

Lobitos and Piedritas project

The aim of this project is to design and build functional prototype front end components for a rubbish spotting and collection system to be used in Lobitos.

The goal of this system is to make it easier for people (local residents or visitors) to report dumped or blown rubbish to the municipality and for those reports to be passed to rubbish clearance teams (typically eco-tourists, surfers or local volunteers).

The issue of rubbish on the beaches is important for the surfing community; it is currently dealt with informally by the surf schools and local children, who collect rubbish in exchange for surfing lessons. There are also problems with rubbish being blown from the local waste disposal site, and the health hazard from sewage spills.

You may assume that a rising number of people will have low-end or older smartphones, but that there will still be a large number of featurephones in use for the next few years.

The network infrastructure is poor and connections are expensive, so your designs may need to take this into account.

The local population are mostly Spanish speakers while the tourists are mostly English speakers.

The remainder of this brief is taken from the Engineers Without Borders Challenge 2020 document.

Background

Lobitos and Piedritas are neighbouring communities on the northern coast of Peru.

Tourism is a growing economic opportunity for this arid region, due to the beneficial conditions for sports such as surfing. However, doing this sustainably to protect the local natural habitat, and including the local community in the economic benefit, is not without challenge.



Lobitos and Piedritas are neighboring coastal communities located in the Piura region of northern Peru, South America. Lobitos is a small fishing and surfing town of 1,300 residents located 17 km from the city of Talara, the tourist capital of Piura. Piedritas is a community of 400 residents located halfway between the city of Talara and Lobitos. The residents of Piedritas are in the process of obtaining a land title to formally establish the community and

gain reliable access to basic services such as electricity and water. Both Lobitos and Piedritas are located within an oil concession area.

The region is home to several key industries, including oil exploration and extraction, artisanal fishing, surf tourism, ecotourism, and transportation. With year-round swells and miles of coastline, Lobitos attracts surfers and tourists from around the world.

Piedritas is located in a large equatorial dry forest, which offers many natural assets for ecotourism and forms part of a valuable ecosystem for wildlife and biodiversity. The recent growth of the tourism industry has caused some tensions and resentment among the local population in both Lobitos and Piedritas because the money generated from tourism largely benefits the foreign business owners and not the lower-income neighbourhoods.

While Lobitos is known for its surf tourism, 30% of the local population lives below the poverty line and 14% live in extreme poverty. In Piedritas, between 70- 80% of the residents are living in poverty or extreme poverty due to high levels of unemployment and a lack of basic infrastructure and services.

The nearby solid waste dump of the city of Talara has significantly increased the level of pollution in the community and the surrounding environment.

Despite the challenges of the coronavirus (COVID-19) pandemic, there is a desire for a sustainable and equitable tourism industry that incorporates the unique skills and talents of the local residents, whilst ensuring all people can meet their basic needs, preserving the local ecosystem, and diversifying the tourism offerings.

History

Peru was home to the Norte Chico civilization, the oldest civilisation in the Americas and one of the six oldest in the world.

1000-1476 CE The Tallán culture existed along the northern coast and in the Piura region. As a matriarchal society, the women leaders were called “Capullanas.”

In a number of archeological sites in the Piura region, researchers have unearthed “huacas” (ancient buildings) and “conchaes” (ancient collections of seashells). Exploration of these sites indicates that the area has been inhabited for centuries and the past cultures lived off the sea and land.

1200-1535 The Inca Empire, the largest and most advanced state in pre-Columbian America, flourished in ancient Peru.

1526-1811 Led by Francisco Pizarro, the Spanish colonised Peru. Under Spanish rule, much of the ancient culture was lost.

1811-1824 Peru gained independence on 28 July 1821, during the War of Independence. Spain made futile attempts to regain its former colonies and only in 1879 finally recognised Peruvian independence.

1878-1884 Territorial disputes occurred with neighbouring countries, including the War of the Pacific and the Ecuadorian-Peruvian War (1941). The government started to initiate a number of social and economic reforms to recover from the damage of the war. Political stability was achieved only in the early 1900s.

EARLY 1900S US and British entrepreneurs led the early exploration and exploitation of Peru’s oil fields, the majority of which were discovered in the remote northern desert coast. An Englishman, Alexander Milne, discovered the last major oil field near Lobitos and formed the Lobitos Oilfield Company to mine the fields.

1920s-1950s The International Petroleum Company (IPC), owned by Standard Oil, acquired 50% of the Lobitos stock. The town of Lobitos and surrounding land became an enclave for British and US citizens. The British influence is evident in the town’s layout and buildings,

making Lobitos unlike other Spanish colonial towns. While the foreign oil companies built much needed infrastructure, Lobitos was mainly an oil camp with a town and housing for the oil workers. The fishing community grew during this time as there was more local demand. Lobitos also became a major stopping place for large ships travelling along the coast.

1950s-1970s Piedritas was a town that mainly relied on the raising of livestock, including goats, pigs, and chickens. The town was located in a valley with ravines and a large carob tree forest that provided shade and natural grazing for the livestock.

1962 Burmah-Castrol (later to become British Petroleum or BP) bought the majority of shareholding of the Lobitos Oilfield Company. The petrol from Lobitos was refined and then sold in 229 service stations in Ireland and North West England. The population at this time included thousands of expats working in the oil fields.

1968 A military coup overthrew the democratically elected administration of Fernando Belaúnde. The military government saw the strategic importance of Lobitos and built a military base swelling the local population to more than 10,000 people. The new military government, led by General Juan Velasco Alvarado, took numerous steps to assert Peru's diplomatic and economic independence, including nationalising the oil industry, expelling all foreign operators, and establishing Petro-Peru.

1983 Heavy rains from a major El Niño event caused a huge mudslide that destroyed much of the dry forest in the valley where Piedritas was located. In the aftermath of this devastating event, the remaining residents resettled just outside of the valley, further towards the city of Talara.

1990 Alberto Fujimori was elected president of Peru, during a tumultuous time of severe economic crisis where a large percentage of the population of Peru was living in extreme poverty and there was a civil war with the terrorist group Sendero Luminoso (Shining Path).

1991 To stabilise the economy, the "Inti" was replaced with the nuevo sol (new sol) as the official currency in Peru.

1992 Fujimori dissolved the Congress and the judiciary, suspended parts of the constitution, and assumed dictatorial powers. He argued that the Congress, controlled by opposition parties, was obstructing his efforts to fight terrorism, poverty, and corruption. The following year, a new constitution tilted the balance of government power in Fujimori's favour to enable sweeping legislation and economic reforms and facilitate Peru's re-entry into the global economy.

1995-1999 Peru and Ecuador went to war over the border demarcation along the headwaters of the Cenepa River. The Montevideo Declaration went into effect in May 1999. Part of the peace agreement included reducing the military presence of both countries in the vicinity of the newly recognised border, which involved removing the Lobitos military base. The departure of the military had a dramatic impact on the town by not only removing an economic base, but also removing much of the military base infrastructure.

1998 A major El Niño event triggered mudslides that brought a large amount of sand to the beach and altered the seafloor. These environmental changes created perfect waves for surfing, and in the early 2000s, surfers discovered Lobitos and the opportunity for tourism grew.

2000 Fujimori won a controversial election, but amid growing allegations of corruption, he announced his resignation.

2001 Alejandro Toledo was elected president and ushered in a new era of political reform that involved decentralising the Peruvian government and giving more power and resources to the municipalities. With these reforms, the Peruvian government gave money collected

from the oil and mining industries in each locality to the municipalities to invest in local development projects. The government, however, did not provide appropriate training in management, accountability, and transparency for public administrators, governors, and mayors. This lack of planning and oversight contributed to the prevalence of corruption and misuse of public funds at the regional and local government level.

2004 Sofía Mulanovich, a Peruvian, won the World Surfing Championship title in Hawaii, which sparked a renewed national interest in the sport.

2008 The Association of Surfing Pros hosted an international surfing competition in Lobitos.

2008-2011 ProInversión, Peru's state agency for the promotion of private investment, announced the sale of the military base land for a large-scale US\$119,000,000 tourism project to position Lobitos as an important international surf and wind surfing destination.

The project was to include the construction of 400 condominiums, an 18-hole golf course, and shopping centres. The private land auction was supposed to take place in 2011 and be signed before the transition of presidential powers, but the residents of Lobitos protested because they were not included in the planning process. Lacking local support, the tourism project failed to take off.

Geography and climate

Peru's Pacific coastline accounts for 11% of the area of the country and stretches for 2,414 km (1,500 mi) along the western edge of the nation from Ecuador to Chile. The coastal area is characterised by narrow bands of arid to semi-arid desert, rocky coastline, beaches, and fertile valleys. Rivers that flow down from the Andes Mountains and into the Pacific Ocean feed the fertile valleys. Two important ocean currents, the cold-water Humboldt Current and the warm-water El Niño Current, connect along the coast of Peru to create an abundance of aquatic life and biodiversity.

Lobitos and Piedritas are located in Piura, where the climate is a tropical dry climate and warm all year round. Temperatures in Piura are at their hottest during Peru's summer months, from December to March, when by day, highs generally exceed 32°C (90°F). During the winter months of June to September, temperatures are slightly cooler. From June to August, daytime temperatures average between 25°C (77°F) and 27°C (81°F). Due to the arid conditions, precipitation is lower than 100 mm (4 in) per year, except in the case of severe El Niño events, which can provoke major flooding and annual precipitation that can be as high as 4,000 mm (157.5 in).

Peru's coast also experiences occasional El Niño events. This phenomenon generally occurs every 15-20 years, but in recent years, has been occurring more frequently due to climate change. Warm ocean currents mix with increased air pressure in an abrupt reversal of atmospheric and sea conditions. This oceanic upheaval produces heavy rains and major climate shifts. In 2017, Peru's northern coast experienced a major El Niño event, which caused intense rains, flooding, mudslides, and widespread power outages.

The northern coast of Peru has a wealth of mineral and natural resources. Petroleum fields are located both inland and offshore along the remote northern desert coast, and the oil industry has a long history

of extracting oil from the region. Natural resources include the equatorial dry forest, which provides a habitat for a wide variety of flora and fauna, including the carob tree and the critically endangered Peruvian Plantcutter bird. The dry forest begins north of Lima, stretching along the coast and all the way to the southern border of Ecuador. Much of what remains of the dry forest has gone through desertification and widespread deforestation and degradation. It is estimated that only 10% of the original dry forest remains. From 2003-2018, the area of tree-covered areas in Piedritas increased by 182.13%, however, the main body of growth occurred in the invasive species Tamarix, not the native dry forest.