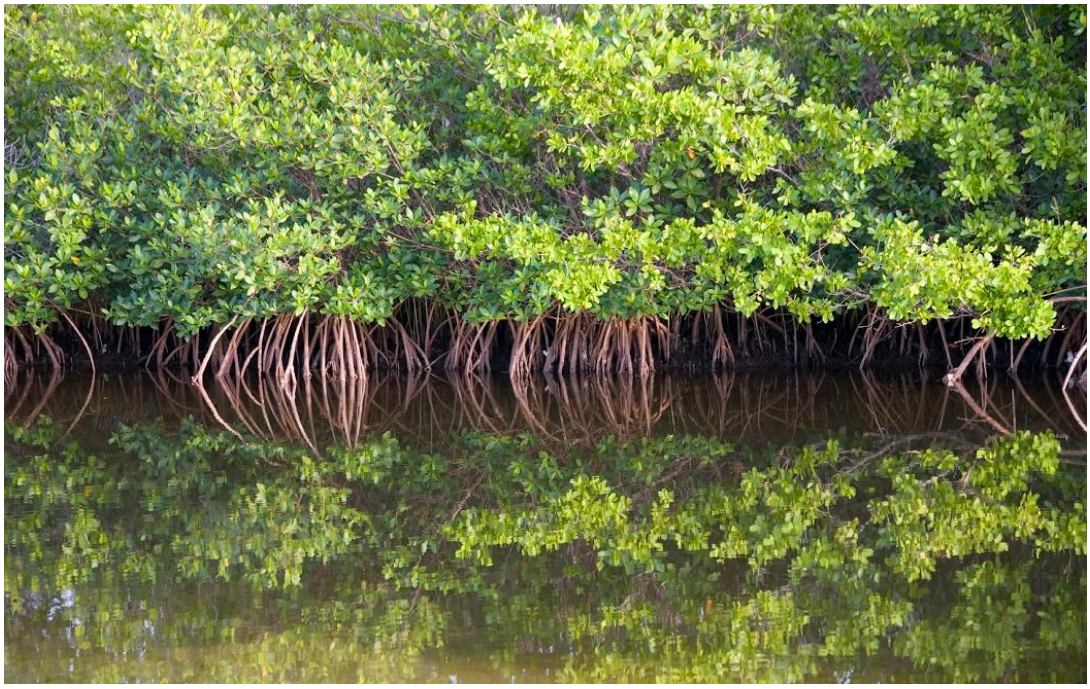

*Image 3: Healthy Mangrove Systems Provide Extensive Ecosystem Services*

*Source:* PROFOR, 2017.

Other ecosystem services are less well reported but similarly important. For example, mangroves have been valued at $5,820 USD per hectare annually when compared to the cost of a conventional sewage treatment plant (6); $12,263 USD per hectare annually compared to the cost of building breakwaters to protect beaches from erosion (7); and up to $10,821 USD per hectare annually for coastal defenses against storms (8). Furthermore, mangroves are capable of storing more carbon than almost any environment on the planet. The converse of this is that when forests degrade or are lost, the large stores of captured carbon are newly released into the atmosphere (9). Data show that mangrove forests on average contain approximately 1,023 Mg (approximately 2.26 lbs) of carbon per hectare (10). If all of the ecosystems that depend on mangroves are included in the value of a mangrove, *of all the biological carbon, over half (55%) is captured by mangroves, sea grasses, salt marshes, and other marine living organisms which are dependent on mangroves* (also known more specifically as 'blue carbon') (11).

Finally, as tourism grows in Rincón del Mar, the mangroves are an important tourist attraction. A WRI study in Belize attributes $196 million USD per year to mangrove and coral-reef related tourism (12).

## 6. The Project: Community Incentives for Mangrove Protection

Based on the FAO Framework, “Income for Coastal Communities for Mangrove Protection” (13) and on the recommendations from the Center for Global Development for Performance Payments to slow climate change (14), this project has three main goals:

**1) Completely protect and preserve the 45 hectares of mangroves to the east of Rincon del Mar.**

**2) Restore the mangroves around Rincón del Mar, to the same levels as in the Sanguaré Natural Reserve, based on soil organic and biomass carbon stocks.**

**3) Provide the community with economic and social incentives to protect the local environment.**

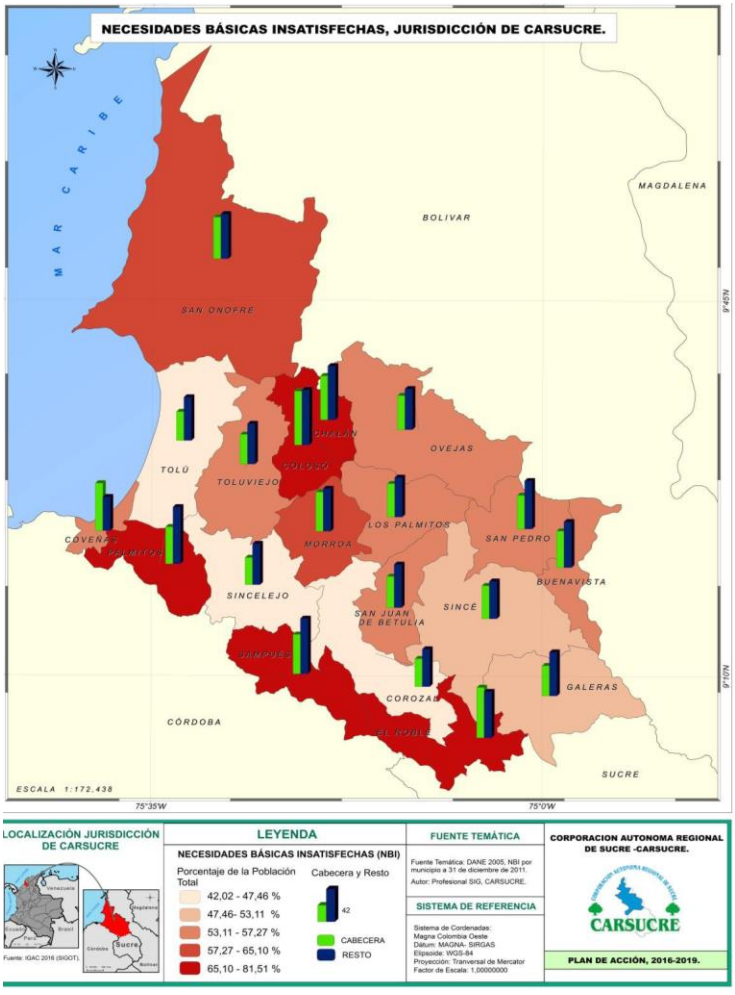


*Figure 2: Poverty expressed as unsatisfied basic needs (NBI) in the Department of Sucre. Dark red areas show the highest poverty levels, and in the san Onofre region, where Rincón del Mar is found, roughly 57-65 % of the population suffer from unsatisfied basic needs.*

*Source: CARSUCRE, 2011.*

Due to the interdependent socio-economic and environmental conditions in the region, environmental and economic problems must not be considered as separate issues: they are intrinsically linked, and as poverty increases, so does environmental degradation, and vice versa. A lack of economic opportunities and investment in social well-being have led to environmental destruction in the area, making it critical to link any environmental protection initiatives in the region to economic incentives.

E2E is committed to coordinating the project with regional initiatives and plans that contribute to poverty reduction and environmental protection in the region in the long-term.

### 6.1 Pilot Carbon Estimation

E2E has performed pilot sampling of the mangroves to estimate the biomass and soil organic carbon stocks, a good indicator of mangrove health (15). Further measurements will need to be made to reach the level of accuracy required by the FAO/IUCN framework, and will be performed within the first four weeks of project execution.

The average biomass carbon was found to be 129 Mt C/ha and the average soil organic carbon was 240 Mt C/ha. To contextualize the carbon stocks, a study conducted on mangroves on the Caribbean coast of Honduras found an average biomass carbon of 196 Mt C/ha and an average soil organic carbon (up to 1m) of 381 Mt C/ha (16).

## 6.2 Restoration Activities

As well as monitoring and protecting the mangroves, E2E will work alongside the community to undertake active restoration, which involves replanting the areas where the mangroves have been chopped down or dried out. E2E will work with CARSUCRE to identify areas where the restored hydrological conditions are appropriate for planting seedlings. Replanting activities are an integral part of working towards the performance-based community incentives. In order to provide the seedlings required for replanting, E2E and Mundo Verde will construct and maintain a nursery (17). The location will be determined in consultation with CARSUCRE.

## 6.3 Community Incentives

In February 2017, E2E conducted door-to-door surveys in Rincón del Mar to discover and prioritize the needs of Rinconmarenses. The following concerns were identified and prioritized by the people of Rincon del Mar. The ítems are listed in order of most important to least important.

1. Effective solid waste management in the town.
2. Access to drinking water in schools
3. Improved roads
4. Restoration of the mangroves
5. Sustainable, locally appropriate sources of employment
6. Public spaces for recreation
7. Stable health care provision
8. Improved education
9. Improved housing
10. Sewage system

Considering the operational feasibility of each concern, alongside local partners, E2E is currently developing community projects in the following areas:

1. Effective solid waste management
2. Sources of Employment
3. Spaces for recreation
4. Improved education

The community incentives program is still in the design phase, as the first incentives will not be delievered until after at least the first 6 months of project execution.

*Image 4: Women Leaders from Rincón del mar Talk about Waste Management and Recycling with the E2E Team*

*Source:* E2E, 2017.

## 6.4 Mangrove Protection and Empowering Women in Rincón del Mar

We believe that this project is a powerful tool to empower women in Rincón del Mar and are committed to taking direct action that includes women as important stakeholders in the project, addressing key gender inequalities directly through our activities, and influencing them through project design, implementation and our interactions with the community.

We are committed to:

- Considering gender as a critical factor during the decisión making process and making a serious attempt to close the inequality gap;

  - Utilizing knowledge on gender differences in mangrove destruction/protection to plan for capacity building.

  - Raising gender awareness through the project and communicating women's empowerment as a critical development tool for the community;

- Develop gender-specific indicators for women, analyze gender specific data, and report on lessons learned so that we can improve in the future;

  - Strive for at least 50% of women as representation in the community meetings, have a mínimum of 50% women during voting and decision making processes, and ensure a mínimum of 50% female workers hired for the project.

## 7. Why do payments for Environmental Protection to local communities work?

Global carbon markets and carbon credit certification systems are often viable options for the protection of critical ecosystems, halting forest loss and promoting conservation. However, in most cases, these systems are not viable for small communities like Rincón del Mar due to high upfront costs for carbón credit certification, price volatility and other risk factors which are assumed by only the recipient community-- which in most cases are already facing economic, social and environmental hardship.

**Like Rincón del Mar, many small communities are largely dependent mangrove ecosystems, relying heavily on extractive activities from local forests for survival. Unfortunately, these communities often lack of state services and economic opportunities; furthermore, they continuously face pressing human insecurities in a vicious cycle of poverty.**

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Programs which provide payments the protection of environmental goods and services not only alleviate the aforementioned social problems, they also provide a universal, public service: they capture and store carbon, thereby preventing climate change at a global level (14).

Protecting forests is the most cost-effective strategy for fighting climate change (14). However, to create globally equitable programs to protect forests, the communities that stand to lose basic rights due to the absolute protection of forests should be compensated. This project transparently pays local communities not simply based on territorial or historical rights: it is a performance-based scheme which incentives better local behavior with global outcomes.

This project has four major benefits. First, it provides incentives to counter the benefits that would be received from exploiting, and eventually destroying, the local ecosystems. Community incentives are critical to achieving “buy-in” from all actors in the community, and ensuring that the project not only oversees mangrove protection, but also attends to the whole communty´s needs. Second, as results-based program, it requires visibility and transparency throughout the project, transferring benefits in proportion to outcomes. Third, it allows global and

local communities to share the cost of climate change mitigation and also, the benefits of sustainable development in local communities. Lastly, this project is highly scaleable across all community-driven mangrove protection and community development programs in Colombia.

## 8. Partners

1. **Asociación Mundo Verde**, is a group of concerned citizens that have taken the task of dealing with their community's socio-environmental problems into their own hands, and have actively been working to protect the mangroves, improve trash collection and waste management systems in Rincon del Mar; as well as work as environmental advocates in their community through education and door to door knowledge sharing. The three primary members of Mundo Verde attended and were certified in E2E´s 64-hour workshop, "Workshop for Social Impact Management" in January, 2017. As of February, 2017, Mundo Verde is in training with E2E´s Rincón del Mar Coordinator, setting up initial project logistics, collecting data and setting baselines for performance and impact.

2. **Corporación María Mulata,** based in Rincón del Mar, has agreed to support community environmental education efforts to support the program, and are currently developing an environmental education program for the community which includes materials for local schools, the library, and monthly environmental film events. Website: https://www.mariamulatalectora.org/

3. **Sanguaré Reserva Natural,** a private conservation project based near Rincón del Mar, will support the Project by offering technical and academic support for mangrove monitoring, conservation and community education activities. Sanguaré is an exemplary conservation project in the región, with over 15 of experience recovering and restoring tropical dry forest, mangrove and coastal marine ecosystems. Website: http://reservanaturalsanguare.com/

4. **Fundación MIMA,** a non-profit dedicated to creating sustainable communities, currently runs a door to door trash collection program and periodic trash clean ups in the mangroves. They have agreed to support the project by coordinating trash collection in the mangroves and working on community education, which will prevent any further damage to the mangrove ecosystem during the intensive recovery phase. Website: http://fundacionmima.org/

5. **CARSUCRE,** The regional environmental corporation, is currently running mangrove management workshops, and from march-june of 2017 will be opening a 1,500 meter canal through the mangroves of Rincon del mar to remove sedimentation, prevent further urban expansión on the mangroves, and allow for greater hydrologic flows which bring seawater, oxygen and nutrients to the mangroves, which are critical for their survival. They have also agreed to share and distribute educational materials for mangrove protection, provide signage and inputs to communicate which areas of the mangroves are protected, and work with the police to enforce environmnetal protection laws and legal summons. Website: http://CARSUCRE.gov.co/

## 9. Additional initiatives

The following events and activities have already been executed or are underway to support the successful execution of the project.

### 9.1 Capacity Building for Project Management with Mundo Verde

In January of 2017, three members of Mundo Verde joined E2E for the 64-hour, certified course, "Workshop for Social Impact Management" in Medellín to learn project design and management along with 33 other students from Colombia and abroad.

*Images 5 and 6: Participants of the 2017 TGIS Workshop for Social Impact Management in Medellín, Colombia.*

*Source:* E2E, 2017.

### 9.2 Mangrove Management Training

E2E and Olga Rebeca Cabrales, Marine Biologist from the Universidad Jorge Tadeo Lozano gave the three members in training from Mundo Verde a 5 day workshop on Mangrove Protection and Restoration. The workshop included identifying different species of mangroves; mangrove cycles; socio-cultural and economic value of mangroves; causes of loss and degradation of mangroves; and a complete diagnostic of the mangroves in Rincón del Mar. The workshops included theoretical and field work to support the Project.

### 9.3 Delivery of information on sewage pollution

On March 20, a report was submitted by the Social Prosperity Infrastructure Directorate to the National Planning Department, that detailed the problems from a lack of a proper sewage system in Rincón del Mar, and the contamination of the lagoon and mangrove by the sewage of homes and businesses in Rincon.

### 9.4 Articulation of waste management and recycling systems

The E2E y MIMA Foundations have been planning the articulation of waste management and recycling projects in Rincón del Mar and the current project, "Community Incentives for Mangrove Protection" since February 2017. On March 17, Fundación MIMA, the CARSUCRE unit in charge of water, sanitation and sewage and E2E met to discuss a possible collaboration to improve the garbage collection system in Rincon del Mar.

## 10. Next steps and contact information

E2E is immediately looking for funding for this program. The projected budget is approximately $109,000 USD, with flexible contributions or financing mechanisms for Established Partners or Donors.

For more information on the project, or to get in touch with the Executive Director to discuss financing, please contact Teryn Wolfe at terynwolfe@fundacione2e.org;

email the Rincón del Mar Project Coordinator at rincondelmar@fundacione2e.org;

call us directly at +57 305 366 5718 or

contact us through our website at www.fundacione2e.org

The E2E Foundation

**Medellín, Colombia**

**2017**

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