

**Narrating Memory: Discourses of Development and the Environment in a Puerto Rican Coastal Region**

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## Introduction

Luis is a fisherman from Encarnación, a small rural community in the southern municipality of Peñuelas, Puerto Rico. In contrast to most people in this community, he has followed a peculiar work trajectory, which may be characterized as fisherman-proletarian. Luis has never worked in the sugarcane fields and his only remembrances about agriculture are the ways his neighbors earned a living from sugarcane cultivation. During the late 1960s, when sugarcane still dominated the regional economy, he collected crabs and oysters during afternoons and on weekends in the mangrove forests, and helped the older fishermen land the catches and clean the fishing vessels. He also remembered fondly that for doing this, the fishermen gave him some smaller fish that he brought home with a heightened sense of accomplishment. When he was between eight and nine years old he began to fish with friends and relatives using small wooden vessels, fishing nets and fish pots. However, he has always preferred to dive, initially without any gear and nowadays with full scuba equipment.

For most residents of Encarnación, sugarcane cultivation was not a significant economic activity, as it was for residents of Playa de Guayanilla and El Faro, two coastal communities in the nearby municipality of Guayanilla (see Figure 1). Luis' father has never worked in agriculture either. He was among the large number of people who migrated from the highlands of Peñuelas and settled near the coast, in Las Salinas, lured by the industrial boom that petrochemical industries and oil refineries promoted since the early 1950s. His father found a job as a laborer in Productos Salinos de Tallaboa, later known as Ponce Salt Industries, which inaugurated operations on June 30, 1951 (Balasquide 1972:225). It was a small salt industry that survived for about a decade. Probably because its short life span, few local residents recalled that it had any economic importance to the region. In fact, most local residents only remembered that Productos Salinos de Tallaboa prepared salt, mainly for bakeries and for raising livestock. In Encarnación there were no port facilities to export salt and when competition from other producers intensified, the owners of Productos Salinos de Tallaboa found it more convenient and cost-efficient to distribute the product using facilities available in the port of Ponce, Puerto Rico's second largest city.

When Productos Salinos de Tallaboa closed operations in the mid-1960s,<sup>1</sup> most residents from Encarnación who worked there found jobs in petrochemicals and oil refineries located nearby. The Commonwealth Oil Refining Company (CORCO) began to construct its first unit in 1954 and started operations in 1956. It was finally incorporated on May 19, 1963 and represented an investment of \$25 million with the capacity to refine 23,500 barrels of oil daily. In 1959, Puerto Rico's first petrochemical plant opened "when Union Carbide began operating a \$35-million plant to produce ethylene glycol with feedstocks purchased from the nearby CORCO refinery" (Baver 1993:50). The company that constructed Union Carbide, Chicago Bridge, contracted Luis as a welder. Union Carbide continued to add new units and plants until the late 1970s, thus providing Luis with steady work for fifteen years. Welding was at the time a highly remunerated job in this region of impoverished rural laborers who were coping with the economic changes that industrial development had created. Luis added his new income to what he could

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<sup>1</sup> There was an attempt to use the building and other facilities to promote a small shrimp aquaculture project financed by Chinese capital. However, this project was abandoned shortly after starting operations.

earn from diving for lobsters and queen conch off the Ponce coast. As for many other coastal laborers, industrial development helped him improve his standard of living.

Luis told me this story during the course of an interview conducted on November 3, 1997. In 1997, I carried out ethnographic fieldwork in Playa de Guayanilla, El Faro and Encarnación among small-scale commercial fishermen (see Pérez 2000 for detailed information on the ethnographic research). The three communities were founded by families who moved from the highlands of Guayanilla and Peñuelas during the early 1930s in order to find jobs in coastal areas where sugarcane was cultivated. When sugarcane production declined in the late 1960s, rural migrants obtained work in some factories located in close proximity to their communities. Playa de Guayanilla is one of the poorest rural districts in the region studied. For the past twenty years it has been under the jurisdiction of INSECO, the Puerto Rican government's program for community, economic and social development. For example, in the late 1960s, Blay (1972) found that it lacked the amenities of other coastal communities in southwest Puerto Rico with comparable population. And in the late 1970s, it was described as an isolated coastal community that resembled a slum rather than a "traditional fishing community" (see Lucca Irizarry 1981:127). The efforts of the Puerto Rican and United States governments to improve its socio-economic conditions have not yet altered the conditions of rural poverty. And local residents still complain about the bureaucratic hassles they confront in order to receive the necessary financial and institutional support.

During the time I lived in the region, I was concerned with the government policies altering the conditions of the rural economy. Besides asking local residents about the changing economic conditions, I also inquired about the transformation of the coastal landscape. The creation of a huge petrochemical complex since the early 1950s has had the most devastating effects on both the local economy and the coastal landscape. Although the expansion of the industrial complex has slowed down since the early 1980s, several important events with yet unforeseen consequences were taking place during my stay in the region. For example, fishermen from Encarnación told me about how the ongoing construction of a submarine pipeline to discharge used water into the sea near Punta Cucharas in Ponce interfered with their fishing excursions in the cays and areas near the coast. Also, Eco-Eléctrica, a natural gas power plant, was under construction only a few miles to the north of Playa de Guayanilla.<sup>2</sup> It is a subsidiary of Kenetech-Enron Corporation that will generate 400 MW (megawatts) of electricity and help Central Costa Sur Power Plant keep pace with the high demand for energy on the island. Puerto Rico's Electrical Power Authority has determined that the island will need approximately 1,000 MW (megawatts) of electricity in the early years of the 21<sup>st</sup> century because the Puerto Rican government has not built a single plant since the late 1980s (see Servicios Científicos y Técnicos 1995:Appendix). Natural gas should produce less contamination than petroleum, but it is yet undetermined how could Eco-Eléctrica affect coastal and marine resources in the region.

John and Jean Comaroff (1992) have suggested that history and anthropology are inextricably linked to the production of ethnographic representations. But, as I realized during my research, anthropological knowledge is incomplete when it relies solely on partial, fragmented

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<sup>2</sup> During a visit to the region in December 2000, Eco-Eléctrica had initiated operations at a limited pace while some parts of the project were still under construction. The Puerto Rican government expects that Eco-Eléctrica will start full operations by the year 2001.

remembrances that people convey through personal memories. Personal memories become strategies that people use to construct and imagine their histories, lives and work experiences. The combination of personal memories and historical narratives help us understand socio-economic changes and transformations of the coastal landscape, but in this particular case personal memories proved to be a confusing battleground that contradicted and challenged some people's discourses of development and the environment in southern Puerto Rico. Like a fishing net that captures only certain species while allowing others to escape, memory is prone to subtle manipulations that can disguise political tensions and ambiguities.

In this essay, I analyze the transformations of the rural economy and the coastal landscape as a result of industrial development. I first describe briefly the region where I conducted ethnographic fieldwork highlighting the history, geographic location and the conditions of the rural economy. I then present a historical background of industrial development and analyze the main outcomes of industrialization. Finally, I analyze a set of interviews with local residents that show the contested nature of personal memories and discourses as they relate to the interviewees' opinions of economic transformations. The analysis of the multiple discourses on development and the environment compares Luis' perceptions with those of two other interviewees, one from Playa de Guayanilla and another from El Faro. I will argue that the differences in discourses and opinions are few and depend on the extent they benefited from industrialization.

**Figure 1. The southern coast of Puerto Rico showing the area of ethnographic research**

## Mapping the region: Nature, history and the dynamics of economic development

Playa de Guayanilla, El Faro and Encarnación are located at 17.58° N latitude and 66.39° W longitude, approximately 15 kms. west of Ponce. The region is characterized by low levels of rainfall and the predominance of arid soils. The municipality of Guayanilla occupies an area of 42.4 mi<sup>2</sup> and includes 17 rural districts or *barrios*. In 1997, the year I conducted research in the region, total population was estimated at 27,830 inhabitants. On the other hand, Peñuelas measures 45 mi<sup>2</sup> and consists of 18 *barrios*; population figures in 1997 estimated that approximately 26,858 inhabitants lived in this municipality.<sup>3</sup> Finally, eighty-six families lived in El Faro at the time of my ethnographic research. Both Guayanilla and Peñuelas extend upward from the Caribbean Sea to the Cordillera Central, the mountainous range that runs continuously from the eastern to the western part of the island, and thus include coastal valleys, semi-arid hills and forested highlands. These geographic and climatic features allow for the cultivation of sugarcane, coffee, tobacco and fruits, and livestock and cattle raising as the major economic pursuits.

Two small bays, Guayanilla Bay and Tallaboa Bay, define the main features of the coastal landscape. Guayanilla Bay is the largest one and covers eight kms.<sup>2</sup>; it is protected from storms by Punta Verraco and Punta Guayanilla, two protruding land masses covered with wetlands, mangroves and xerophitic vegetation. Also along the coast there are great extensions of sub-tropical dry forests, which extend into the municipality of Guánica in the southwest coast of Puerto Rico. A few miles from the coast there are various islets and sandy cays, such as Cayo Mata, Cayo Caribe, Cayo Palomas and Cayo María Langa, that harbor abundant sea grapes, red mangroves, and *majagua*, and comprise some of the best fishing grounds in the inshore areas. The shallow waters of the insular platform are also rich in coral reefs that nurture a diversity of marine plants and animals and constitute natural breakwaters to protect coasts from erosion. Also in the shallow waters there are extensive areas of sea grass that provide a natural habitat for the reproduction of various fish species with commercial value for local fishermen. In a research study carried out during the late 1970s, the coastal landscape was described as follows:

the southern coast of Puerto Rico is noted for its diversity of marine habitats. It is lined with long stretches of luxuriant mangrove forests, dense beds of turtle grass, and coral reefs. The near shore islets also reflect these features. All these habitats are teeming with an exquisite variety of marine life that make up the food webs of which man is one of the important members. Guayanilla Bay, located on the south coast of Puerto Rico, is a significant component of the region (González 1979:90-91).

Sugarcane cultivation has been the most productive economic activity in the region. Especially from the 1930s to the late 1960s, the sugar economy dominated agricultural production and two sugar mills, Hacienda Rufina and Hacienda San Francisco, were among the largest producers of sugarcane in Puerto Rico (see Gayer, Homan and James 1938:80). Both

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<sup>3</sup> Estimates were downloaded from the Internet. The report, Estimates of the Population of Puerto Rico Municipios, July 1, 1997, and Demographic Components of Population Change: April 1, 1990 to July 1, 1997, can be found at [www.census.gov/population/estimates/puerto-rico.prmunnet.txt](http://www.census.gov/population/estimates/puerto-rico.prmunnet.txt). Current population figures are as follow: Guayanilla has 23,072 inhabitants and Peñuelas 26,719 inhabitants (United States Census Bureau, 2000).

sugar mills provided employment opportunities to local residents in the various stages of sugar cultivation. In fact, the original settlement of El Faro was a community of rural laborers employed by the owners of Hacienda Rufina. They also owned and operated a port in Playa de Guayanilla from where they exported refined sugar to national and international markets. In other words, the region has been incorporated into Puerto Rico's political and economic system for a long time and has struggled along with the island to keep pace with global trends favoring capitalist development and modernization.

At the time of my ethnographic research, agriculture provided some rural workers with seasonal jobs. For instance, Tropical Fruit, an Israeli-owned corporation, owns 1,232 *cuerdas*<sup>4</sup> in Barrio Boca, a few miles west of El Faro, that are cultivated with bananas and mangoes for export to international markets. The United States Environmental Protection Agency (EPA) has recently sued the company and demanded the elimination of all pesticides used to grow bananas and mangoes.<sup>5</sup> Some local residents work in agricultural fields north of El Faro cultivating vegetable and fruits to distribute in local markets. Limited employment opportunities are available in various government offices and small stores in the municipal towns but the few industries that operate in areas close to Playa de Guayanilla, El Faro and Encarnación do not provide enough employment opportunities to local residents. They are able to obtain work primarily in low-paying semi-skilled or unskilled positions. Since industrial development during the last two decades has been practically halted, local residents have limited opportunities to find employment in the nearby industrial complex. It is estimated that Guayanilla's unemployment rate is close to 16% while Peñuelas' is estimated at approximately 24.6%, higher than the total unemployment rate for Puerto Rico.<sup>6</sup>

There are few field studies about the region prior to the start of industrialization in the mid-1950s, a situation that might be explained in light of the fact that sugarcane production never developed as it did in other regions of southern Puerto Rico (see Mintz 1956:321-323 and Mintz 1974). In other words, low agricultural productivity made the region unattractive to historians and anthropologists interested in agricultural and rural development. The first field studies were conducted in the early 1970s and focused on the consequences of industrial pollution for marine and aquatic resources along Guayanilla and Tallaboa Bays (see Chartock 1980, López 1979). These early investigations were limited to evaluating "the effects of heated water on organisms from the vicinity of a steam-generating plant" (López 1979:92). As noted elsewhere, "[Guayanilla Bay] is polluted primarily by energy-related effluents and has offered, and will offer, a unique field laboratory to assess the dynamics of bioavailability, uptake and transport of toxic (acute and chronic) contaminants through tropical marine ecosystems. Further, the long exposure to

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<sup>4</sup> A cuerda is approximately .9712 acre.

<sup>5</sup> The United States Environmental Protection Agency has banned four pesticides that Tropical Fruit utilizes in Puerto Rico: Malathion, Supracide-2E, Captan 50 and DITHANE F-45. Residents from Barrio Boca have developed pulmonary conditions, like asthma and bronchitis, allergies and skin irritation due to exposure to these pesticides. In 1997, the United States Environmental Protection Agency filed a case against Tropical Fruit on behalf of local residents. For additional information on this case, see the newspaper articles, *Complacidos con orden de EPA and Inflexible la EPA con la Tropical Fruit*, by Jackeline Del Toro (1997), in *La Estrella de Puerto Rico*. January 30 to February 5, 1997.

<sup>6</sup> Unemployment figures were downloaded from the Internet and based on the data provided by the following documents: Unemployment Rate: Guayanilla Municipio, Puerto Rico; NSA and Unemployment Rate: Peñuelas Municipio, Puerto Rico; NSA. Both documents can be found at [www.economagic.com/em-cgi/data.exe/BLSLA](http://www.economagic.com/em-cgi/data.exe/BLSLA).

uninterrupted discharges accompanied by occasional spills has led to their accumulation in the sediments which in turn have become non-localized pollution sources” (González 1979:90-91).

A striking feature has been the absence of studies that examine the extent to which industrial development has altered the coastal landscape. Various economic development processes have accelerated the region’s incorporation into the world economy since the 1950s and the coastal landscape now shows the all too-familiar outcomes of industrialization and de-industrialization noted in other coastal areas around the world as (Cerf 1990), Koester (1986), and Kottak (1999) have aptly documented. As I will explain in the next section, the region’s coastal landscape has been rapidly transformed since the mid-1950s by heavy industrialization in areas near the coast, which nowadays is dotted with rusted chimneys and abandoned oil storage tanks that are remnants of an aborted development strategy based on the construction of petrochemical plants and oil refineries.

By diverting the study of industrial development from the socio-political framework of modernization and cultural change in Puerto Rico, these investigations have also failed to evaluate the ideologies driving industrial development. Pantojas García (1990) attempts to inscribe the analysis of economic modernization in the context of ideological transformations in Puerto Rico since the late 1940s. One of his main contentions is that Operation Bootstrap, the model of economic development pursued since that moment, responded to the ideological shift of the Popular Democratic Party (PDP) from a populist organization mainly concerned with improving the socio-economic situation of peasants and rural laborers to the creation of a professional cadre of technocrats engaged in the elimination of backward agrarian structures (Pantojas García 1990:39-45). For Pantojas García (1990), the modernization of Puerto Rico’s economy and culture go hand in hand with the fragmentation and differentiation of society in social classes.

### **Industrial development and the transformation of the coastal landscape**

Puerto Rico’s proximity to the northern coast of Venezuela, which lies at 525 miles away and is an oil producing country, was taken into consideration to select Guayanilla and Tallaboa Bays as sites for a petrochemical industrial complex on the southern coast of the island. The Commonwealth Oil Refining Company (CORCO) was the first major industry established there. It attracted other industrial developments, like electricity production and ship building. For example, in 1958 the South Puerto Rico Towing and Boat Service, Inc. started operations, and a few years later, it constructed a small shipyard (*Astillero del Sur, Inc.*) where the Frances P., the first maritime tug boat to operate in Puerto Rico, was built. Tug boats were a necessary addition to industrial development in the region as they guided bigger ships entering Guayanilla Bay to refine crude oil in CORCO plants. On the other hand, on April 12, 1958 Central Costa Sur Power Plant initiated operations with two power generating units; by 1983 energy demands in Puerto Rico had greatly increased and the plant was expanded in order to include six additional units (Sievens Irizarry 1983:45). Industrial development was based on the creation of a huge petrochemical and oil refining complex and subsidiary industries to sustain large-scale industrial production in nearby areas. For example, the Central Costa Sur Power Plant supplies electricity to

the industrial complex as well as to the majority of municipalities on the south and west coasts of the island.

The promotion of such industries was the backbone of the capital importation/export-processing (CI/EP) strategy that Pantojas García (1990:101-142) has identified as the second stage of industrial development in Puerto Rico<sup>7</sup> (see also Baver 1993:47-69, Dietz 1986:252-255, Maldonado 1997:155-159). The establishment of the petrochemicals and oil refineries complex was based on “the allocation to Puerto Rico of special oil imports quotas between 1965-1973” (Pantojas García 1990:106). Presidential Proclamation 3663 of December 10, 1965 completed the legal framework of oil importation in Puerto Rico by amending Proclamation 3279 of 1959 and changing the limitations to oil imports. Presidential Proclamation 3279 imposed limitations on oil imports from foreign countries and was at odds with further plans to develop a petrochemical complex on the island. Without the amendment of Proclamation 3279 the expansion of the oil industry (two oil refineries had operated in the island since 1955) would have been halted. Proclamation 3663 thus provided the key incentive for developing a petrochemical industry in Puerto Rico by allowing the United States Secretary of Interior to assign special oil quotas in order to stimulate the island’s economic development.

The petrochemical industrial complex had benefited from the concession of special oil import quotas in 1965 and 1968, and for this reason the majority of petrochemical plants and oil refineries gained privileged access to cheap Venezuelan and Middle Eastern oil. According to Pantojas García (1990:110-111), in 1969 a United States corporation operating in Puerto Rico paid \$2.25 for a barrel of Venezuelan oil while producers in the United States were forced by the quota to buy oil at \$3.50 per barrel. In order to eschew the possibility that higher oil import quotas were applied to Puerto Rico, lobbyists and legislators travelled to Washington, DC. and gained support to amend Presidential Proclamation 3663. The United States Congress approved Presidential Proclamation 3279 in 1979 and allowed the island to continue importing oil at cheaper rates than oil importers in the United States mainland. However, the United States government did not envision the collapse of oil prices and it did little to avoid the Organization of Petroleum Exporting Countries (OPEC) from calling an oil embargo in 1973.

Industrial development in Guayanilla and Tallaboa Bays was so rapid and successful that in 1977 twenty-seven out of fifty-one petrochemical plants established in the island “were operated by CORCO and Union Carbide. Both these companies had been ranked among the 500 largest companies in the United States by Fortune Magazine” (Pantojas García 1990:114). CORCO provided a larger share of government revenues and employment than any other industrial plant operating at the time in Puerto Rico. For example, in 1978 it supplied 80% of the petroleum products consumed in the island and served as Puerto Rico’s largest employer, with a labor force numbering approximately 2,700 workers. CORCO was not only the biggest and most important industrial employer on the island but was also considered among the “largest independent petroleum refiners and petrochemical producers in the world” (Baver 1993:58-59).

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<sup>7</sup> The first stage of economic development consisted of the promotion of government investment to finance the operation of various industries, such as cardboard, glass and shoe factories that relied on large pools of semi-skilled labor power. Manufacturing production was devoted mainly to supply the basic needs of the Puerto Rican population. This program was replicated in many Latin American countries since the 1930s and is commonly known as import substitution industrialization (ISI).

By 1978, “nine petrochemical plants were operating in the complex as CORCO subsidiaries or joint ventures, representing a total investment of more than \$545 million” (see Baver 1993:58-59).

Industrial development along Guayanilla and Tallaboa Bays continued unabated until the early 1980s, when the economic crisis produced by high prices for imported oil forced many industries to shut down. The sudden collapse of oil refining and petrochemical production halted the plans to construct a port on Mona Island, off the southwest coast of Puerto Rico, that would have been used as a transshipment station for crude oil imported from Venezuela and the Middle East. The Puerto Rican government has recently proposed the construction of a transshipment port, *El Puerto de las Américas*, in the Guayanilla and Tallaboa Bays region, where the petrochemical complex was formerly located. Ponce and Guayanilla are the preferred locations because of the industrial infrastructure already in existence in the area. Ponce has outstanding port facilities as well as improved highways and an airport that can promote international flights. The natural depth of Guayanilla Bay and the varied industrial infrastructure that were a part of the petrochemical complex would facilitate the construction of a transshipment station for crude oil in southern Puerto Rico. Guayanilla seems to be the ideal location but its selection is conditioned on the rehabilitation and cleaning up of the territory contaminated with chemical discharges.

Most petrochemicals and oil refineries established since the mid-1950s are gone; today some tanks and storage facilities are used as “terminal facilities for suppliers of liquid petroleum gas used for cooking” (Baver 1993:59). The downfall of industrial operations in Guayanilla and Tallaboa Bays obviously crippled the island’s incipient industrialization program. As an example, consider the fact that industrial output in Puerto Rico fell almost 20%, from 5.2% in 1974 to 4.2% in 1976 and the industrial complex’s contribution to manufacturing net income fell from 13.1% in 1974 to 8.1% in 1977, a reduction of approximately 40 percent (Baver 1993:57-58). The only industries that remain such as DEMACO, Vassallo Paints and Coating, Peerless Oils and Chemicals, and TEXACO have started operations more recently and rely on an educated and well-trained labor force. Some of the industries established after the early 1980s are owned by Puerto Rican capitalists. Most industrial infrastructure is located in Peñuelas, although their economic impact has extended throughout the region, even to areas far away from both Guayanilla and Peñuelas. Table 1 shows the great number of industries located in the region from 1956 to the present.

**Table 1. List of industries located along the Guayanilla and Peñuelas Bays**

Name of the industry	Location	Years of operation
Commonwealth Oil Refining Company (CORCO)	Peñuelas	1956 – 1982
Costa Sur Power Plant	Guayanilla	1958 – Present
South Puerto Rico Towing and Boat		

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Service, INC.	Guayanilla	1958 – Present
Union Carbide	Peñuelas	1959 – 1985
Hercor Chemical Corp.	Peñuelas	1966 – 1982
Peerles Oil Chemicals	Peñuelas	1968 – 1981
Styrochem Corpration	Peñuelas	1968 – 1982
Air Products and Chemicals of Puerto Rico	Guayanilla	1970 – Present
Orochem Enterprises	Peñuelas	1971 – 1978
ESSO Standard Oil	Peñuelas	1971 – 1978
Puerto Rico Olefins Plant	Peñuelas	1971 – 1978
Pittsburgh Plate and Glass Industries	Guayanilla	1972 – 1978
Rico Chemicals Corp.	Guayanilla	1975 – 1981
Caribe Isoprene Corp.	Peñuelas	1975 – 1982
Oxochem Enterprises	Peñuelas	1976 – 1978
Industrial Chemicals Corporation	Peñuelas	1977 – Present
DEMACO	Guayanilla	1984 – Present
BETTERROADS	Guayanilla	1985 – Present
Arochem International	Peñuelas	1988 – 1992
Vassallo Paints and Coatings	Guayanilla	1988 – Present
Peerless Oil and Chemicals	Peñuelas	1989 – Present
TEXACO Industries	Guayanilla	1990 – Present

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**Adapted from Servicios Científicos y Técnicos. Proyecto de Investigación de la calidad del agua en la Bahía de Guayanilla, Puerto Rico. 1995:64-67**

As a result of rapid and careless industrialization in coastal landscapes, both the Guayanilla and Tallaboa Bays are heavily contaminated with discharges of hot water and pollutants from nearby industries and oil refineries (see Chartock 1980). Chemical and industrial contamination, as well as discharges of hot water from the Central Costa Sur Power Plant, have negatively affected fish populations and other marine invertebrates that inhabit the bays, especially during the larval and spawning phases. During these two phases, fish and other organisms are at the mercy of water currents. Also as a result of heavy industrial pollution, both the Guayanilla and Tallaboa Bays have experienced until recently a significant reduction in the quantity and diversity of fish and mollusks, such as the queen conch. Fortunately for the present and future activities of the local fishermen, since the early 1980s industrial pollution levels have decreased and a recovery of certain fish species has been noted by both fishermen and environmentalists (see *Servicios Científicos y Técnicos* 1995:89). As mentioned earlier, chemical and industrial pollution in the bays has diminished mainly because most industries have shut down operations as a result of a decline in foreign investment in petrochemical and oil refining industries.

Industrial development has impacted the lives of the local residents and the conditions of the regional economy in three ways. First, it has reduced agriculture's contributions to the reproduction of the rural household economy and provided some residents with a steady source of employment. Some residents have found jobs in the industrial complex during the early construction phases or, later, in menial positions such as janitors. Table 2 shows the number of residents and the types of jobs they have had. Demographic data collected in 1997 indicate that 12 residents (24%) found employment in nearby petrochemicals and oil refineries, but only one has held a high-income producing position as a machine operator for Union Carbide. Six of the twelve residents (50%) have worked as laborers, two (17%) have worked as welders, two more as janitors and one (8%) as a painter in TEXACO. I assume that the number of residents employed during the early construction stages must have been much higher than indicated in the table because industrial development in the region required a large labor force of both semi-skilled and unskilled workers. Similarly, the fact that the industrial complex was expanded constantly until the early 1980s might have helped local residents find employment opportunities setting up the industrial infrastructure.

Second, industrial development has led to dramatic population changes as great numbers of people have settled in coastal areas and others abandoned the region when industrial production dwindled. Industrialization thus furthered the expansion of commercial activities as more people migrated to areas close to the industrial complex. The growth and expansion of coastal communities promoted commercial activities like bars, small lodging facilities and restaurants that increased the local demand for fish. Some residents took advantage of this situation and set up independent fish houses in order to purchase and sell fresh fish. Indeed, the recent spatial and residential distribution in Playa de Guayanilla has been attributed to the economic and commercial boom promoted by industrial development. For example, a man I interviewed argued convincingly that when industries were operating in the region this community grew larger and expanded with more commercial activities devoted to the preparation and selling of fish pastries and beverages, "just like it is now because everywhere there is a store."<sup>8</sup>

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<sup>8</sup> Interview conducted on September 26, 1997.

Third, industrial development has dramatically transformed the natural landscape of the coastal zones. Mangrove forests, agricultural lands, and residential areas were cleared in order to make way for the construction of the industrial infrastructure. One of the most dramatic transformations of the coastal landscape was the relocation of Peñoncillo, a small community of rural workers located on the north side of Guayanilla Bay. With the help of the Puerto Rican government, which was enthusiastically promoting industrial development in the region, Pittsburgh Plate and Glass Industries bought the lands where Peñoncillo was originally located. The residents were relocated to the eastern tip of Playa de Guayanilla in a section known today as Villa del Carmen. As a town “planned” by industrial and government administrators, Villa del Carmen boasts wider roads and nicer homes than the other two sections of Playa de Guayanilla: San Pedro de Macorís and Honradez. At the time of the relocation in the late 1960s, the lands were still cultivated with cash crops such as coconuts, bananas and other types of fruits. The original vegetation was cut down and the wetlands in the shoreline were replenished with clay soil brought from outside the region. Although many residents wanted to remain in the Peñoncillo, their houses were torn down without further considerations.

A major highway borders the industrial complex in the north side and a local road that connects Playa de Guayanilla, El Faro and Encarnación crosses it. The local road goes from east to west and passes through some old wooden houses, small family shops, the original Catholic Church of Encarnación, an elementary school, and a junior high school before it extends further close to Playa de Guayanilla. It cuts across the petrochemical and oil refining complex and provides access to two smaller roads that lead to Playa de Guayanilla and El Faro, respectively. Encarnación lies at 7 kms. east of El Faro and the short trajectory between them takes about half an hour as these smaller roads are much less traveled than the highway. However, while traveling through the local road from Encarnación to Playa de Guayanilla and El Faro the traveler’s eyes can easily get blurred by the somber visual landscape of de-industrialization that the rusted chimneys and tanks of the petrochemical complex produce. Until the road approaches the cliffs from where one can glimpse Playa de Guayanilla, it is flanked by abandoned buildings --more images of de-industrialization.

The tall, rusted chimneys of the industries that once formed the huge petrochemical and oil refining complex dominated by the Commonwealth Oil Refining Company (CORCO) are a sad landmark and now salute with their gloomy presence passengers traveling through the highway to the beaches and towns in southwest Puerto Rico. While most petrochemicals are now abandoned other industrial operations, like those of Central Costa Sur Power Plant, Air Products, and Industrial Chemicals, are still maintained. The present condition of the coastal landscape contrasts sharply with the conditions prevailing three decades ago. From the 1950s to the 1970s, the industrial complex produced a bright spectacle of lights that illuminated the hills facing the coast. But since industrial development has greatly diminished since the 1970s the illumination and visual attraction of the region has also faded. Currently, the dull spectacle of lights that the industrial complex can produce disguises the irregular features of the southern coast where the residents of Playa de Guayanilla, El Faro and Encarnación sleep away, unaware of the great number of cars passing nearby.

**Table 2. Types of industrial jobs available for twelve fishermen in Guayanilla and Peñuelas**

Type of Job	Number	Percentage
Laborers	6	50
Welders	2	17
Janitors	2	17
Painter	1	8
Machine operator	1	8
Total	12	100

But southern Puerto Rico is hardly an exception. Heavy industrialization in coastal areas has rendered negative results around the world, as Cerf (1990), Koester (1986) and Kottak (1999) have demonstrated. Koester (1986) analyzed the economic transformation of Cul de Sac Valley, a community in southeast St. Lucia, from plantation agriculture based on slave labor to commercial agriculture based on the production and exportation of bananas to European markets to, finally, the construction of a transshipment station to store oil for an American company, Amerada Hess. St. Lucia is located along the route utilized by oil cargoes passing by the Caribbean in close proximity to the United States Virgin Islands, where Amerada Hess operated an oil refining complex during the late 1970s. Similar to the situation confronted by residents of Peñoncillo when Pittsburgh Plate and Glass (PPG) constructed a petrochemical industry on the north side of Guayanilla Bay, residents in Cul de Sac Valley were relocated to an inland area far from the shoreline and forced to cope with adverse economic conditions. The transformation of St. Lucia's rural economy from sugar plantation to oil storage occurred at a much later time than in southern Puerto Rico and had less devastating consequences because it only lasted a few years between the late 1970s and early 1980s (Koester 1986). In fact, when industrial development was pursued in Cul de Sac Valley local residents in southern Puerto Rico were already coping with the burdens of de-industrialization.

Cerf (1990) analyzed a similar case of late, rapid industrialization in coastal landscapes in her study of the impacts of industrial water pollution on an artisanal fishing community in northeastern Brazil. Sao Braz, a poor fishing settlement located close to the estuary of the Subaé River, in the state of Bahía, began to cope with the burdens of industrial economy during the early 1980s, when a lead smelter, various paper industries as well as sugarcane refineries and distilleries were established along the coast of Bahía de Todos os Santos. As a result of heavy industrialization, most fishermen intensified production by fishing with cotton nets made with smaller mesh sizes that captured high percentages of juvenile fish. Cotton nets, which had been

replaced by nylon nets during the mid-1950s, had become increasingly unproductive because industrial pollution in the river estuary and inshore fishing areas reduced the population of some major fish stocks. Transformations of the rural economy included an increasing combination of various working strategies that involved migrating to major urban centers in search for jobs, changing occupations more frequently, securing low-wage employment in some of the newly established factories in the region, farming, odd jobbing and entrepreneurship. Of all these strategies, farming or agricultural employment was preferred the least because of huge inequalities in the land tenure system in rural Brazil as well as negative stereotypes of agricultural workers as lazy, poor and illiterate (see Cerf 1990:179-185). On the other hand, entrepreneurship almost always involved setting up a small store, a bar or restaurant where fishermen could sell fresh fish or pastries made with their own catches.

In contrast to the situation in St. Lucia, where oil refining collapsed during the early 1980s, in northeast Brazil industrial development has continued well into the 1990s and fishermen from Sao Braz and nearby towns are still coping with economic and cultural changes brought about by modernization. Kottak (1999) provides another example of rural and landscape transformations through his investigations of economic modernization in Brazil and its impact on the rural economy of Arembepe, a small fishing community in the northeast. Kottak (1999) has conducted field research in this community since the early 1960s and been able to document socio-economic, cultural and political changes for more than thirty years. The similarities between southern Puerto Rico and northeast Brazil in terms of the impacts that industrial development has had on coastal environments and rural households are impressive. For example, the growth and development of coastal communities by the expansion of squatter settlements, the intensification of fishing activities and modifications of fishing technologies and practices are some outcomes that can be attributed to processes of industrial development in both countries. Excluding obvious differences in economic development programs pursued by the Brazilian and Puerto Rican governments since the mid-1950s --which reflect the particularities of economic and state formation processes in both countries-- outcomes of economic and cultural modernization have been replicated with amazing similarity in the two countries.

### **Discourses of development and the environment in southern Puerto Rico**

In Landscape and Memory, Simon Schama (1995) has reminded us that “landscapes are culture before they are nature; constructs of the imagination projected onto wood and water and rock... But it should also be acknowledged that once a certain idea of landscape, a myth, a vision, establishes itself in an actual place, it has a peculiar way of muddling categories, of making metaphor more real than their referents; of becoming, in fact, part of the scenery.” Industrialization and de-industrialization in southern Puerto Rico are a part of the coastal landscape and have impacted profoundly the local residents’ perceptions of development. As will become evident below, those perceptions are characterized by a multiplicity of contested discourses that depend on benefits derived by the transformation of the rural economy. Therefore, residents who benefited the most from industrialization regard the transformation of the economy and the landscape more positively than those who benefited less. Let us return to

Luis' memories, with which I opened this narrative to compare it with two other discourses on development and the environment.

When the boom of industrial expansion in the region came to an end in the late 1970s, Luis did not have many opportunities to find industrial employment and thus intensified fish production by diving for lobsters and queen conch. At the time of my research, he lived with his wife, a daughter who was about to graduate from high school and a brother-in-law that he has raised. His brother-in-law has an associates degree in computers but had been laid off from his position at Peñuelas' City Hall. While his brother-in-law was working at the city hall, Luis became ineligible to receive benefits from the Nutritional Assistance Program, the federal program to help low income families raise their economic standards, although he plans to apply for the program once again. None of the other family members were working at that moment, and Luis counted on Nutritional Assistance Program benefits to supplement his earnings. Although he contracted bend disease<sup>9</sup> at a young age, he continues to fish almost daily, though the money he earns from catching lobsters and queen conch barely suffices to support his family. The times are long gone when he earned a robust salary working as a welder for Chicago Bridge in the construction of Union Carbide, CORCO, and other petrochemical industries.

Luis is one of a few residents who secured a steady job while the industrial construction boom lasted. Not surprisingly, he harbors fond memories of the transformation of the rural economy and the coastal landscape. He remembers especially that when industrialization was being promoted many local residents were able to improve their economic situation, and that they were able to purchase automobiles, repair their homes and acquire most modern conveniences like television sets, radios, and washers that Puerto Rico's government heralded as the hallmark of progress. As he described it, the economic boom seemed like an endless golden opportunity and everyone believed that local residents were going to experience higher economic standards forever. But when the promises of economic development faltered during the late 1970s, many industrial workers lost their jobs and opted for a fast and easy, though abominable, escape: they committed suicide by hanging themselves. Amidst the rusted chimneys and tanks of petrochemical plants and oil refineries, Central Costa Sur Power Plant still rises as an undefeated giant. However, it does not provide any jobs for local residents because, according to Luis, "it has its own work force. Now everyone around here is unemployed or seeking odd jobs."<sup>10</sup>

While Luis' case reinforces the perception that industrialization in southern Puerto Rico had positive results because it provided a reliable source of income, it is also true that only a small number of residents with necessary skills and training found jobs in the industrial complex. As a young person with a solid training in welding, Luis was among the lucky residents who found steady employment in one of the highest paying industrial jobs available in the region. The older and poorly educated people, however, fared quite differently because their access to industrial jobs was limited. Such was the situation that Rullán, a foreman in Central Rufina until it closed operation in the late 1960s, had to confront. Like most residents from El Faro, Rullán

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<sup>9</sup> Bend disease afflicts divers who inhale gases from the diving tanks. This situation commonly happens when divers are swimming deep in the ocean and cannot swim up to the surface to maintain an appropriate balance of gas inhalation. Bend disease affects the nervous system and, although many divers are successfully treated with decompression, some may have difficulty to work fully again.

<sup>10</sup> Interview conducted on November 3, 1997.

never benefitted directly from industrial employment; he deplores industrialization because it relied on the labor force of workers from nearby towns and municipalities. For Rullán, the only significant contribution of industrial development has been that “the municipal government earned the revenues that [industries] paid”<sup>11</sup> for operating in the region. A pillar of Puerto Rico’s model of industrial development were tax exemptions for a period of between ten and twenty years to United States multinational corporations operating on the island. Most industries frequently abandoned the island when their tax exemption period expired, although in the region under study they left mainly because of the 1970s economic recession.

Rullán was not upset only because a few residents from his community found steady employment in the industrial complex, but because he saw how the industrialization of Puerto Rico’s economy replaced sugarcane production and by extension the old social structure of hierarchical privileges he cherished so much. His perceptions of industrial development are nuanced by a longing for an agrarian past that only foremen and overseers (like himself) wished had never disappeared. The people who worked in both sugarcane and industrial production are grateful for the contributions that industrialization made to the regional economy. For example, Don Ramón, a resident from Playa de Guayanilla, worked during the early 1970s in the construction of Pittsburgh Plate and Glass Industries (PPG), and fished in order to supplement his household’s income. For him securing a temporary job in the industrial complex made it possible to purchase a variety of products that otherwise he could have never acquired. By the time he worked for Pittsburgh Plate and Glass Industries the sugarcane economy had already collapsed.

The discourse of older residents is interesting because while some praised industrialization’s contribution to the local economy others rendered a nostalgic longing for an agricultural past they know will never return. Don Ramón worked for many years in sugarcane cultivation and harvesting, and his father was a *colono*<sup>12</sup> who sold sugarcane on contract to Central Rufina. As a result, he nurtures memories with perceptions of agricultural work as the best and most dignified way to earn a living. He told me repeatedly that most local residents were doing fine when sugar mills were operating in the region, “but when the industries came sugar mills were closed.”<sup>13</sup> Like for many residents who also engaged in sugarcane production, it did not matter to Don Ramón that he was poorly paid for cutting and harvesting sugarcane under an implacable sun. Nor did it matter that the sugarcane economy was subject to the vagaries of prices paid for this commodity in global markets. What really mattered for him was that industrial development in Puerto Rico turned agriculture, and especially sugarcane production, into an unfeasible economic pursuit.

Rapid, intensive industrialization, as has been the case along the coastal regions of southern Puerto Rico, has always had an impact on people’s perceptions of economic development. For small-scale fishermen in northeast Brazil, where industrial development has been a much more recent occurrence, Cerf (1990) reported that many people felt powerless dealing with the most common problems of industrialization, like environmental pollution and

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<sup>11</sup> Interview conducted on October 10, 1997

<sup>12</sup> A *colono* is a sugarcane grower who owns agricultural lands but makes contracts with owners of sugar mills to process and refine sugar. Don Ramón told me that there were seven colonos operating in Playa de Guayanilla before the late 1960s.

<sup>13</sup> Interview conducted on September 25, 1997.

overharvesting of fish stocks with high commercial value. This sense of powerlessness was manifested in the fishermen's "attitude of passivity and reliance on a higher authority" which, in the context of rural northeast Brazil, entailed the expansion of government bureaucracy in local fishing communities (Cerf 1990:111). For coastal residents in southern Puerto Rico, industrialization is an ambiguous terrain that serves to create positive and negative perceptions depending on what emphasis they put on economic development. I have suggested earlier that many residents interviewed in Playa de Guayanilla, El Faro and Encarnación have a positive perception of industrialization because it allowed them to have steady employment and improve their economic well-being. For example, in order to justify industrial development's positive influence they commented that retired industrial workers receive generous pensions.

On the other hand, residents with negative perceptions of industrial development argued that it has increased pollution levels and prompted the collapse of some major fish stocks, like queen conch and snappers. It is important to note that even residents who have a positive perception of industrial development also blamed it for the declining productivity in local fisheries. Industrial pollution has also contributed to the elimination of mangrove forests and other coastal vegetation, as well as to the reduction of fish biodiversity in coral reefs. It is true that some industries have produced more contamination than others. For example, Central Costa Sur Power Plant and Pittsburgh Plate and Glass Industries have repeatedly been identified by both fishermen and environmentalists as major sources of industrial pollution (see Servicios Científicos y Técnicos 1995). Scientists have determined that hot water discharged by Central Costa Sur Power Plant has increased water temperature levels in Guayanilla and Tallaboa Bays while discharges of chloro by Pittsburgh Plate and Glass Industries have decimated marine and coastal resources. In the late 1970s, Pittsburgh Plate and Glass Industries was forced by the United States Environmental Protection Agency (EPA) to shut down operations because it exceeded permissible levels of air and water pollution in Puerto Rico.

The transformation of coastal landscapes and the degradation of coastal and marine environments are major factors that shape perceptions of development. It is fairly easy for local residents to change perceptions in their assessment of economic development. The diversity of opinions and perceptions that most residents produced can be better assessed when we acknowledge that the economic well being they derived from industrialization was rather short lived. Coastal residents agreed that heavy industrialization has had adverse and possibly irreversible effects on coastal areas and marine resources as well. Today industrial pollution does not represent a serious problem anymore precisely because most industries have abandoned the region. Now local residents have to cope with new problems, such as the indiscriminate use of jet skis in fishing areas and bureaucratic procedures they have to go through in order to receive fishing licenses.<sup>14</sup> However, as some residents argued, it will be hard to revert to the conditions they had prior to the beginnings of industrial development because "the damage is already done and the fisheries will never be the same."<sup>15</sup>

The outcomes of industrialization have affected negatively rural households in the region and forced local residents to adapt to the precarious economic conditions they now experience. The closing of industrial operations has increased unemployment rates among local residents and

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<sup>14</sup> See Pérez 2000 for more details on these matters.

<sup>15</sup> Interview conducted on November 3, 1997.

compelled them to combine various working strategies in order to supplement household incomes. In contrast to previous times, local residents now have to scratch a living from the multiple occupations they may be able to obtain. Most of the residents interviewed received benefits from the Nutritional Assistance Program while the elder receive Social Security benefits. The reduction of industrial pollution levels is credited with a noticeable recovery of some fish stocks as well as maritime flora and fauna along the coasts. Environmentalists have confirmed this condition in recent studies conducted in the region (see *Servicios Científicos y Técnicos* 1995:89) and local residents told me, perhaps a bit euphorically, that nowadays they can fish anywhere in the inshore areas. But only a small group of people deemed this recovery a positive sign of a more promising future. The majority, however, remembered fondly the good old days when fish were plentiful and environmental pollution and degradation did not exist. The people I interviewed in Playa de Guayanilla, El Faro and Encarnación made me believe that good memories can really last forever.

## **Conclusion**

The differences between the discourses of the three residents discussed above are not significant. Luis and Don Ramón found employment in the petrochemical and oil refining complex and thus can attest to the economic bonanza it ushered in. However, since both depended to some extent on local fishery resources, they criticized the degradation of the coastal landscape and the loss of marine resources as a fallout of industrial development. On the other hand, Rullán never worked for any of the petrochemical industries and saw how industrialization displaced the agricultural economy based on sugarcane production. As I mentioned earlier, he was the foreman in one of the most productive sugar mills in southern Puerto Rico. Neither Luis nor Don Ramón found permanent jobs in the petrochemical complex and since industrialization in the region did not last very long their economic benefits were partial and short lived.

The comparison of the economic and landscape transformations in southern Puerto Rico and regions in northeast Brazil and the Caribbean attests to the fact that similar industrialization processes in coastal areas have been harmful to local residents. Rural workers lack the education, training and skills to keep pace with the changing economic conditions produced by global capitalism. In northeast Brazil, industrialization in coastal areas has expanded while in southern Puerto Rico it has decreased in the last two decades. The proposed construction of the transshipment port in areas close to Playa de Guayanilla, El Faro and Encarnación has created much political debate in Puerto Rico. Currently, the proposal is still waiting for approval from the Puerto Rican government and the cleaning up of the polluted coasts of southern Puerto Rico. Meanwhile, local politicians have raised concern that such delay put Puerto Rico in peril as other Caribbean nations such as the Dominican Republic can have the chance to attract investment for a transshipment port in the Caribbean, which will be financed by transnational capital.

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