

Designing a Regional Ecotourism Development Plan for the Caño Martín Peña Communities



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WPI

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Abstract

The Caño Martín Peña communities in San Juan, Puerto Rico have plans to dredge the channel that runs through them and boost their economy through ecotourism. Our project designed an ecotourism development plan that ensures the use of the restored channel for community benefit. Through community business analyses, conversations with the community, and a gap analysis, we identified existing ecotourism assets, recommended investments, and outlined strategies to formulate what we found into a sustainable ecotourism destination. Our findings are conveyed through a map of our envisioned plan, a business management hierarchy, and guidelines for participating businesses. These deliverables highlight the potential for ecotourism to drive socioeconomic growth in the communities.

Executive Summary

Introduction

Unmanaged aquatic waste can pollute bodies of water and have lasting economic, environmental, and social impacts on surrounding societies (US EPA, 2015). In 2004, a social justice initiative called Proyecto ENLACE del Caño Martín Peña was formed to address the negative impacts that pollution has had on the eight communities surrounding Caño Martín Peña, a channel that runs through southern San Juan, Puerto Rico (Proyecto Enlace del Caño Martín Peña, 2022; Urban Waters Learning Network, 2024). Since then, the main goal of Proyecto ENLACE has been to prepare the communities for the dredging of the channel, after which walking paths will be developed along each side of the channel, public gathering spots and water access will be implemented, and wildlife conservation will be enacted. However, due to its prime location in San Juan, Caño Martín Peña ENLACE is concerned that the area could be exploited by outside corporations once it is restored. To ensure that the communities benefit from the dredging and that the local history and culture are preserved, ENLACE wants to capitalize on the opportunity for channel-based ecotourism by managing and guiding the initiative.

Project Goal, Objectives, and Methods

Our team strived to design a channel-based ecotourism development plan that supports ENLACE's post-dredging plans for ecotourism and facilitates economic growth in the Caño Martín Peña communities. We achieved this goal by completing the following objectives:

Objective 1: Identify economic, environmental, social, and cultural assets present in the Caño Martín Peña communities.

Objective 2: Determine the viability of these assets for use in an ecotourism development plan.

Objective 3: Determine the opportunities and investments to develop a well-rounded tourist experience.

Objective 4: Develop the ethical principles and guidelines for ecotourism businesses.

Objective 5: Develop a plan that forms links between assets, opportunities, and investments around the channel.

We utilized a multi-method approach comprised of interviews, a focus group, and online comparative research to develop the ecotourism development plan. To introduce ourselves to the communities and their existing assets, we went on two tours with community leaders. We held a focus group with ENLACE employees to gain insight on their visions for an ecotourism development plan, and we analyzed 70 local businesses through Google Maps and Hecho en el Caño Martín Peña to identify tourism-relevant businesses in the area. To ensure that each asset we found was appropriate to market or partner with an ecotourism destination, we developed a set of criteria based on whether an asset allowed for easy channel access, and whether it benefitted the communities. We conducted a case study of 6 ecotourism development plans to determine what typical ecotourism amenities are missing in the communities, and to identify ethical principles for partnering businesses. We thematically linked assets and areas for investment in a set of visuals that emulated our recommendations for a Caño Martín Peña ecotourism hub.

Key Findings

We categorized the findings from our research into three parts: existing assets, opportunities and investments, and guidelines.

Existing Assets

The existing assets in Caño Martín Peña fall into three categories: local businesses, community events, and location. There is one community-owned ecotourism business in Caño Martín Peña called Bici-Caño, which is a bicycle tour company that provides a way for ecotourists to learn about the communities while safely venturing outside the immediate proximity of the channel. In the communities surrounding Caño Martín Peña, there are also an abundance of locally owned restaurants, bars, and convenience stores. However, many of these businesses either lack quality reviews or do not have locations close enough to the channel, making them unattractive to tourists. From our research, we found 2 restaurants and 1 convenience store within a 3-minute walk of the channel that also had quality reviews. Caño Martín Peña has two community events (the Mercado AgroArtesanal de Barrio Obrero and the Festival del Caño) that have the potential to draw people from other communities. Finally, we found that the proximity of Caño Martín Peña to popular San Juan tourist locations is an asset. From the Condado Vanderbilt Hotel, a frequented lodging option on a popular tourism street, it is at most a 15-minute car ride to the communities. There is also a train station near ENLACE and bus lines that run through the communities. While these options do not currently provide convenient connections from Old San Juan or Condado, they have the potential to open Caño Martín Peña to populations located in other areas and service could increase in the future.

Opportunities and Investments

The following opportunities and investments were areas within the communities that either did not exist or required improvements. In our research of three ecotourism development plans, we determined that these features were imperative to include in a well-rounded ecotourism experience for Caño Martín Peña.

- **The Welcome Center** serves as the primary point of contact ensuring that visitors to the ecotourism destination are provided with the proper information about the region from ongoing events, orientation, and navigation directions. The center is the first building visitors see when arriving at the ecotourism destination acting as the gateway to Caño Martín Peña.
- **Direction Signs** provide directions for visitors who are unfamiliar with Caño Martín Peña by being installed at intersections. The direction signs are a part of the wayfinding system that increases visitor familiarity and fits within the branding of the ecotourism destination.
- **Advertisements** should reflect the environment and culture of Caño Martín Peña through the creation of illustrated maps effective promotion is developing a visual identity that resonates with the target audience, using natural colors imagery feature elements such as nature conservation and sustainability that reflect the area's unique attributes. The illustrated map should be distributed to various consumer touchpoints outside the region.
- **Community Green Space** serves as an open space for visitors and residents to experience recreational activities and social interaction. The green space provides adequate space for events to be hosted such as the Mercado AgroArtesanal de Barrio Obrero and the Festival del Caño.
- **Interpretive Signs** connect to trails providing opportunities for passive learning for visitors. Interpretive signs at Caño Martín Peña should invite visitors to explore the communities down the channel. Each interpretive sign should contain an image of

what that area looked like before or during the dredging of the channel. Next to these images, we recommend descriptions in English and Spanish of insightful history about Caño Martín Peña.

- **Water Infrastructure** are multipurposed areas that serve as an open recreation space for people to enjoy most of the year but can also store rainwater following heavy storms. Investing in kiosks on the water plaza would provide businesses with direct access to the channel and stimulate economic growth.
- **The Ecotourism Management System** lays out the chain of command for all businesses operating within ecotourism destinations. The system builds on the ecotourism management plan and is a tool to guide the development of tourism in a protected area in a way that seeks to synthesize and represent the vision of all the stakeholders whilst fulfilling the conservation objectives for the site.

Guidelines for Local Ecotourism Businesses

We created a set of ecotourism guidelines that businesses operating in the Caño Martín Peña must follow to be considered ecotourism friendly by ENLACE. Businesses would be required to follow these guidelines to partner with the ecotourism hub. We identified seven ethical principles from our analysis of six ecotourism development plans and Proyecto ENLACE's master infrastructure plan. We used these ethical principles to inform our decision when choosing ecotourism standards criteria. We used Global Sustainable Tourism Council industry standard as a base for our recommended criteria. In total, we selected nine criteria:

1. Legal compliance with all certifications and laws
2. Respect daily lives of locals
3. Safely dispose of waste
4. Offer tourist-friendly payment methods
5. Accessible by all people
6. Local, equal, and fair employment
7. Engages with the Caño Martín Peña as a destination
8. Directly supports the community
9. Avoid single use plastics and Styrofoam

Key Recommendations

Our recommendations consisted of three deliverables. First is a map to display the channel with the proposed assets by the architectural firm OLIN alongside our identified assets, see Figure A. To pair with the map, we have created a narrative describing a vision for a tourist's day in the CMP communities.

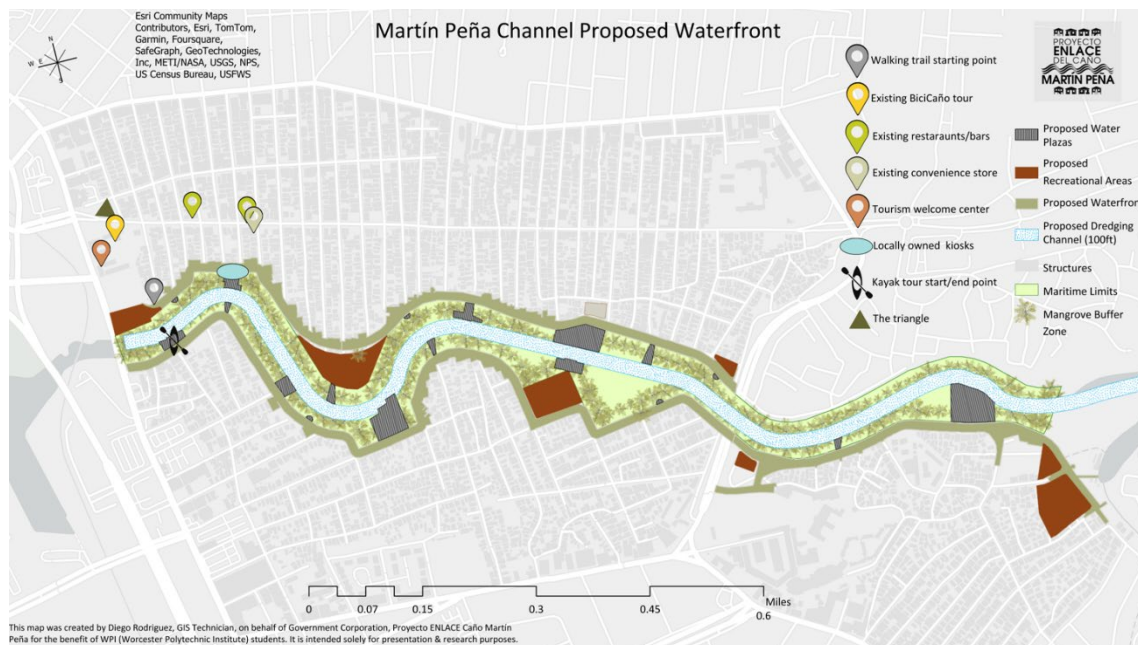


Figure A: Image of the Caño Martín Peña waterfront with marked locations for ecotourism assets.

We describe the different ways tourists can involve themselves with local businesses, tours we recommend, remain ecologically friendly, and educate themselves on the vibrant history and culture of these San Juan communities. The map is placed alongside this description to serve as a way for ENLACE to visually recognize the interactions the tourist could have.

Second, our sponsor requested a management system to maintain ecotourism in the community. We have created an outline for an additional branch at ENLACE that will maintain all aspects of the businesses involved including certifications, marketing, business development, community engagement, ecotourism standards, and sustainability maintenance. The development of ecotourism assets is a time-consuming process with steps that can be implemented before, during, and after the channels dredging. Third, we have outlined a timeline consisting of these three phases to aid in ENLACE's decision making for implementation. This timeline contains various aspects of ecotourism development such as brand creation, progress documentation, and the development of infrastructure once the dredging is complete and assets can develop from it. From these phases, ENLACE will maintain a long-term outlook on the dredging project that will guide its success over the following years.

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Introduction

On average, Puerto Ricans dispose of 5.56 pounds of waste per person per day (“Solid Waste Municipalities Mitigating for Future Disasters TODAY,” 2021). This waste, if left unregulated, can pollute bodies of water and have lasting economic, environmental, and social impacts (US EPA, 2015). The eight communities that surround Caño Martín Peña, a channel that runs through southern San Juan, Puerto Rico, have spent decades working to mitigate the negative impacts that unregulated waste disposal has had on their channel.

In 2004, a social justice initiative called Proyecto ENLACE del Caño Martín Peña was formed to address the negative impacts that pollution has had on the communities (Proyecto Enlace del Caño Martín Peña, 2022; Urban Waters Learning Network, 2024). The main goal of Proyecto ENLACE is to prepare the communities for the channel to be dredged. However, due to its prime location in San Juan, Caño Martín Peña is expected to be exploited by outside tourism businesses once the channel is restored. To ensure that the communities benefit from the dredging, ENLACE wants to capitalize on the opportunity for channel-based ecotourism.

Small communities situated in areas of natural beauty can use ecotourism to drive local economic growth (Beyond Green Travel, 2022). However, ecotourism businesses tend to be small-scale with limited resources, making it difficult for operators to advertise independently (Kiper & Özyavuz, 2013). To combat this challenge, some communities have linked several ecotourism activities and other local businesses into an ecotourism destination that promises a set of sustainable attractions with better visitor retention (Beyond Green Travel, 2022). In the Caño Martín Peña region, the vast opportunities for channel-based activities that will come from the dredging, paired with the communities’ rich history and culture, can be used to develop an ecotourism destination. To guide this planning process, our team designed an ecotourism development plan to facilitate economic growth in the Caño Martín Peña communities.

Our literature review of ecotourism development planning discusses ecotourism markets and implementation, what sustainable regional economic development plans require, ecotourism models, and a broad history of the Caño Martín Peña communities. We also establish the role of Proyecto ENLACE del Caño Martín Peña. We then explain our objectives for the project and the methods we used to guide the project. In our findings section, we describe ecotourism assets the communities currently possess, which features of the communities need to be invested in, and how those assets should be connected to create a regional ecotourism destination.

Literature Review

Ecotourism has become a popular market for developing communities looking to manage natural resources and develop a source of income for their residents (Noh et al., 2020). A community-based ecotourism initiative allows residents to address and control future impacts that tourism can have on the local society, culture, economy, and natural environment. Furthermore, including community members helps ensure community goals are prioritized and stakeholders understand how to best help communities with ecotourism development (Leksakundilok, 2004). The stakeholders involved in ecotourism can include governmental entities, non-profit organizations, consulting firms, investors, community-based organizations, residents, or other ecotourism companies (Keith Gumedde & Thandi Nzama, 2022). An ideal community-based ecotourism initiative would attract paying tourists, provide employment for local citizens, and educate visitors about the importance of natural conservation (Garrod, 2003).

Sustainability Models for Ecotourism Initiatives

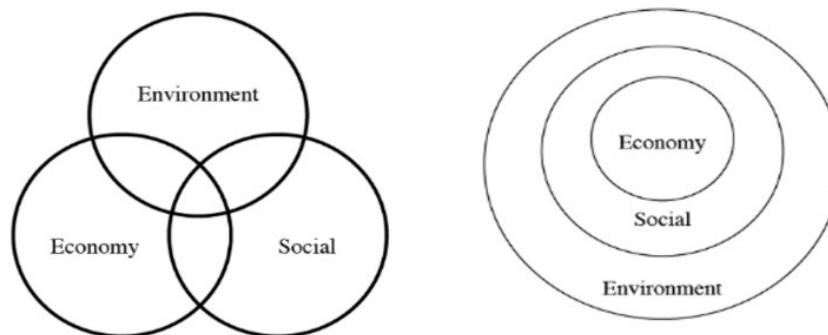


Figure 1: (Giddings et al., 2002) 'Triple Bottom Line' Model (left) and 'Nested Diagram' Model (right)

The most popular community-based ecotourism structures are built on foundational principles to ensure that an ecotourism business is sustainable. The interaction of these principles and the influences they have in a business model can differ. The Triple Bottom Line Model, also referred to as 'People, Profit, and Planet', was the first widely accepted ecotourism model that recommended economic, societal, and environmental principles as equal features of a sustainable business (Noh et al., 2020). It was originally introduced by John Elkington in 1994 and officially accepted by the United Nations in 2007 (Mulligan, 2018). However, Giddings et al. (2002) suggested the Nested Diagram Model, which gave different priorities to these three principles, where environment was most influential, then society, and finally economy. Figure 1 provides a visual of how these two models differ.

The primary issue with these three-part models is that it is difficult to determine what specific ideals fall under the society principle (Mulligan, 2018). In a paper for the Cultural Development Network, Jon Hawkes (2001) suggested an additional fourth category, which he described as "cultural vitality". This addition sought to separate a community's cultural values and beliefs from other societal interactions. With the incorporation of this category, the Four Pillars of Sustainability Model was born. Similar variations of this four-domain model have been adopted for ecotourism initiatives internationally, in places including New Zealand, Canada, and cities in Europe and the United States (Mulligan, 2018).

Regional Ecotourism Development Plans

A common struggle among communities working to implement an ecotourism attraction is that one initiative on its own is not enough to attract tourists and maintain community income. In recent years, tourists have begun looking for a holistic experience rather than a single attraction. An experience offers multiple interlaced venues and activities that encourage social interaction and retain customers (Ammirato & Felicetti, 2013). Restaurants, lodgings, sports, craft fairs, and museums, are all examples of attractions that work well with ecotourism initiatives to create an experience that supports a local ecosystem and community (Ammirato et al., 2014). A common term to define this type of interactive community ecotourism structure is a

regional ecotourism development plan (Solimar International, n.d.). According to Pine & Gilmore (1998), ecotourists are specifically attracted to regional ecotourism destinations that highlight education, aesthetics, escape, and entertainment. Ecotourism regions invite customers to enjoy a holistic experience that keeps them in communities for more than just one attraction. Tourists are also encouraged to spend more time in a community through experiential marketing that fosters interaction between community members and visitors (Chan & Saikim, 2022). Overall, ecotourism development plans provide community benefits such as employment, involvement in decision-making, and funding for local projects (Liu et al., 2023).

The Coastal Alabama Partnership Regional Ecotourism Plan is an excellent example of a development plan that supports a community's transition to an ecotourism destination. The development plan's main purpose is to provide recommendations to the stakeholders and residents of the Mobile and Baldwin Coastal Alabama counties. These recommendations identify existing community assets based on the four principles of ecotourism: nature, culture, economy, and society (Beyond Green Travel, 2022). The Coastal Alabama research team conducted meetings from July 2021 to April 2022 with stakeholders, including business owners, community members, government officials, and local non-profit organizations (Beyond Green Travel, 2022). Project venues were identified in Coastal Alabama that were appropriate for all aspects of ecotourism and would achieve multiple goals through a focused investment. The identified venues were eco-lodges, public parks, water docks, and walking trails. Each identified project venue was used to fill a gap in local ecotourism infrastructure or expand on an existing asset, with hopes that it would improve the ability for Coastal Alabama to attract tourists. To build on these venues, the researchers suggested activities such as kayaking tours through the Mobile Delta, nature lessons, cultural history demonstrations, and overnight camps (Beyond Green Travel, 2022).

The Coastal Alabama plan emphasizes capacity building, which the United Nations defines as “the process of developing and strengthening the skills, instincts, abilities, processes and resources that organizations and communities need to survive, adapt, and thrive in a fast-changing world” (Beyond Green Travel, 2022; United Nations, n.d.). The Coastal Alabama plan places an emphasis on building capacity mainly for tour guides, but also for locals to learn skills needed to start new developments. Capacity building implementations include methods for skill and social capital development that community members can apply to more than just ecotourism (Moscardo, 2008).

Caño Martín Peña and Caño 3.7

The Caño Martín Peña is a 3.75-mile-long channel in the heart of the San Juan metropolitan area that connects the San Juan Bay to the San José Lagoon. The eight communities surrounding this channel grew from the informal settlement of migrant workers in the 1930s and 1940s (ENLACE, 2023). In 2020, there were an estimated 11,000 registered residents of the communities surrounding the channel (US Census Bureau, 2024). However, there are many residents living informally in the communities that may not be accounted for in this statistic (ENLACE, 2004). The unregulated dumping of trash around the channel has caused it to become very clogged and shallow. The frequent flooding in the communities due to the channel being shallow has jeopardized the health of the residents and the integrity of homes within the communities.

In 2004 the United States American Corps of Engineers funded the creation of Proyecto ENLACE, a social justice and environmental initiative tasked with clearing the channel and

improving the local economy. Proyecto ENLACE is a consortium of three community-led groups: the G-8, the Community Land Trust, and the ENLACE Corporation, all under the umbrella of the name Caño 3.7. Proyecto ENLACE is a semi-independent entity, and they therefore have a versatile and unique position between the community and the public.

Over the past two decades, the three entities within Caño 3.7 have spurred various community development projects. The G-8 Inc. is a non-profit organization that works with ENLACE to involve the people living along the channel in its development, comprised of leaders from each of the Caño Martín Peña's eight communities. The Community Land Trust is a private, independent board of 11 representatives that own over 80 hectares surrounding the channel. The board is composed of six community residents, three representatives from government institutions, and two non-residents appointed by the board. The Community Land Trust was established to give control of the land back to the citizens, to allow residents to directly benefit from revenue earned, and to prevent gentrification. The ENLACE Corporation is a group that works to organize and execute the urban, economic, environmental, and social planning tasks for the channel dredging (Project ENLACE, 2004). These three groups developed a document called The Comprehensive Development Plan that highlights environmental and socio-economic goals of Caño 3.7, along with community empowerment and involvement (Project ENLACE of Caño Martín Peña, 2004). Caño 3.7 hopes that this plan would direct the long-term recovery and stability of the communities (Rodríguez Del Valle, 2017).

Through the work of Proyecto ENLACE, Caño Martín Peña has received funding to dredge the channel. However, once the channel is dredged, it is likely that large corporations will see Caño Martín Peña and its communities as an opportunity for expansion. These large corporations will likely come from "The Golden Mile," a financial district adjacent to Caño Martín Peña that has extremely valuable real estate (Agu, 2014). If Proyecto ENLACE can keep the channel in the communities' hands, this valuable and culturally vibrant land has much room for economic growth. To ensure that the communities are in control and benefit from the infrastructural improvements to the community, Caño 3.7 has created an infrastructure master plan that highlights the addition of assets useful for ecotourism development. Some notable additions include walkways down the length of the channel, water plazas for entry to the channel, and regeneration of wildlife around the channel. These additions have led our team to focus our project ideas on a channel-centered ecotourism development plan that builds upon these areas for sustainable community success.

Methods

Our goal was to design a channel-based ecotourism development plan for the Caño Martín Peña communities. We achieved this goal by completing the following objectives:

Objective 1: Identify economic, environmental, social, and cultural assets present in Caño Martín Peña.

Objective 2: Determine the viability of these assets for use in an ecotourism development plan.

Objective 3: Determine the opportunities and investments to develop a well-rounded tourist experience.

Objective 4: Develop the ethical principles and guidelines for ecotourism businesses.

Objective 5: Develop a plan that forms links between assets, opportunities, and investments around the channel.

Objective 1: Identify What Economic, Environmental, Social, and Cultural Assets Currently Exist in Caño Martín Peña

We identified the existing assets in Caño Martín Peña to find a starting point for the ecotourism development plan. Our methods included two tours with community leaders, one focus group, and online research of local businesses to identify assets.

We took two tours with community leaders as our introduction to the communities. These tours helped us identify potential assets that could be implemented into an ecotourism development plan. Our tours included a 2-hour van tour with José Bauzá to learn about the communities and see ENLACE initiatives in person. We also went on a 2-hour bike tour with Bici-Caño and interviewed the coordinator, Kathleen Del Mar Ramos, to gain a first-hand perspective of the communities and to understand the communities' only existing ecotourism initiative. We asked Ms. Del Mar Ramos about Bici-Caño's background, how Bici-Caño engages and benefits the communities, how Bici-Caño markets its bike tours, and what her opinions were about incorporating Bici-Caño into a regional ecotourism development plan. See Appendix : Interview Questions for Bici-Caño for questions.

We held a 1-hour focus group with 10 ENLACE Corporation employees, some of whom are also Caño Martín Peña residents, to gain insight on how they envision an ecotourism development plan. Attendees included employees from the environmental, urbanism, economic, and citizen participation departments of the ENLACE Corporation. We asked the focus group attendees questions about what they think Caño Martín Peña's assets are, what should be emphasized from the infrastructure master plan, what features should be highlighted in our proposed ecotourism development plan, and how to encourage residents to start businesses that will contribute to an ecotourism development plan. See Appendix B: Interview Questions for the ENLACE Corporation Focus Group for questions.

We analyzed 70 local businesses through Google Maps and Hecho en el Caño Martín Peña (a business directory for the communities) to identify tourism-relevant businesses in the area. We organized all 70 businesses into one Excel spreadsheet that detailed their name, Google rating, number of Google ratings, address, business type, proximity to the channel, and if they were listed on each of Hecho en el Caño, Google Maps, Facebook, and TripAdvisor. We then prioritized businesses that were best options to include in regional marketing. We removed all businesses with industries that were not relevant to tourism or had a small internet presence. This narrowed our list of 70 businesses down to 43.

Objective 2: Determine the Viability of Existing Assets for Use in an Ecotourism Development Plan

To determine if each asset we identified would integrate well with opportunities and investments in an ecotourism development plan, we developed a set of criteria. If an asset allowed for easy access to the channel, if it was easily accessible from the channel, if it provided increased income to the communities and its members, or if it highlighted local history and culture, we labeled it high-priority. Priority referred to how important it was to include each asset in a development and marketing plan. We labeled those that did not meet any of the criteria low-priority. Only high-priority assets were included in our findings and recommendations.

For the 43 local businesses we identified online, we selected high-priority assets through a more specific set of criteria: if they were within a 3-minute walk of the channel, if they had at least 4.0 stars on Google, and if they were marketed on either Hecho en el Caño or Facebook. We included a medium-priority category to identify businesses that met the high-priority criteria but were not within a 3-minute walk of the channel. Low-priority businesses either had no reviews, poor ratings, or were at least a 9-minute walk from the channel. Both high and medium-priority businesses were included in our findings and recommendations.

Objective 3: Determine the Opportunities and Investments That are Needed for an Ecotourism Destination

We determined areas for investment in the communities by conducting a comparative analysis of three sustainable ecotourism development plans. This analysis helped us identify what investments other ecotourism destinations included in their plans to succeed. We found the destination plans through Google Scholar and through the Foundations of Puerto Rico website. The destination plans we chose were The Coastal Alabama Regional Ecotourism Plan, The Aloe Bay Master Plan, The Study on the National Strategic Plan for Ecotourism Development in the Dominican Republic, and The Aguadilla and Isabela Ecotourism Development Plan.

We reviewed Proyecto ENLACE's master plan to ensure that our proposed investments aligned with the region's development goals and will expand on existing assets. This allowed us to integrate conservation principles, social responsibility, and environmental considerations into an ecotourism development plan. Our approach supports sustainable growth by identifying strategies for responsible infrastructure development, resource management, and resilience planning, thereby ensuring the long-term viability of ecotourism in Caño Martín Peña.

Objective 4: Develop the Ethical Principles and Guidelines for Ecotourism Businesses

We created a set of ecotourism guidelines that businesses operating in the Caño Martín Peña must follow to be considered ecotourism friendly by ENLACE. We analyzed six ecotourism destination plans as well as Proyecto ENLACE's infrastructure master plan to identify ethical principles to inform creation of ecotourism guidelines. These ecotourism development plans were collected from Coastal Alabama, Arecibo & Camuy, the Dominican Republic, Quảng Nam & Thừa Thiên Huế, the Philippines, and the Košice Region. We used a thematic analysis to identify ethical principles because it was the most flexible and applicable strategy between differently formatted texts (Nowell et al., 2017). After reading through each plan, we developed thematic codes that categorized ideas into distinct categories where ethical principles and values were reflected. The codes we used were "ethics," "values," and "recommends." We also created second level codes which categorized themes by their topic. We used each of the four pillars of sustainability (i.e. society, culture, environment, economy) for our second level codes (Mulligan, 2018). We then looked for instances of these codes in each text, and documented what value they represented and where in the text they were located (Braun & Clarke, 2006). The themes we found, alongside our discussions with our sponsor, informed our choices for which criteria we prioritized when we developed an ecotourism standard.

We read through three ecotourism standards to identify common criteria and validate the themes we found from our previous analysis. The main standard we referenced was that of the Global Sustainable Tourism Council industry criteria. We selected our final criteria based on three requirements: if it was viable for a small business in the Caño Martín Peña district to meet

the criterion, if ENLACE could measure whether a business fulfils the criterion, and if ENLACE could assist businesses in meeting the criterion.

Objective 5: Develop a Plan that Forms Links Between Assets, Opportunities, and Investments Around the Channel

Through research of two ecotourism development planning websites, we designed a map to present the visual connections between our identified community assets, opportunities, and investments. These ecotourism development websites were Foundation for Puerto Rico and Solimar International. We examined common subjects found in these organizations' websites about attractions connecting to each other thematically, e.g. a tour ending at a locally owned restaurant or multiple community owned shops located in one district. We wanted this display to be concise and focus on the connections between activities, such as kiosks connected to the plazas serving local food or arts.

We worked with Diego Rodriguez at ENLACE to construct an architectural map of the eight communities and the channel post-dredging. We added our recommendations onto this map, which displayed a cohesive channel-based ecotourism development plan. We also created a timeline that displayed a phased implementation strategy for ENLACE before, during, and after the channel dredging.

Findings and Analysis

The findings and analysis section summarizes the results that informed our recommendations for Caño Martín Peña's ecotourism development plan. The first section describes three categories of existing assets in the communities and explains their importance within an ecotourism development plan. The second section highlights a set of investments that need to be made in the communities to create a complete ecotourism destination. The final section outlines a list of ethics and guidelines for all businesses to follow if they want to be included in Caño Martín Peña ecotourism branding and programs.

Identifying Assets Within the Community

We identified Caño Martín Peña's existing assets to develop a foundation for an ecotourism development plan. Assets were prioritized if they met criteria that would make them well-suited for an ecotourism development plan, such as being easy to reach from the channel and benefitting the local communities. We thematically organized these assets into three categories: local businesses, community events, and transportation. See Appendix C: Existing Caño Martín Peña Assets for a list and individual analysis of all identified assets.

Local Businesses

We identified three industries of local businesses in Caño Martín Peña that are most suitable for an ecotourism hub: ecotourism, restaurants and bars, and convenience stores. Because we were not able to informally walk around the communities, our search of businesses was limited to an online search.

Bici-Caño

Bici-Caño has been the only formal ecotourism initiative in Caño Martín Peña since its start in 2015. Participants of the tour embark on an interactive bike ride through the southern Caño Martín Peña communities to learn about the history of the channel, and the struggles and achievements of the communities. Bici-Caño is an excellent business for an ecotourism hub to market and partner with because it gives tourists a way to safely visit important features of the communities outside the immediate proximity of the channel. See Figure 2 and Figure 3 for photos from our tour on February 4th, 2024.



Figure 2: An image of the BiciCaño trailer and bikes



Figure 3: An image of the community garden we visited on the tour

Restaurants and Bars

Restaurants and bars retain tourists by giving them accessible locations to take a break and refresh before or after ecotourism events like Bici-Caño. We identified two high-priority restaurants and bars in Caño Martín Peña (El Retorno and Heladería Los Muchachos). See Figure 4 for a map of these businesses in relation to the channel and proposed channel plazas. The light green stars point to the high-priority restaurants and bars identified. The grey polygons show where the water plazas will be after the dredging of the channel. The white line is the current state of the channel.

Convenience Stores

Including local convenience stores in an ecotourism development plan ensures there are places that provide tourists with last-minute necessities before, during, or after their ecotourism experience. They also offer ways for tourists to spend money within the communities. We identified one high-priority convenience store called Joanna Colmado Minimarket. See Figure 4 for a map of these businesses in relation to the channel and proposed plazas. The yellow star points to the high-priority convenience store identified.

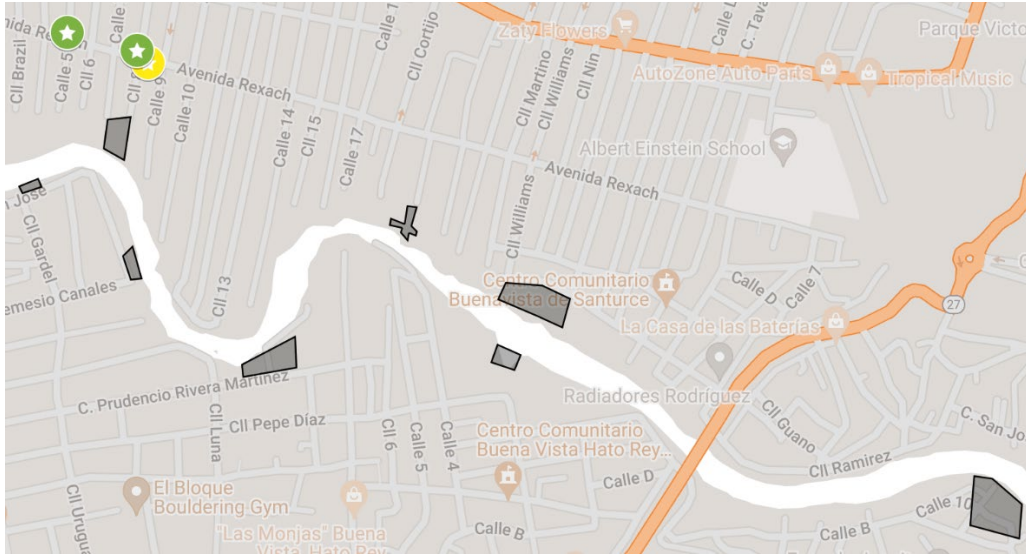


Figure 4: A map of local businesses in relation to the channel and the proposed channel plazas

Community Events

The Mercado AgroArtesanal de Barrio Obrero and the Festival del Caño are two significant Caño Martín Peña events, deemed assets for the plan because they highlight local culture and history and can attract visitors. The Mercado AgroArtesanal de Barrio Obrero is an artisan and agricultural market held on the second Sunday of every month. This routine market, if advertised within an ecotourism hub, could become a strong source of income for the communities and could provide local businesses with increased revenue and outreach. We visited the market on February 8th, 2024, and there were roughly 20 tents selling items such as acrylic paintings, dog collars, and jewelry. Figure 5 is a photo taken from the event.

The Festival del Caño is an annual event held in April that closely resembles the San Sebastián festival in Old San Juan. This event is a local celebration of Caño Martín Peña's rich history as it grew from an area of informal settlements to eight established communities. The event incorporates local musicians and allows local artisans to sell their products. Like the monthly agriculture and artisan market, the Festival del Caño will draw people to Caño Martín Peña to learn about the culture and history of the communities.



Figure 5: Image taken at the Mercado AgroArtesanal del Barrio Obrero

Location

The proximity of Caño Martín Peña to the popular San Juan tourist areas makes it easily accessible for tourists looking to spend a day participating in ecotourism activities. From the Condado Vanderbilt hotel, a frequented lodging option on a popular tourism street, it is at most a 15-minute ride to the communities. With a personal vehicle, parking would be the only potential fee visitors would have to pay for transportation. With Uber, the fare is typically \$5-\$10 for a 4-passenger vehicle. There is also a train station near ENLACE and bus lines that run through the communities. While these options do not currently provide convenient connections from Old San Juan or Condado, they have the potential to open Caño Martín Peña to populations located in other areas and service could increase in the future.

Identifying Investments Needed for the Communities

After identifying existing assets within Caño Martín Peña, our next step was to identify investments that could transform the region into an ecotourism destination. These investments were informed by a comparative analysis of ecotourism destination development plans outside of the Caño Martín Peña communities.

Establish a Welcome Center for Caño Martín Peña



Figure 6: Escuela Santiago Iglesias, future site for Caño Martín Peña Welcome Center

Establishing a welcome center for Caño Martín Peña is essential for providing visitors with vital information about the region. ENLACE intends to establish a Welcome Center at Escuela Santiago Iglesias, seen in Figure 6. However, due to the school's failure to meet building codes, a new design for the welcome center will need to be developed. The Coastal Alabama development plan emphasizes the importance of a bi-directional approach for the welcome center (Beyond Green Travel, 2022). Caño Martín Peña needs to implement a bi-directional welcome center that serves as an asset, like the water plaza, attracting visitors to the facility and operates as a gateway to the rest of the region by informing visitors. The significance of the welcome

center lies in its ability to distribute information, provide a facility for community engagement, and promote local attractions. The Dominican Republic development plan indicates that their welcome center would serve not only domestic tourists but also function as a platform for marketing activities aimed at promoting local attractions and businesses (Ministry of Tourism & Ministry of Environment and Natural Resources, 2010). ENLACE should prioritize the development of a new design for the welcome center at Escuela Santiago Iglesias that meets building codes and aligns with the bi-directional approach emphasized in the Coastal Alabama development plan. The welcome center should serve as a gateway to Caño Martín Peña and incorporate gateway architecture with unique design elements reflective of the region's cultural and environmental heritage (Baldwin, 2024). This will ensure that the welcome center not only provides essential information to visitors but also serves as an iconic symbol of Caño Martín Peña's ecotourism offerings. Additionally, ENLACE should leverage the welcome center as a platform for marketing activities aimed at promoting local attractions and businesses. This approach will maximize the impact of the welcome center as a hub for information dissemination and community engagement in Caño Martín Peña.

Install Direction Signs



Figure 7: Sample TOD Sign from Wisconsin Department of Transportation

There is a challenge with accessibility in Caño Martín Peña because there are no proper directions for visitors to navigate around the channel. We learned from Mr. Bauza-Mora that residents of Caño Martín Peña are not receptive to visitors wandering into residential areas away from the channel. Ensuring visitors can easily navigate through the communities will benefit the ecotourism hub by minimizing confusion for each visitor and enhancing the area's reputation as a visitor-friendly destination. The Coastal Alabama and Dominican Republic development plans both suggest implementing a wayfinding system to increase visitor comfort and understanding of the region. Their wayfinding systems incorporated signs and landmarks to provide directions for anyone not familiar with the location developing a sense of safety (Beyond Green Travel, 2022). ENLACE should develop direction signs to provide directions to the local businesses and

attractions that are a part of the ecotourism destination. Direction signs should be installed at every entrance, intersection, and decision point, ensuring they are positioned at an average sightline or eye-level to enhance readability. All signage should fit the natural environment and be visible to visitors (Foundation for Puerto Rico, n.d.). In high-traffic areas overhead signs can be helpful to direct occupants towards the nearest exit or main points of interest. See Figure 7 for a sample of the directional sign. These measures will improve the accessibility of destinations, improve safety, and increase enjoyment for people unfamiliar with the region (Ministry of Tourism & Ministry of Environment and Natural Resources, 2010).

Advertisement to Showcase Caño Martin Peña

Advertisements are essential tools for promoting ecotourism hubs effectively and attracting visitors. We learned through our comparative analysis that developing a visual identity that resonates with the target audience by using natural colors and eco-friendly imagery are the most effective marketing techniques. In the Dominican Republic, regional ecotourism is promoted through the creation of elaborate illustrated maps, designed for multiple advertising uses in brochures and magazines (Ministry of Tourism & Ministry of Environment and Natural Resources, 2010). These illustrated maps display the diversified image of the region to audiences unfamiliar with ecotourism destinations. These maps can be distributed across various consumer touchpoints within and beyond the region, including gas stations, outfitters, retail stores, welcome centers, rest stops, and museums (Beyond Green Travel, 2022). For Caño Martin Peña, strategic distribution of these maps is essential, particularly in high-traffic tourist areas such as Old San Juan and Condado, where hotels, restaurants, and rest areas are located. Establishing partnerships with businesses in these areas can facilitate the direct promotion of Caño Martin Peña to visitors, ensuring convenient access to information about the diverse array of ecotourism attractions and activities in Puerto Rico, beyond the confines of Old San Juan and Condado. ENLACE should prioritize the strategic distribution of illustrated maps showcasing Caño Martin Peña's ecotourism offerings, especially in high-traffic tourist areas such as Old San Juan and Condado. Additionally, establishing partnerships with businesses in these areas can enhance direct promotion to visitors, facilitating access to information about the region's diverse array of ecotourism attractions and activities.

Invest in a Community Green Space

Based on the findings regarding the Triangle as an open grass field utilized for ENLACE's events, including the Mercado AgroArtesanal de Barrio Obrero, the area presents an opportunity for further development within Caño Martin Peña. Adequate parks, open spaces, and recreational facilities are crucial for enhancing the quality of life in communities by offering enjoyable activities. According to the Dauphin Island Comprehensive Plan mentioned in the Coastal Alabama plan, the Triangle is categorized as a mini park or "pocket park," as defined by the National Recreation and Park Association (NRPA), situated within a densely developed area with a limited or concentrated population (Beyond Green Travel, 2022). To maximize the benefits of the Triangle for the community, ENLACE should collaborate with parks and recreation agencies to redesign the triangle, considering trade-offs that mini parks may entail compared to larger parks. Furthermore, ENLACE should reach out to local businesses to create agreements for funding the installation and long-term maintenance of the triangle, offering them

the opportunity to operate at events hosted at the site in return for their support. Additionally, consistent engagement with the community about the triangle is crucial to promote interest and involvement in the project's progress and sustainability efforts. Proposed amenities such as landscaping, park benches, and picnic tables, along with infrastructure improvements, will not only enhance events hosted in the area but also contribute to making Caño Martín Peña a more appealing ecotourism destination.

Interpretive Signs



Figure 88: Interpretive Sign at Green Point, Gros Morne National Park, Newfoundland, Canada

Interpretive signs serve as tools for communicating the environmental, cultural, and historical narratives of ecotourism destinations, prompting visitor engagement and comprehension of the area. Caño Martín Peña already plans to incorporate a waterfront walking trail along the channel following the dredging. The walking trail presents an opportunity for the ecotourism destination to tell the story of the area's efforts in environmental conservation and cultural preservation and will integrate interpretive signs. The use of interpretive signs should contain information about the region and its culturally historic sites (Beyond Green Travel, 2022). Each interpretive sign should contain an image of what that area looked like before or during the dredging of the channel. Next to these images, we recommend descriptions in English and Spanish of insightful history about the region that is less known to best entice visitors during their time down the trail (Denarian, Maynard, Pellegrini, Sposato, 2022). See Figure 8 for an example of the interpretive sign. The interpretive signs also underscore the principles of sustainability by educating and inspiring visitors to recognize and engage with the interconnected environmental, economic, social, and cultural aspects inherent in the ecotourism experience within Caño Martín Peña.

Invest in Waterfront Infrastructure

The development of waterfront infrastructure serves as an opportunity to improve recreational opportunities, support economic growth, and promote community engagement in the Caño Martín Peña. The eight water plazas proposed in Proyecto ENLACE's Master Plan provide

direct access to the channel and are a perfect location for soft-adventure activities like kayaking, and stand-up paddleboarding (SUP). Water plazas are multipurpose areas that serve as open recreation areas for people to enjoy most of the year but can also store rainwater following heavy storms (Johansson, 2019). Water plazas do not follow a singular design and can be tailored in scales and designs to fit the region. The Coastal Alabama development plan recommended redesigning a park to have waterfront access. This redesign involved constructing a restaurant near the park and coordinating events that bring activities to the location (Beyond Green Travel, 2022). For Caño Martín Peña, operating multiple kiosks will serve better than a singular business. According to the Aguadilla and Isabela destination plan clustered businesses typically perform better when operating adjacent to complimentary business by creating an economy of scale. Investing in kiosks on the water plaza that are run by local businesses would stimulate economic growth by capitalizing on the frequently visited visitor areas. Kiosks are small, stand-alone booths used in high-traffic areas to provide business owners with a low-cost alternative to market their products (Keaton, 2023). Co-location is a common strategy that ENLACE can implement to result in high visitor traffic and sales volumes. (Foundation for Puerto Rico, n.d.). Placing multiple kiosks on the same water plaza will give visitors a higher concentration of businesses, making customers start to associate that area with an ambiance or range of options, like a shopping center.

Ecotourism Management System

The Community Land Trust will take responsibility for the ecotourism hub from Corporation ENLACE once the channel is dredged. However, the specific roles and responsibilities necessary to run this ecotourism destination are not established. Before establishing a management system for an ecotourism destination, three other plans need to be implemented. The proposed sequence presents the progression required for establishing an effective management structure within an ecotourism destination. The proposed sequence presents the progression required for establishing an effective management structure within an ecotourism destination. The Conservation Area Plan (CAP) serves as the foundation by outlining strategies for the conservation and protection of environmental and cultural resources (Andy & Moore, 2002). The CAP also performs a SWOT analysis to determine the major threats, sources of threats and strategies for mitigating those threats. The General Management Plan builds upon the CAP by providing a definition for managing all aspects of the ecotourism destination, integrating conservation goals with recreation, education, and sustainable use. (Andy & Moore, 2002) The General Management Plan should broadly define the parameters within which all management and administrative actions must take place. With the foundational conservation and general management plans created, the Ecotourism Management Plan (EMP) can be developed. This EMP specifically explains the sustainable management of ecotourism activities and businesses within the ecotourism destination, promoting responsible practices, minimizing negative impacts, and enhancing visitor experiences (Andy & Moore, 2002). After establishing all three plans that build upon each other the management system can be constructed. The management system systematically addresses the challenges encountered throughout the ecotourism hub and its affiliated businesses. By establishing a structured management flow chart, the ecotourism destination at Caño Martín Peña can effectively implement a management system that manages business operations, addresses any issues, and ensures long-term sustainability.

Guiding Principles for Ecotourism Certification

The six ecotourism development plans we analyzed (Coastal Alabama, Arecibo & Camuy, the Dominican Republic, Quảng Nam & Thừa Thiên Huế, the Philippines, and the Košice Region) best reflected their guiding values explicitly in “ethics,” “value,” and “recommend” statements. We found seven main ethical principles through our thematic analysis. These ethical principles informed our decisions when choosing ecotourism standards criteria:

1. Building local empowerment
2. Improving business management
3. Facilitating social equity
4. Resident experience
5. Visitor experience
6. Cultural preservation
7. Environmental improvement

When researching various standards from ecotourism councils, we found that many of them reference the Global Sustainable Tourism Council (GSTC) Industry Standards. These standards are comprehensive and, while we gained insight on performance indicators from other standards, we based our criteria primarily on those from the GSTC. In total, we selected the following nine criteria, explained in detail in Appendix D: Ecotourism Standard Criteria:

1. Legal compliance with all certifications and laws
2. Respect daily lives of locals
3. Safely dispose of waste
4. Offer tourist-friendly payment methods
5. Accessible by all people
6. Local, equal, and fair employment
7. Engages with the Caño Martín Peña as a destination
8. Directly supports the community
9. Avoid single use plastics and Styrofoam

We also identified actions ENLACE can take to support partnering businesses in meeting these criteria. As we found from the Bici-Caño tour, simply removing single-use plastic bottles creates a lack of access to water for visitors who did not bring enough with them. This issue could show up with other tours and restaurants. By offering water coolers or water filters to businesses for a low monthly cost, ENLACE could solve this problem and allow businesses to reduce their dependence on disposable bottles. One tour company we interviewed told us how they provided a business they visit with reusable glassware to reduce plastic waste. We believe

ENLACE could do this to lower the barrier of entry for businesses and as an incentive to participate in the regional destination.

Since many of the Caño Martín Peña businesses are small operations, they won't have a structure for accountability if grievances are brought up by customers. ENLACE could fill this role by creating mechanisms for employees and residents to file complaints about a business which ENLACE could then follow up on and provide accountability through the ecotourism management system.

Businesses that meet these guidelines and fall within a geographical boundary can participate in the Caño Martín Peña's unified branding and ecotourism destination material (e.g. pamphlets, maps, guides) as well as market themselves as having met ENLACE's business standards. Marketing with these standards can inform residents, visitors, and investors that the business they are engaging with is committed to environmental and social responsibility (Global Sustainable Tourism Council, n.d.). During our research, we also found the Blue Flag program which allows beaches, boats, and marinas that have met the organization's standards to hang a blue flag outside their business (Blue Flag, 2023). ENLACE could implement a similar form of branding with some symbol indicating a business is ecotourism-friendly and ecotourist can feel confident that business will provide a good experience for them while benefiting the community.

Consolidating Assets into a Plan

This section explains how we connected Caño Martín Peña's current assets and investments to form a well-rounded ecotourism development plan. We visually displayed this ecotourism plan in four ways: (1) by creating a map of the communities post-dredging with included ecotourism attractions, (2) by explaining a sample daytrip for visitors of the community (3) by developing an ecotourism management structure to guide maintenance of the hub, and (4) by designing a phased implementation strategy for amenities before, during, and after channel dredging.

Future Vision of the Caño Martín Peña

To help us visualize an ecotourism hub for Caño Martín Peña, we worked with Diego Rodriguez to create an ArcGIS map that displayed ENLACE Corporation's plans for the channel post-dredging. We built our ecotourism hub-specific recommendations off this map, which can be seen in Figure 9. This map serves as a vision for how each proposed amenity will be placed around the channel, and furthermore how each of these amenities connect to create an ecotourism experience.

We strategically placed elements on the map so that everything would be easily accessible to tourists, while also not interfering with residential life. The Triangle, Welcome Center, water plazas, recreational areas, maritime limits, proposed waterfront, and dredged channel were all ideas proposed by ENLACE with the architectural firm OLIN. The existing local businesses, locally owned kiosks, and the kayak tour are our proposed additions. We put our proposed additions to be placed close together because we wanted to ensure there was a clear connection between a tour and places to eat or stop to rest afterwards. For example, we recommend wayfinding signs be placed around the water plazas and tour gathering points to direct tourists to the kiosks and to the local businesses within a 3-minute walk of the channel (Sposato, et al., 2022).



Figure 99: Image of the Caño Martín Peña waterfront with marked locations for ecotourism assets.

Sample Daytrip in the Communities

To better understand our vision for the communities, we designed an example daytrip for visitors of the channel and the communities. Upon arrival, visitors would stop at the welcome center to familiarize themselves with the ecotourism activities offered. They would be informed visually and verbally (by local employees) about the kiosks, community events at the Triangle, restaurants and convenience stores, the self-guided walking tour with informative signs, the kayak tours, Bici-Caño, and the restaurants. For visitors interested in the kayak tours or Bici-Caño, visitors would be encouraged to either sign up for an experience or head to their tour's starting location if they booked ahead of time.

The walking tour, kayak tour, and Bici-Caño tour will show participants the resurging wildlife and vegetation around the channel, while illustrating what the scene looked like before the dredging. This is also where they will learn about caimans and wild boar, informing the visitor that they used to be invasive and prevented other wildlife from thriving. Guides and interpretive signs will also tell a story to participants about the history of the communities and how the channel was dredged.

After learning about their options for the day, visitors would then be prompted to grab a detailed map of the communities that includes environmental, historical, and cultural education, as well as safety rules and ecotourism guidelines for them to follow. This hand-held copy of the communities' general information would serve as reinforcement for the interpretive signs and

amenities visitors will encounter throughout their experience. It also would serve as a marketing tool for visitors to share with their family and friends after their experience.

Visitors could then either walk to the Triangle to check out a community event or follow a walking trail down to the nearest water plaza, which is lined with interpretive signs that introduce them to the communities' history. Once they have reached the plaza, they could stop at the kiosks to purchase locally crafted food and arts or embark on a self-guided walking tour around the channel. To conclude their day, they can enjoy a sit-down meal at highlighted restaurants advertised through the marketing team.

Business Management Flowchart

Major barriers of growth in many new ecotourism destinations include weak infrastructure, scarcity of financial and human resources, low activity of local communities, and unfriendly institutional environment. Therefore, developing a management mechanism for local ecotourism is urgent (Chkalova, 2019). Adding a management flowchart to our ecotourism development plan recommendations will ensure that the Caño Martín Peña ecotourism hub creates jobs for community members.

Once the channel is dredged, Corporation ENLACE will cease to exist. For this reason, we recommend that our proposed ecotourism management flowchart stems from the Community Land Trust. By the time the channel is dredged, the Community Land Trust will ideally have control over all the community land. They will therefore be able to ensure that an ecotourism hub and any associated businesses operate to benefit the communities. To ensure that there is management specifically designated for ecotourism, we recommend that the Community Land Trust create a new department head called "Ecotourism Director". This director will manage a marketing team, infrastructure management team, business development team, certification office, community engagement team, and ecotourism standards team. The flowchart that displays our proposed chain of command can be found in Appendix E: Ecotourism Hub Management Hierarchy. Each group managed by the Ecotourism Director will have its own role in ensuring the ecotourism destination runs successfully. We defined the specific roles of each team below:

- The **Ecotourism Standards Team** will oversee any businesses that want to be included in Caño Martín Peña branding. We propose that the standards businesses abide by are set by the Community Land Trust and are informed by the nine guidelines detailed in Appendix D: Ecotourism Standard Criteria.
- The **Marketing Team** will be responsible for promoting the ecotourism hub to visitors. This will include improving and maintaining online presence, business advertisement, inter-business collaboration, and showcasing attractions.
- The **Infrastructure Management Team** will monitor building conditions and control maintenance of the area. These areas will include the welcome center, plazas, kiosks, interpretive signs, location maps, and roads.
- The **Business Development Team** will work with individuals, groups, or informal businesses that wish to become a part of the ecotourism destination. They will do this through ENLACE's proposed business incubator and accelerator to ensure that businesses are successful and that all ecotourism hub guidelines are met. This department will work closely with the Certification Office.
- The **Certification Office** will help businesses become and remain certified to operate. In many of our interviews, certification was a topic and issue for business

owners as funding is the most difficult step. Many opt to remain doing tours or serve food informally. This is why there is a need for a certification office to ensure assets are legally operating. We recommend that these job positions in the ecotourism branch will work alongside the U.S. Small Business Administration to bridge the gap between government and community.

- The **Community Engagement Team** will cover aspects such as reaching out to residents for job opportunities, schools for volunteering opportunities, and other nearby businesses for developing partnerships. This team will be vital to the ecotourism hub because including residents in initiatives and events has been shown to provide social solutions, build social cohesion, and build social capital (Williams, 2003).

To incentivize businesses to become a partner of Caño Martín Peña's ecotourism destination, the Ecotourism Director and their teams must highlight the benefits that they will provide (Taylor, et al., 2023). For example, if a business wants to become a partner but does not have funds to begin, they can participate in the business development team's incubator or accelerator program that works closely with the certification office to establish community businesses. If a business is struggling to properly advertise, the marketing team can include them in Caño Martín Peña's cohesive branding and have them specifically mentioned during tours, if the ecotourism standards team approves the business as one that follows their guidelines. Overall, our proposed business management flowchart allows Caño Martín Peña's ecotourism hub to generate quality assets.

Phased Guideline for Ecotourism Hub Development

To guide and compartmentalize the development of an ecotourism hub in Caño Martín Peña, we designed a phased timeline for what tasks we recommend be completed before, during, and after the channel dredging. This timeline is visualized in Appendix F: Phased Guideline for Ecotourism Hub Development. In the table, we split up tasks for ecotourism hub development into four themes: Collecting Media/History, Ecotourism Hub Management, Community Outreach, and Ecotourism Infrastructure. All these themes together summarized our ideas for a strong ecotourism hub and prove that there are actions the communities need to accomplish well in advance of the dredging to protect their land from exploitation.

Conclusion

The eight communities surrounding Caño Martín Peña have spent decades working to reverse the negative effects that trash pileup has had on their channel and their residents. Once the channel is completely restored, there is concern that Caño Martín Peña will be exploited by tourism companies not associated with the communities. The social justice initiative Proyecto ENLACE del Caño Martín Peña hopes to develop ecotourism initiatives that address these concerns.

For our project, we worked closely with ENLACE to design an ecotourism development plan that ensured the channel would be used to benefit the communities and highlight the local history and culture. Through interviews, focus groups, and numerous hours spent with ENLACE, we connected existing assets, areas for investment, and business guidelines into a plan that was informed by the communities' voice. We hope that ENLACE uses our findings to reach out to

local businesses and incentivize sustainable guidelines for operation. We also hope that ENLACE gauges residents' interest in starting their own ecotourism businesses or selling local crafts regularly once the channel is dredged. Overall, we envision that this plan helps Caño Martín Peña safeguard their channel from exploitation, and that it brings benefits to residents. We are excited at the prospect of seeing our efforts positively impact the ENLACE Project and the future of Caño Martín Peña.

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Appendix A: Interview Questions for Bici-Caño

Preamble: We are a student group from Worcester Polytechnic Institute in Massachusetts. We are conducting research on ecotourism initiatives in the San Juan area for a community organization called Proyecto ENLACE del Caño Martín Peña. They are a non-profit, community-based organization focused on environmental and social justice. They are looking to expand their ecotourism industry, so we want to understand successful tourism initiatives to inform them in their expansion. Today, we plan to ask you questions about your company and your community. More specifically, we will ask questions about the background of your company, how your company interacts with the community, and how your company succeeds in the San Juan ecotourism industry. Your responses to these questions will be used to better understand how successful ecotourism initiatives can be implemented within the Caño Martín Peña community. No risks will be posed to you during this interview. You are welcome to refrain from answering questions at any time. You are also welcome to stop our conversation at any time. We will use your responses in our analysis of ecotourism, so anonymity is not guaranteed. Before we begin, we'd like to ask if you're okay with us voice recording our conversation to review later and verify notes? From our own research, we understand that Bici-Caño gives bike tours around the Caño Martín Peña area to provide an education and historical context of the struggle of the residents of the area, along with the unique culture of the community and what is being done. Is this accurate?

Company Background:

- a. What is your role in this company?
- b. Can you tell us how and when the company began?
 - i. What motivated the creation of this company?
- c. Are there other products/services associated with the company besides the bike tour?
- d. What educational components does the company provide? (sustainability, local history, art, music, food, etc.)
- e. Did Bici-Caño work with any people, companies, or resources to help develop the company?
 - i. What/who are they?
 - ii. Were they successful in supporting Bici-Caño?
 - iii. Do they still help you now?
 - iv. Do you feel there is more they could have done/do to support you?
 - v. How much involvement/influence do these outside groups have on your ecotourism company?
 - vi. What role did the government play in supporting this company's development, if any?
 - vii. What precautions do you take to protect the company from liability concerns?
- f. How many employees do you have working at Bici-Caño?
 - i. Are your employees mostly part-time or full-time?

Community Engagement and Development:

Definition of Community – people who live within the borders of the 8 communities.

- a. How does the company interact with other tourism companies in the area?
 - i. How competitive is the environment around your company's industry?

- ii. In reference to tourists, what goods or services do you offer that are different from similar tourism companies?
- b. Is the community involved in this company?
 - i. What percentage of employees are from the community?
 - ii. What do community members enjoy about working for the company?
 - iii. How does the company encourage community members to participate?
- c. Can you tell us about how the company directly benefits the community?
 - i. What indirect benefits do you believe the company provides?
 - ii. What are some benefits you would like to provide that you do not already, if any?

Company Marketing/Planning:

- a. What methods did the company use to advertise when it was first created?
 - i. What methods are used to advertise now?
 - ii. Which advertisement techniques/strategies tend to bring in the most tourists?
- b. Where does revenue go? To the community? ENLACE? Employees? ATA?
- c. Are there seasons that are more popular than others?
 - i. What do you do in the off seasons to bring in revenue?
 - ii. How does the company change the presence of advertisements seasonally?
- d. Are your customers typically visitors or residents of the community?
- e. Are your customers typically visitors or residents of the island?
- f. What deals does the company offer to attract tourists?
 - i. When are these deals offered?

Water-based Ecotourism in CMP:

- g. What are your opinions about water-based ecotourism initiatives operating in Caño Martín Peña once the channel is dredged?
- h. Do you have any ideas of water-based initiatives that would be beneficial?
- i. Are there any features of the Caño or the community that would be good to highlight?
- j. Would you like Bici-Caño to be involved in the structuring of an ecotourism hub where multiple businesses/tourism initiatives operate together to benefit the community?

Wrap Up: Thank you for your time, are you okay being contacted with questions in the future?

Appendix B: Interview Questions for the ENLACE Corporation Focus Group

Preamble: We are a student group from Worcester Polytechnic Institute in Massachusetts. We are working with Jose Bauzá and Pablo Vista to develop a channel-based ecotourism development plan for Caño Martín Peña. Jose and Pablo gathered you all here so that we can understand your perspective of assets and areas for improvement within the communities. No risks will be posed to you during this interview. You are welcome to refrain from answering questions at any time. You are also welcome to stop our conversation at any time. We will use your responses in our analysis of ecotourism, so anonymity is not guaranteed. Before we begin, we'd like to ask if you're okay with us recording our conversation to review later and verify notes?

Personal Background:

- a. How long have you been involved with the Proyecto ENLACE del Caño Martín Peña?
- b. Are you a resident of Caño Martín Peña?
- c. What does your specific role in this project entail?

CMP Assets:

- d. What areas, businesses, or historical and traditional features within the communities do you believe should be highlighted in an ecotourism development plan? Why?
- e. What do you think could be done to draw tourists into the community?

Channel-Based Information:

- f. Where are the best access points to the channel?
- g. Are there parts (features, historical facts, etc.) of the channel that you believe should be highlighted?
- h. What ecotourism do you envision to benefit the community once the channel is dredged?
- i. Would CMP residents be interested in managing this business and sharing their story as tour guides? How can we get them interested?

Business Incubator:

- a. What do you think ENLACE could do to encourage people to join the business incubator/take the risk?
- b. Could ENLACE take care of tasks related to business start-up to encourage people to start businesses?

Wrap Up: Thank you for your time, is it possible for us to collect everyone's contact information in case we have further questions?

Appendix C: Existing Caño Martín Peña Assets

Category	Business Name	Notes on Quality	Improvements Needed to Fit Within in an Ecotourism Hub
Ecotourism	Bici-Caño	Provides education on local history and culture, portion of ticket price goes to local community members involved with the tour, rating of 5.0 stars, found on Hecho en el Caño, Facebook, and Instagram	Marketing (internet presence), formal payment and tour booking methods, number of guides, a restroom, bottle racks on the bikes, more ratings, and needs to be on TripAdvisor and/or have a website
High-Priority Restaurants and Bars	El Retorno	1-minute walk from the channel, plenty of dining hours, reasonable prices, good atmosphere and service, rating of 4.8 stars, found on Facebook	Is not on Hecho en el Caño, needs more ratings and needs better business photos
	Heladería Los Muchachos	2-minute walk from the channel, provides quality service and local ice cream flavors, rating of 4.0 stars, found on Facebook	Not on Hecho en el Caño, and needs more ratings
Medium-Priority Restaurants and Bars	Cafetería La Morena	6-minute walk from the channel, good atmosphere, food, and service, rating of 4.5 stars, found on Facebook and Hecho en el Caño	Needs to be closer to the channel
	Michael Pizza & Helados	7-minute walk from the channel, rating of 4.4 stars, has its own website, found on Facebook and Hecho en el Caño	Needs to be closer to the channel
	La Terraza Bar & Rest	8-minute walk from the channel, excellent food and atmosphere, rating of 4.4 stars, found on Facebook	Needs to be closer to the channel and is not on Hecho en el Caño

Medium-Priority Restaurants and Bars	Panadería y Repostería Winnys 2	8-minute walk from the channel, excellent bakery/cafe items and service, rating of 4.2 stars, found on Facebook	Needs to be closer to the channel and is not on Hecho en el Caño
High-Priority Convenience Store	Joanna Colmado Minimarket	2-minute walk from the channel, good atmosphere, fresh food, rating of 4.7 stars, found on Hecho en el Caño	Does not have its own website and is not on Facebook. Needs more ratings.
Community Events	Mercado Agro Artesanal de Barrio Obrero	5-minute walk from the channel, showcases local artisans, provides vendors with increased income for the day, rating of 4.6 stars, found on Instagram, Facebook, and Hecho en el Caño	Marketing (more outreach, internet presence)
	Festival del Caño	Celebrates local history and culture and supports local businesses	Marketing (specifically internet presence)
Location	Personal vehicles	Easy access to the communities and to the channel, cost-efficient	Clearly defined parking locations, easy-to-understand directions in the communities
	Ubers/Taxis	Easy access to the communities and to the channel, cost-efficient	Clearly defined drop-off and pick-up locations, easy-to-understand directions in the communities
	Tren Urbano Railway Station	Easy access to the communities and to the channel, cost-efficient	Does not have stops in popular tourist locations, poorly maintained
	Public Bus Stops	Easy access to the communities and to the channel, cost-efficient	Does not have accessible stops in popular tourist locations

Table 1: Caño Martín Peña assets and information

Appendix D: Ecotourism Standard Criteria

1. Legal Compliance with All Certifications and Laws

Businesses should keep an up-to-date list of all applicable legal requirements, certifications, and documents necessary for operation (GSTC, 2016, A2). In addition to this list, they must maintain documentation showing when each of these documents were last obtained or submitted, when they'll next need to be obtained or submitted by, and copies of each of the current versions of those documents. ENLACE should assist businesses through 1-on-1 sessions or workshops to help them understand what documents are necessary and how to obtain or submit those documents. In addition, businesses should provide all these documents both annually and on request.

2. Respect Daily Lives of Locals

ENLACE should implement a system for residents to file grievances or complaints towards a business. Complaints will be relayed anonymously to the business' owner or manager. Complaints should be addressed within reason (GSTC, 2016, B9). Businesses should keep music at low levels and limit any noise producing outdoor activity at night (GSTC, 2016, D2.6). If a business continuously, negatively, and knowingly affects the daily lives of residents, they should not be eligible for inclusion in regional destination activities.

3. Safely Dispose of Waste

Businesses should safely dispose of waste through whichever means are preferred by ENLACE. Wastewater runoff should be monitored and disposed of safely in a way that minimizes negative effects on the environment (GSTC, 2016, D2.6). A document noting when and where solid waste is disposed of, alongside receipts or photos as proof of disposal, should be maintained and provided to ENLACE monthly and upon request. Recycling should be done locally and waste should be reduced whenever possible (GSTC, 2016, D2.4).

4. Offer Tourist-Friendly Payment Methods

Businesses should offer multiple payment methods when possible, including cash, credit, debit, digital wallets, PayPal, and Venmo. Businesses should also provide customers with physical, email, or text receipts when purchasing items in person. An email or text receipt should be sent when purchased online. ENLACE should assist businesses looking to set up new payment methods.

5. Accessible by All People

Businesses should be accessible to physically handicapped and elderly persons, and information should be openly provided on the level and nature of this accessibility (GSTC, 2016, A7.4). ENLACE should offer inspections to inform businesses on potential accessibility issues and suggestions on how they can be addressed. Menus, websites, and signage should be available in multiple languages when possible. ENLACE should assist businesses in translating written work between Spanish and English when needed. Alternative audio and visual options should exist whenever possible.

6. Local, Equal, and Fair Employment

Businesses should prioritize hiring locally as often as possible (GSTC, 2016, B2). In cases where jobs require specific skills or training, businesses should provide that training to residents rather than hire outside of the community. A list of employees should be maintained and provided to ENLACE on request, including what training and certifications each employee possesses and documentation of those certifications. All employees should have the necessary certifications for the industry they work in. Employees should be given fair, competitive wages. (GSTC, 2016, B7). Businesses should have a policy which they provide to ENLACE that outlines their practices when hiring employees, which should specifically ensure fair hiring without discrimination by gender, sexuality, race, religion, disability, or other identities (GSTC, 2016, B6).

7. Engages with the Caño Martín Peña as a Destination

Businesses should provide contact information and working hours to ENLACE and respond within a reasonable timeframe when contacted during working hours (GSTC, 2016, A10). ENLACE should be informed when businesses close for any number of days outside of regular hours. Businesses should engage with opportunities and events presented by ENLACE when available, including training and marketing.

8. Directly Supports the Community

Businesses should prioritize local vendors when purchasing goods and services (GSTC, 2016, B3). Businesses should maintain a list of vendors they use as well as whether those vendors operate within the Caño Martín Peña communities and provide that list to ENLACE annually and on request. The business should create opportunities to partner with local entrepreneurs for joint ventures when possible (GSTC, 2016, B4). Businesses should donate to and support organizations that benefit the local community and environment, such as Centro de Conservación de Manatíes del Caribe. Examples of support include direct financial contributions or advertising.

9. Avoid Single Use Plastics and Styrofoam

Businesses should not use single-use plastic and Styrofoam for dishes, glasses, utensils, bags, or bottles. ENLACE should provide businesses with water coolers or water filters in exchange for a subsidized monthly fee. Businesses should prioritize providing customers with filtered tap water or cooler water over bottled water when possible. ENLACE should subsidize businesses during a transition from single use plastics to reusable and sustainable materials.

Appendix E: Ecotourism Hub Management Hierarchy

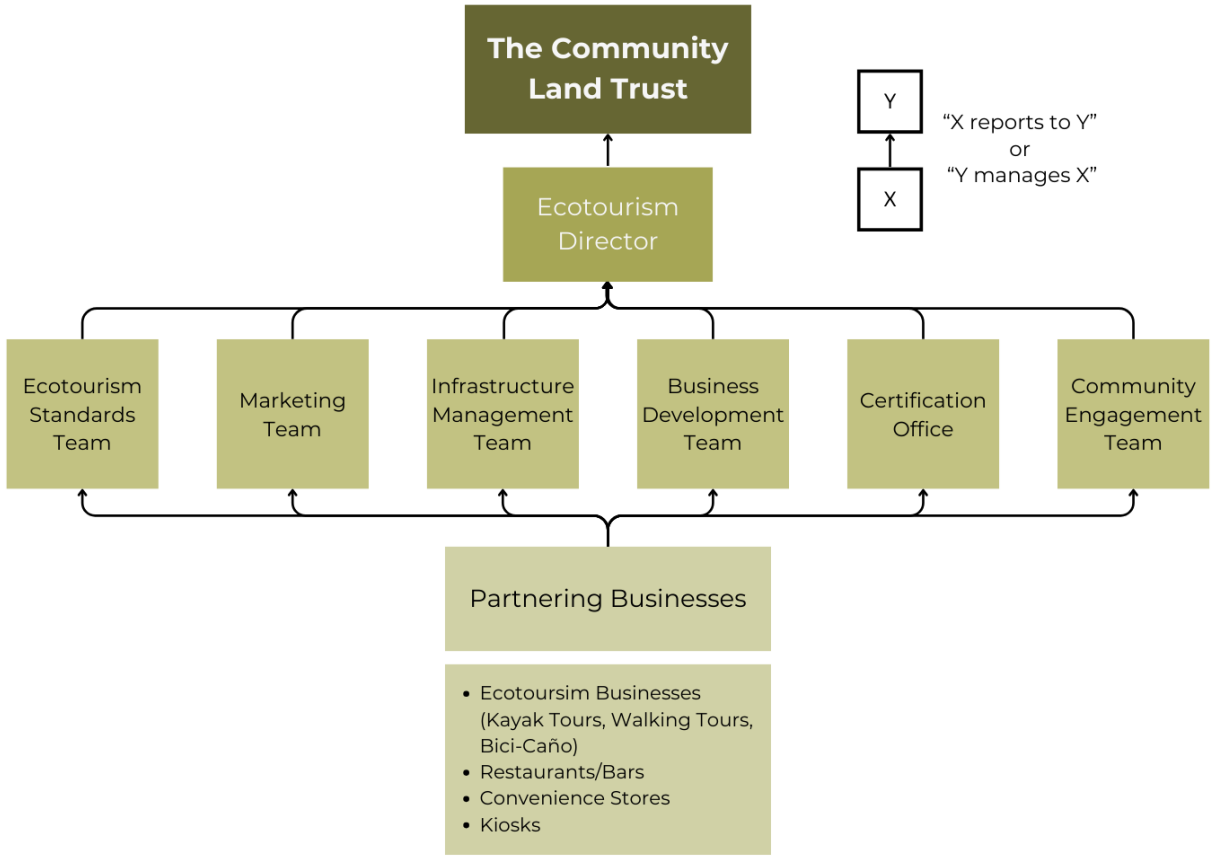


Figure 1010: Flowchart depicting ecotourism hub management hierarchy

Appendix F: Phased Guideline for Ecotourism Hub Development

Topics	Before Dredging	During Dredging	After Dredging
Collecting Media/History	Compiling local history of the channel and the communities	Documenting the dredging through photos, videos, and interviews	Create the hub's map and design interpretive signs
Ecotourism Hub Management	Developing an ecotourism hub team that devises future hub management goals and guidelines	Create a cohesive branding for the hub	Establish a formal management system
Community Outreach	Inform community members of the dredging, develop volunteer program with local schools	Update residents of channel dredging progress	Reach out to entrepreneurs about partnering with the hub
Ecotourism Infrastructure	Hire architects to design kayak tour, kiosk, and Triangle infrastructure	Construct the welcome center and build Triangle infrastructure	Construct signage for walking trails, way finding signs, kiosks, and kayak tourism infrastructure

Figure 1111: Table depicting phased guideline for ecotourism hub development