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Water, Sugar, and Power: Irrigation in Southern Puerto Rico during the Late Nineteenth Century

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*Water, Sugar, and Power:
Irrigation in Southern Puerto Rico
During the Late Nineteenth Century*

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Master's Project submitted in partial fulfillment of the
requirements
for the degree of Master of Arts
University at Albany, State University of New York
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Introduction

The purpose of this paper is to address an important element in the study of the sugar cane industry in Puerto Rico that has been neglected in its literature: water. The image of the successful nineteenth-century sugar cane hacendado¹ inevitably includes the control of great tracts of land. While land was an essential factor in the production of sugar cane, another important factor which has been relatively overlooked in the analysis of sugar cane production is water. Control of water for cultivation or for milling was very important, and having too much or too little water could both create problems. Haciendas needed water for human and animal consumption, water mills, and irrigation, among other uses. The presence or absence, as well as the accessibility of nearby rivers and brooks was an important element that was taken into account in the establishment of a sugar plantation. Nevertheless, water is an element that has generally been taken for granted in works that have dealt with sugar cane production. The intention

¹ Throughout this work I will mainly use hacendado or hacendados to refer to the landowner of any "hacienda". I am also using the term hacienda, together with plantation or estate to refer to the XIXth century farm found in the Caribbean and Latin America, specifically in this case in Puerto Rico. I am using these terms for the same reasons that Scarano (1984) used them in Sugar and Slavery in Puerto Rico. He defined haciendas as: "large, relatively well-stocked agricultural units worked by a servile labor force (whether legally free or not); these units produced most of Puerto Rico's sugar during the nineteenth century. 'Hacienda' is used for ethnographic reasons, as it is the term most commonly found in the primary sources; both 'plantation' and 'estate' are derived from the comparative literature on the latifundium in Latin America and the Caribbean." (Scarano 1984:191)

of this work is to portray the relevance of water in studies dealing with the production of sugar cane in Puerto Rico, especially in the southern coast of the island, where most of the sugar cane haciendas were located during the XIXth century.

The importance of colonial Puerto Rico in the production of sugar cane during the first half of the nineteenth century for the sugar world market and especially to the U.S. market has been described in the works of Francisco A. Scarano (1984) and Teresita Martínez-Vergne (1992). After many centuries of economic backwardness in relation to the rest of the Spanish colonies, Puerto Rico entered the sugar competition at the beginning of the XIXth century due to a series of events which favored the island: the Haitian slave revolution in the 1790's, the economic stagnation of the British and French West Indies, and Spain's loss of its continental American colonies. These events created the conditions that allowed Puerto Rico to participate in the sugar cane industry (Scarano 1994). The Spanish Crown decided to change its policies regarding its remaining colonial possessions and approved new and more liberal legislation for its overseas possessions to increase its control (Martínez-Vergne 1992).²

² Martínez-Vergne's (1992) explanation of Puerto Rico's incorporation into the world sugar market differs greatly from Scarano's. She explains: "In his introduction, Scarano rejects traditional (political) explanations for the

Though compared to the rest of the Caribbean the sugar cane industry had a late start in Puerto Rico (Scarano 1984, Martínez-Vergne 1992), it was born with the expectation that it would yield good long-term profits. This hope seemed well founded during the first half of the XIXth century, when sugar prices were high in the world sugar market. As Scarano (1984) explains in his book about the sugar cane industry in Puerto Rico:

By mid-century, Puerto Rico was the second major exporter in the Caribbean (behind Cuba), as well as the United States' second major foreign supplier; its approximate share of world output from cane was then on the order of 5 percent, and its share of internationally marketed output was significantly greater (citation omitted) (Scarano 1984:6).

This trend changed as prices went down during the second half of the century. The sugar industry began to decline and was almost substituted by the strongest coffee trade to date (Cubano 1990).

As discussed in many works (Scarano 1984, Galloway 1989, Martínez-Vergne 1992, Ely 1963), various reasons contribute to explain the drop in the price of sugar in the world market as part of a cumulative process covering the

economic growth experienced in the early nineteenth century and argues convincingly that Spain's actions were not a departure from previous policies, that Puerto Rico's economy had been growing steadily since the eighteenth century, that the stimulus received in the early nineteenth century came in the form of external conditions (and not in legislation), and that Puerto Rico did not become a plantation society the way Cuba did. While all of this is true, it is also undeniable that the early century marked a change in the mother country's attitude toward Puerto Rico, in the island's capacity to generate income, and in the activities of its dominant classes in various local,

entire second half of the XIXth century. The same can be said about the effects of those changes on the local economies of all sugar cane cultivating regions. The two most often mentioned reasons were the introduction of beet sugar to the world market and the over-production of sugar cane in different parts of the world at the time (Ely 1963, Scarano 1984, Galloway 1989). Response to these changes varied throughout the Caribbean. The lowered price of sugar was a serious blow to most local sugar economies, especially coming together with the abolition of slavery in some colonies and with the elimination of price protections in their mother countries in others (Galloway 1989). Though in general there was a feeling of uncertainty throughout the Caribbean, planters were trying to adjust their economic reality to the prevalent environment in the world sugar market, with varying degrees of success or failure. Each colony, and even different regions within a single colony, attempted different strategies to improve productivity and the quality of their sugar in order to remain competitive and capable of surviving the new conditions of the world sugar market.

In the case of Puerto Rico, during the latter half of the nineteenth century different regions tried different approaches to resolve a generalized crisis in the sugar cane

industry. Although the crisis can be partially attributed to the fall of sugar prices,³ this was not its only cause. In some cases, the absence of financial capital⁴ to invest in agriculture was a very important factor that must be taken into account when trying to understand the history of many nineteenth century haciendas in Puerto Rico. Other cases seem to have been more affected by a sugar crises which was under way between the 1840s and the next big price fall in the world sugar market during the 1870s. This appears to have been the case in the southern part of Puerto Rico, specifically in the Guayama region where a prolonged drought was the cause most often mentioned by the hacendados in that area to explain their difficulties.⁵ As a response to these various situations, some hacendados tried to modernize their sugar-making technology, using new kinds of machinery to increase the production of sugar extract from the cane (Scarano 1984). Others tried to implement a new system of sugar mills called "centrales" (Martínez-Vergne 1992), where small planters took their harvest to be refined at a large sugar mill controlled by a single owner. Still

³ Since 1840, sugar prices went into a steep decline, punctuated with smaller raises, but not as high as the ones in the beginning of the nineteenth century (Scarano 1984).

⁴ Martínez-Vergne explains this problem as follows: "[...] the absence of investment capital, often expressed simply as 'the lack of capital' resulting from the farmer's difficulty in obtaining cash advances for the successful completion of the agricultural cycle. The problem was less access to money than the terms under which planters borrowed investment capital." (Martínez-Vergne 1992:28)

⁵ Aguas, Exp. 928, Leg. 28, c. 413.

others tried to improve their productivity by constructing irrigation channels to expand the cultivation of sugar cane (Ramos 1981, Bonnin 1984, Scarano 1984). Not all of these approaches were successful and some were quite short-lived.

Nevertheless, studying the strategies attempted by the hacendados during that period reveals to us the tools they had available for dealing with these changes. They also reflect the capability, or incapability, of the colonial and metropolitan governments to aid the local economies in the different agricultural regions. For example, notarial protocols show the movement and accumulation of lands in the hands of different hacendados, giving us some glints about the mentality of the time in terms of the belief that more lands meant more sugar cane and, in the long run, greater profit. On the other hand, the study of the royal orders issued during the same period of time concerning land grants can help us to understand governmental policies in agricultural matters (Godreau & Giusti 1993). Accumulation of lands in the hands of few hacendados was the norm during the latter part of the XIXth century, as presented in the works of Cubano (1990) and Martínez-Vergne (1992).

Interestingly, little is said about the accumulation of another means of production as important as land, water. It is even more surprising that water is rarely mentioned in works on the southern part of Puerto Rico, renowned for

being the island's most arid area, and where droughts were an ever-present danger to the sugar cane harvest. The great flow of immigrants who established new sugar cane plantations in the area at the beginning of the XIXth century and even earlier, not only reshaped the economy of the southern region but must also have placed a strain on this scarce resource. (An in-depth discussion of the roles of immigrants in XIXth century Puerto Rico may be found in Scarano 1981 and other works; Oquendo 1986; Sued 1983).

How important was the control of water in arid and semi-arid areas such as those in southern Puerto Rico? How relevant was it to XIXth century sugar cane planters in that zone? How easy or difficult was it to get water for agricultural purposes during that period? What ecological, economic, and social changes could be derived from the control of water? How were the landscape and other geographical elements altered by the introduction of irrigation in the area? These and other questions have not yet been answered. The lack of works on this topic makes it difficult to begin to approach this overlooked element in the production of sugar cane. Although this work does not aim to answer all these questions, it is my intention to address the issue by analyzing the case-study of the Guayama⁶ Irrigation Project using the methods provided by

⁶ Guayama is a southern town where the irrigation project was proposed

ethnohistory. The reason for choosing this town, and studying the series of documents generated for the granting of a water concession to build an irrigation system, is to demonstrate the significance of water for the southern sugar cane hacendados through an analysis of these proceedings.

I also want to address the role of the colonial and metropolitan state in relation to the promotion of projects such as the ones attempted in Guayama. Despite the microscopic nature of this work, the richness of the documentation gives a good picture of the procedures for granting water concessions in Puerto Rico during the XIXth century, and may stimulate new inquiries for further research. Guayama has the advantage of being located in a geographical area shared by many other towns with similar agricultural practices, similar problems with water availability, and similar climatological hazards (such as droughts and hurricanes). These similarities allow the future use of my work for comparative studies.

The Guayama Irrigation Project was an enterprise advanced by a series of sugar cane hacendados in 1864. They proposed to the government the construction of a reservoir in the mountains to the north of the district. A series of channels and aqueducts would be built to carry the water to the valley and irrigate the sugar cane fields. Plans were

by most of their sugar cane hacendados in 1864.

drawn up by a British engineer contracted by the hacendados for that purpose. Though the project was approved by the colonial government, the hacendados failed to begin construction and lost their permit two years later. During the next twenty-six years, the hacendados of that area tried unsuccessfully to carry out this project with private or public financial sources. Time and time again they failed, but they never stopped trying. Not until the beginning of the U.S. occupation was the project finally achieved.

My primary documentation for this work came from the Archivo General de Puerto Rico (AGPR). This archive is the repository of Spanish governmental and municipal documents,⁷ as well as all governmental documentation for the XXth century. Documents are organized by governmental department and by municipality. In this case, I used the Water series within the section corresponding to the Department of Public Works, which comprises the records of any water concessions, disputes, laws, maps, water syndicates, etc. The section is quite extensive, and the documents relating to the project are only a little piece of what can be found there. Information is organized by municipalities, rivers, or the names of the haciendas. The richness of these materials is truly remarkable, and they offer considerable possibilities

⁷ The contents of the archive are mostly of the XIXth century, though it also includes materials from the XVIth and XVIIth centuries, in lesser quantities and in worse conditions of preservation.

for future research on the role of water in Puerto Rican society, not only in the XIXth century but also in the XXth.

In addition to this documentation, I also used secondary sources in two main areas: works dealing with water laws and irrigation and water practices in Spain and Puerto Rico; and recent studies which might provide an overview and insights on the sugar industry in Puerto Rico during the XIXth century.

In this work I have deliberately avoided a direct discussion of the development of sugar cane's social classes, the colonial political situation, or the role of slavery, though some of these issues are addressed indirectly through the analysis of water. This decision is based on my intention of emphasizing the importance of water within the overall picture of the sugar cane industry. Social class, politics and slavery are also a part of this picture, but for the purposes of this study water is the center, and the rest are ramifications which may arise and be considered when analyzing the documents. Lack of time and material precludes a more thorough examination of the connections between water and social class and politics, but I do hope to offer at least some new insights on these topics.

Theoretical Frameworks for the Study of Water

The study of the social and economic consequences of the use of water for agriculture and society is not new in the field of anthropology. Most prevalent in the literature are studies in sub-disciplines such as archeology and the diverse schools around ecology and society. Interest has focused mainly on specific geographical regions with a long history in the use of water for irrigation, such as Asia, Africa and Mesoamerica, but has not been limited to those areas.

The first social theory that dealt with irrigation was Karl Wittfogel's famous--and controversial--"Hydraulic Hypothesis" (Wittfogel 1957). This author linked the development of a bureaucratic class that would eventually become the core of state power to the development and management of successful irrigation systems (Lees 1994:363; Kelly 1973). Another theorist following this same line of thought was Julien Steward, who around the same period of time developed a unified theory of the origins of the state as a consequence of the management of irrigation systems (Lees 1994:364, Kelly 1973).

In a sense, the work of these two theorists has provided the basis for studying the social consequences of the development of irrigation. Though, as Susan Lees (1994) has stated, there have been more critics than supporters of these theories. The major critique has been the lack of

evidence to prove that large-scale irrigation systems preceded the development of the state.⁸ Another theory that has been used comes from Marx's analyses of modes of production, such as the Asiatic mode of production or the peasant mode of production, where the phenomena of irrigation is or was present (Henao 1980; Rojas et al. 1974).

Wittfogel's main argument regarding the importance of irrigation as the primary mover towards statehood has been discarded by many scholars. However, the concepts he developed are still alive, such as centralization and the importance of the State's bureaucratic corps in the control of irrigation systems. These concepts have been modified through empirical research, for example, in the works carried out in the valley of Tehuacán by Robert Hunt⁹ (1980), and together with his wife Eva Hunt (Hunt & Hunt 1974).

Other approaches found in the study of irrigation are more oriented towards cultural ecology. For example, some use ecological models to explain the relationship between

⁸ In her article, Susan Lees cited the following authors as critics of Wittfogel and Steward's theories: Robert M. Adams, William Sanders and Barbara Price, among others.

⁹ Enge & Whiteford (1989) quoted Robert Hunt's concept of centralization as follows: centralization occurs where control over the water allocation process is taken over by a politically centralized bureaucracy, effectively replacing local organization or organizations (Hunt 1980; Kelly 1983). This contrasts with the concept of unification (Hunt 1980) that describes the role of directing an irrigation system as vested in an individual or group (Enge & Whiteford (1989).

human beings and their environment, as in Lansing & Kremer's (1993) article on irrigation systems for rice farming in Bali.¹⁰ Another case is the work of Gene C. Wilken, who applies the concept of resource management to traditional agriculture to understand past and present use of agricultural resources: soil, water,¹¹ surface geometry, climate, and space (Wilken 1987).

Anthropology is not the only discipline to have studied water and society. History, though to a lesser degree, has also been interested in such research. Thomas Glick's work (1970) on medieval Valencia, for example, is often quoted in works by anthropologists (Enge & Whiteford 1989, Wilken 1987, Lees 1994). In Irrigation and Society in Medieval Valencia, Glick characterized the history and development of the "huertas"¹² in Valencia, Spain tracing their Islamic origins and studying the conflicts generated by the water struggles. Another type of work on Spain is Agua y modo de producción, edited by Ma. Teresa Pérez Picazo and Guy Lemeuner. This collection of works used Marx's concept of mode of production as a theoretical framework to understand the use of water in Spanish society from medieval times to

¹⁰ The main goal of that article was to "comprehend the emergence of cooperative behaviour among Balinese farmers" (Lansing & Kremer 1993). To that end, they designed an ecological model that would be compared with the empirical data for two years that they had already collected and published in Priests and Programmers (Lansing & Kremer 1991:117-126).

¹¹ Wilken explained: "although water originates as precipitation, it is considered separately from other climatic elements because of its distinctive nature once it is on or below the surface." (Wilken 1987:3; references omitted)

the present, and to approach the role of the state and the elites in its control and management. Stephen Webre (1990) has done some work on the "New World", regarding the use of Spanish municipal water in the colonial city of Santiago de Guatemala (1555-1773). In the U.S. southwest, Betty Dobkins (1959) studied the influence of Spanish water use practices in the Texas Water Law. These works are a small sample of the vast amount of literature on irrigation, comprised mostly of technical works dealing with the functionality of irrigation systems. There has been a recent increase in the study of the implementation of irrigation systems in Third World countries and their effect on society (Siy 1987; Skold et al. 1984).

In the case of the Caribbean, both past and contemporary history lack studies on the relevance of water uses and practices. As mentioned earlier regarding Puerto Rico, there is a lack of research on the role of water in sugar cane cultivation, and on the social consequences, if any, to the sugar cane hacendados. In The Sugarmill: The Socio-Economic Complex of Sugar in Cuba, 1760-1860, Moreno Friginals (1976) never mentions where Cuban sugar cane hacendados got the water for their lands. That raises the question about whether Cuban hacendados depended solely upon rainfall for cultivation, whether water was irrelevant to

¹² "Huerta": intensively irrigated alluvial region (Glick 1970:xvii).

them, or whether the author just assumed the use of water when studying the development of the sugar cane industry in Cuba. Another notable absence is the lack of works dealing with the issue of how cities in the Caribbean secured potable water for their urban populations. There is a real need to begin investigating these issues,¹³ especially when the problem of water scarcity has affected not only the Caribbean but also Latin America (UN:1991).

In this writing, I want to borrow different theoretical frameworks from both anthropology and history to analyze the case of Guayama. As mentioned earlier, I will use ethnohistorical methods: through the analysis of primary resources, I intend to demonstrate the validity of emphasizing water as an independent variable to be taken in account when assessing the development of the sugar cane industry during the XIXth century in Puerto Rico. This hypothesis may well

¹³ I have recently found an ecological approach to the sugar cane industry in the thesis by Juan A. Giusti-Cordero (1994), Labor, Ecology, and History in a Caribbean Sugar Plantation Region: 1770-1950. I consider this work very important because of its uniqueness in incorporating what he called a labor-ecology approach to understanding the history (social, economic, and ecological) of the northern region of Puerto Rico. He offers the following explanation for the use of this approach: "I found the labor-ecology relation to be important in other ways for understanding the historical development of Piñones and other wider Loiza region. First, few written historical records exist for this zone, and the memory and derived accounts of today's informants rarely reach before 1900. Ecological data may help to fill gaps in information and perspectives, or at least to connect and see the significance of such evidence as we have.

"Second, the ecology-labor approach brings us closer to the ways that the piñoneros and loicofos themselves saw their reality: their understanding of nature, of the seasons, of land and property, and even the children's games were often shaped by their labor and from the patterns of their ecology. I developed a similar, connected awareness of the importance of local genealogy and of toponymy. And though far less conspicuously in Steward's work than in Marx, an apparent 'determinism' actually cloaked a vital, dynamic concern with

be extended beyond the sugar cane industry; it seems quite possible that, like land, water control and accumulation affected the development of social stratification not only within a single town but also between towns in the same geological area.

I also intend to use as theoretical tools the approaches originated by the works of Wittfogel and Steward regarding irrigation, bureaucracy, and the state. To do so, I am emphasizing the importance of climatological conditions, specifically the presence of droughts and their effect on the town of Guayama. I will also examine the role of the Spanish State and bureaucracy, and the development and application of water laws to colonial Puerto Rico, to understand how these may have affected the development of the water project aimed at helping Guayama's sugar cane industry. I will be applying Marx's concept of means of production to water, considering it a necessary element for the production of sugar cane, and looking more specifically at the ways water was controlled and accumulated, either through reservoirs or elevated by water pumps to irrigate the sugar cane fields.

In Chapter One I will review the literature which in one way or another connects the use of water to sugar cane production. Chapter Two will deal with two major features

of Guayama: its geology and climate. I will highlight the importance of water to the Guayama area, the presence of droughts during the XIXth century, and their effect on the town's social and economic life. I will also discuss water concessions and, more specifically, the conflicts which arose around them. Chapter Three considers the development of the water laws in Spain, as well as their effects both in Spain and Puerto Rico. Finally, Chapter Four deals directly with the Guayama Irrigation Project. The chapter is divided in two parts: the first part will address the bureaucratic processes involved in granting the water concession needed to build the irrigation project, and the governmental attitude towards the proposal. The second part of the chapter deals with the reasons why the project was cancelled by the government, showing the problems that the Guayama hacendados had to face which made it impossible for them to make this project a reality.

Chapter I

Water and Sugar in Puerto Rico: What do we know?

Southern Puerto Rico, and especially the districts of Ponce and Guayama, are famous for two things: first, they have some of the best agricultural lands in all of Puerto Rico, and secondly, they are known for their aridity and propensity to droughts (Scarano 1984). In that region, water is a very important factor that could determine the success or failure of a sugar cane crop (Scarano 1984). Unfortunately, few scholars have paid attention to this important means of production and its relationship to the sugar cane culture. In my research, I found only three works on the southern part of Puerto Rico that mentioned irrigation and its connection with sugar cane cultivation. The first was La hacienda azucarera: Su crecimiento y crisis en Puerto Rico (Siglo XIX) by Andrés Ramos Mattei (1981). This work is based on his doctoral research of Hacienda Mercedita in Ponce and its survival and decline during the XIXth century. Although his mention of irrigation in that hacienda is brief, his statement regarding the importance of water in the expansion of sugar cane cultivation is significant. He says:

The hacienda faced several obstacles in increasing the amount of land specifically dedicated to sugar cane. One of

them was water. Mercedita was constantly concerned with the control of water for irrigating its sugar cane plantations.

Periodic droughts were notorious on the southern coast, especially from Guayama to Ponce, throughout the 20th century. Lack of rainfall considerably reduced the yield of sugar and prevented expanding the sugar cane plantations.¹⁴

Ramos Mattei adds that Mercedita was granted several water concessions. In 1867 the hacienda was allowed to draw water from the Barros pool, and in 1872 from the Inabón river (within the town's jurisdiction), with the purpose of constructing a water pump and directing the water towards a channel, also to be constructed, and through it to the lands of the hacienda. This was done in 1877, the same year the owner of the hacienda finished paying for a steam-powered irrigation pump. In 1895 the hacienda got its final water concession, to draw water from the Guayo river in Juana Díaz (a neighboring town), and bring it to the hacienda (Ramos 1981:52-53). Ramos Mattei closes the section on this subject with the following words:

Added to the others [1895], this concession was another of the most important factors for Mercedita's internal growth. The water allowed the expansion of sugar cane cultivation and eliminated the insecurity of intermittent bad crops due solely to insufficient rainfall.¹⁵

¹⁴ "La hacienda se enfrentó a varios obstáculos en la expansión del terreno propio dedicado a caña. Uno de ellos fue el agua. Mercedita mantuvo una preocupación constante por el control de agua para regadío de sus plantaciones dedicadas a caña. Las sequías periódicas fueron notorias en la costa sur, sobre todo desde Guayama hasta Ponce, a través del siglo XIX. La ausencia de lluvias mermaba considerablemente el rendimiento en azúcar y evitaba extender las siembras de caña". (Ramos 1981:52) All Spanish texts are translated and in footnotes. They are transcribed as they appeared in the originals consulted.

¹⁵ "Añadida a las anteriores [1895], la concesión constituyó otro de los factores más importantes en el crecimiento interno de Mercedita. El agua posibilitaba la expansión del cultivo de caña y eliminaba la inseguridad de malas cosechas intermitentes sólo por la falta de lluvia". (Ramos 1981:52-53)

I also consulted a thesis written by María Isabel Bonnin Orozco (1984), Las fortunas vulnerables: comerciantes y agricultores en los contratos de refacción.¹⁶ The author briefly refers to water concessions and irrigation for sugar cane, offering important insight on the application of the laws which regulated and promoted the construction of irrigation channels, as well as the responses of the different groups affected by these laws. She explains:

Extending the cultivation areas required more water for irrigation, and the construction of dams and channels to direct it towards its destination. At the time, the south of the island was experiencing a serious drought. Irrigation channels would have to be built if the harvest was to be completed. The Spanish government cooperated with the island's producers on this matter, granting a ten-year tax exemption through the Royal Decree of 1853 to those hacendados who owned or built irrigation channels. These hacendados would only have to pay whatever taxes they might owe from previous years. The Royal Decree of May 21, 1862 further extended this privilege, to include municipal taxes as well.¹⁷

As explained by Bonnin, these new laws were not well received by all taxpayers. From 1865 on, many complaints

¹⁶ "Contratos de refacción" were "generally short-term loans for a period of six months to a year and accrued interest at a rate of 12 to 18 percent per year. Merchants [the "refaccionista" or factor] usually provided warehousing facilities and marketing arrangements, charging a commission of around 2.5 percent of the total of the value of the product and requiring borrowers to sell their product through them." (Martinez-Vergne 1992:28)

¹⁷ "Extender las áreas de cultivo suponía disponer de mayor agua para regadío y la construcción de represas y canales para conducirla hasta su destino. Al mismo tiempo la zona sur de la isla estaba sufriendo una época de gran sequía. Se hacía imperiosa la construcción de canales de regadío para llevar a cabo la cosecha. El gobierno español cooperó en esta materia con los productores de la isla, concediendo por Real Cédula de 1853 el privilegio de no tener que pagar contribución por diez años a los que tuvieran o construyeran canales de riego. Estos hacendados azucareros sólo tendrían que pagar las contribuciones que adeudaran de años anteriores. Por Real Cédula de 21 de mayo de 1862, este privilegio se extendió a la contribución municipal". (Bonnin 1984:125; references omitted)

were presented to the government from different towns regarding the effect of these decrees on the towns' tax collection. One of the major complaints was from sugar cane hacendados who lacked the financial capital to construct irrigation channels and were therefore unable to take advantage of the tax exemptions. Others complained about having to pay taxes when others did not, feeling it was onerous for them to have to 'make up' the difference for those who didn't contribute. Another consequence of these laws was that some hacendados who were unable to pay their taxes were forced to sell their haciendas to the hacendados who had been able to build irrigation channels. This resulted in an accumulation of large extensions of land in the hands of a few hacendados (Bonnin 1984:125).

Despite the complaints against the new laws, many Ponce hacendados with enough capital to invest in irrigation channels took advantage of these dispositions. As Bonnin reports in her thesis:

We have fifteen cases where the contractors requested permits to construct irrigation channels, all of which were approved. The construction of channels, dams, etc... required a lot of capital. For example, Cortada [an hacendado from Ponce] obtained a permit for such an operation, which cost 47,000 escudos for the Mallorquina hacienda only. Once the new irrigation system was installed, his yearly production tripled. The sugar cane hacendados of Ponce who built irrigation channels were generally the ones who produced the largest volume of sugar. Most of them doubled their production between 1866 and 1872.¹⁰

¹⁰ "Tenemos quince casos donde los refaccionados pidieron permiso para

The final work I found that dealt with irrigation and sugar cane is the book Sugar and Slavery in Puerto Rico: The Plantation Economy of Ponce, 1800-1850 by Francisco A. Scarano (1984). There are two paragraphs, one in chapter 2 and another in chapter 5, that mention water, irrigation, and their relation to sugar cane cultivation. Since I read them, these two paragraphs interested me and became the starting point for my own research. In the first example, Scarano presents the importance of water for sugar cultivation, and describes how the hacendados used the advantages of Ponce's situation to benefit their estates. He explains:

Before reservoirs for irrigation were built in the first decade of the present century, the lack of sufficient rainfall was a major drawback to cane culture in the southern plains. For most of the nineteenth century, in fact, the successful cultivation of that staple hung in a precarious balance that could be easily upset by even one season of less-than-average rainfall. Yet, unlike other districts that receive more rainfall, Ponce compensated adequately for this liability with an uncommon abundance of rivers and streams drawing waters from the highest points of the Cordillera just to the north. Four rivers--the Portugués, Bucaná, and Inabón--traversed the valley along its widest part east of the town, at times coming so close to each other that they converged temporarily into a single course during floods. These rivers irrigated the best sugar cane lands in the valley when they overflowed during the rainy season. During the dry season their porous beds were often without water, but they were reputed to be underground streams beneath them which surfaced before draining into the

construir canales de regadío, todos ellos fueron aprobados. Para llevar a cabo la construcción de canales, represas, etc... se necesitaba mucho capital. Por ejemplo, Cortada obtuvo permiso para dicha operación ascendía a 47,000 escudos para la hacienda Mallorquina solamente. Una vez se instaló el nuevo sistema de riego su producción anual se triplicó. Los hacendados azucareros de Ponce que construyeron canales de regadío era, por lo regular, los que producían mayor volumen de azúcar. La mayoría de estos productores duplicaron su producción entre 1866 a 1872". (Bonnin 1984:125)

sea, close to the largest concentration of haciendas. More important, the rivers made it possible for the plantations of the 1840's to construct rudimentary irrigation canals that permitted them to extend cultivated areas and improve productivity during the distressing price fall of those years. In contrast, the hacendados of Guayama where rainfall was more abundant, were unable to take advantage of irrigation because there was insufficient river water in that district.¹⁹ (Scarano 1984:38-39)

The other paragraph describes how the introduction of irrigation improved the sugar cane culture:

Irrigation itself constituted a major improvement in agriculture methods. It will be remembered that Ponce turned to irrigation on a scale unmatched by other Puerto Rican sugar districts that were subject to drought. Because the introduction of irrigation followed several years of acute drought and low prices, one might argue that its adoption stemmed more from a desire to alleviate unusually adverse circumstances than from a search for long-term improvements in agriculture yields. Motivations notwithstanding, it is incontestable that the primitive irrigation works which were constructed brought marked improvements in productivity and allowed planters to extend cultivation to lands previously considered barren, even though their success depended on an abundance of rainfall in the mountains rather than on controllable elements. In 1866 several planters reported to the government that sugar yields from newly irrigated fields increased by as much as 300 and 400 percent. The alleged results must be questioned on the grounds that the reported figures on sugar-per-cuerda yield before irrigation were unusually low, and that post-irrigation figures were probably inflated to impress the government, which was considering a tax exemption for capital invested in irrigation works.²⁰ That irrigation upgraded yields is unquestionable, however, and it did not escape the southern planters' attention that, among other things, irrigation made their medium-quality soils more productive than the best lands on the northern side of the island. More important, irrigation mitigated the effects of periodic changes in weather conditions, allowing plantations to maintain a fairly constant level of production despite sharp fluctuations in rainfall. (Scarano 1984:104-105)

¹⁹ My emphasis.

²⁰ My emphasis.

As pointed out in these three examples, in the southern part of Puerto Rico water was understood to be as vital an element as land for the cultivation of sugar cane. However, there have been no studies on its deep ecological, social, and economic implications for the history and development of the sugar industry in that region in Puerto Rico. So far there have been only small commentaries, within a larger picture, of the role of water in the production of sugar cane, and a few glints on the effects of having the control of that means of production in the hands of a few hacendados. For example, Bonnin mentions the measures adopted by the Spanish Crown to promote the construction of irrigation channels, and their different effects on the various groups involved in sugar cane cultivation. She points to an apparent relationship between the construction of irrigation channels and the subsequent appropriation and accumulation of lands in the hands of those hacendados who were able to build them, a topic that would require additional research.

Another example is found in Scarano's comments of the hacendados of Ponce. Compared to the rest of the island, these hacendados invested more than any others in the construction of irrigation channels for their properties, aimed at extending their agricultural lands and improving sugar cane productivity. Scarano's mention that the

majority of the sugar plantations were located near an area of abundant underground water is also interesting.²¹ What is lacking in this picture is how the control of water could have shaped the hacendados' class in Ponce. What types of conflicts arose between landowners attempting to secure water for their haciendas? Water seems to be assumed as a given. Was this true? Ramos Mattei's comments on the accumulation of water for use on the lands of Hacienda Mercedita gives us an idea of the importance of water to the production of sugar cane. What is left out is how these

²¹ I would like to react to Scarano's comments on Guayama included in the two excerpts mentioned above. I have to disagree with his statement that the Guayama hacendados failed to develop irrigation channels due to insufficient river waters in that jurisdiction. Contrary to Scarano's belief, the reasons for the Guayama hacendados' "failure" to develop irrigation channels are more complex. For example, the lack of financial capital appears to be a stronger reason than insufficient water to explain the project's failure. This will be further discussed in the following chapters.

I also disagree with his argument that the development of irrigation was more a response to the drought and to lower sugar prices than a strategy to increase profits in the long-term. As I will show later in this work, the irrigation project of the hacendados of Guayama, in addition to being a response to a climatological situation was also a project with the long-term goal of improving sugar cane productivity and the financial situation of the hacendados and the government. Any understanding of this project is incomplete without any of these elements: drought, low prices, and a desire for long-term profits.

Finally, although I agree with Scarano regarding the distortion of the numbers the hacendados gave the government in order to obtain the water concession for the project, I understand that the reason for the distortion was not to seek a tax exemption from the government. As explained by Bonnin in her thesis, tax exemption to construct irrigation channels was an incentive given by the government to encourage wealthy hacendados to invest and increase their profit in sugar cane production. In the process of trying to get a water concession, the Guayama hacendados wanted to impress the government with the potential profit that not only they, but the entire region and ultimately the island's treasury, would obtain if the concession was granted. What the hacendados wanted from the government was the right to call their enterprise a public utility. This would mean that, if the concession was granted, the government would pay and help the hacendados expropriate all the private lands through which the irrigation channels would pass. Since this project was one of the most, if not ~~the~~ most expensive project conceived on the island during that period, it was important for the hacendados to get that title in order to make the project a reality. Though, as I will show later, this alone was not enough to help them make it happen.

kinds of water grant would have affected the balance of power with other haciendas, that may have wanted and needed the same water. These are but some of the inquiries that could be addressed in futures studies.

As explained earlier, the control of water was as complex as the control of land. Since I began my research I found that getting water for their lands was not an easy process for the hacendados. The case of Guayama is a good example of how water grants were handled from the municipal to the state level, both in San Juan, the colonial capital, and Madrid, the metropolitan capital. Depending of the magnitude of the water grant, an applicant would need to go through many steps in the bureaucratic process to finally get the concession. Water concessions, like land concessions, were governed by the laws and regulations the colonial government brought to the island. These laws stipulated how grants could be made and to whom they could be given. The way in which these grants were handled, in the colony as well as by the metropolitan government, can give us some hints on the political and fiscal situation of Spain, and how these policies affected the island as a whole.

Water laws and royal orders related to water were issued in Puerto Rico during the entire XIXth century, and especially after 1850. But there are no studies dealing

with their implementation and effects on the success or failure of the different sugar regions along all of the island's northern and southern coasts. Bonnin (1984) touches upon this a little in her thesis, but the picture is incomplete, as we have yet to know whether or not water was controlled and accumulated by the sugar planters in southern Puerto Rico, and how important or not was this control in the balance of power in that region.

There are various advantages to studying water concessions like the one attempted in Guayama during the XIXth century. For example, among other considerations, due to the nature of rivers and brooks the government had to be sure that all the people along the riverbanks agreed with a new concession. This created quite an abundance of documents, since all the municipalities had to make sure that every citizen affected by a specific grant or project had the opportunity to express his or her approval or rejection of it. On the other hand, in some cases the needs of a specific enterprise could generate new legislation to aid in achieving the project's ends. The Guayama project was one such case, and its analysis is valuable to begin to understand the importance of water and the many ramifications that may be derived from its study.

Chapter II

Drought, Water and Sugar Cane: The Landscape of Guayama

Located in the southern part of Puerto Rico, the town of Guayama is known for its dryness and, paradoxically, for its fertile lands, especially for sugar cane. Fray Iñigo Abbad y Lasierra (1979), a Spanish chronicler who visited Puerto Rico around 1788, described the area of Guayama as follows:

All the land seems muted past the Guayama river: the luxuriance of the forests, the beauty of the valleys and prairies, suddenly becomes dry and sandy, denuded of the fresh grass which covers this island, and parched by a sun that burns upon it unimpeded.²²

Since the 1700s, many towns were established all along the southern coast in these inhospitable surroundings.

Guayama,²³ Salinas, Coamo, Arroyo, Ponce and many others were founded in this semi-arid region. Initially, their main industry was cattle-raising, replaced later by agriculture, especially sugar cane cultivation (Abbad 1979, Córdova 1968, Scarano 1993).

Though this is the most arid region of the island, it is not completely without water for human, animal, and

²² "Toda la tierra parece muda de aspecto al pasar el río de Guayama: la frondosidad de los bosques, la hermosura de los valles y praderías anteriores, se ve trocada de repente en un arenal seco, desnudo de la yerba fresca de que está alfombrada la Isla y abrasada de los ardores que el sol le imprime sin obstáculos". (Abbad 1979)

²³ Guayama was founded as a town and as a parish in 1736 (Badillo 1983).

agricultural use. All along its coast, many brooks and small rivers run down to the sea, and in certain areas underground water is available (Descripción topográfica 1848. Scarano 1984).

The Ponce-Patillas alluvial plains that Guayama is a part of, are quite appropriate for agricultural use. They are considered some of the best agricultural lands, especially for the production of sugar cane. Most of the lands of Guayama are alluvion, running parallel to the coast for approximately 10 miles (Sued 1983). The quality of the lands in that area was well known during the XIXth century, as evidenced in different accounts from that period as well as the topographical descriptions of the town made by the government in 1831-33 and 1848:

The lands in the area are dry and fairly flat: they produce excellent sugar cane, coffee, cotton, and all types of grain. The town has agricultural establishments of great value, and is one of the first in terms of agricultural advancement, which continues to increase daily due to the fruitfulness of the land.²⁴

The land is loose, substantial, and with excellent soil. The lands of Arroyo and Jovos are true alluvion lands, very rich and invaluable [...].²⁵

The area has a semi-arid or savanna climate, and an average rainfall of 60 inches per year. "[B]ecause of its

²⁴ "Los terrenos de este partido son secos y bastante llanos; producen excelente caña, café, algodón y toda clase de granos. Hay establecimientos de mucho valor en la agricultura, y es uno de los primeros pueblos respecto del adelanto de esta, cuyo aumento se advierte diariamente, debido a la feracidad de la tierra". (Córdova [1831-33] 1968)

²⁵ "El terreno es suelto, substancioso y de mucho suelo. El de los pollares de Arroyo y Jovos, verdadero terreno de aluvión es sumamente rico y de

location south of the Cordillera [Central], these plains are substantially drier than the rest of the Island. Moisture-carrying clouds moving inland with northeast trade winds usually discharge on the northern plain and the central highlands before they reach the southern side, which has the lowest annual rainfall averages in the country" (Scarano, 1982:38). There are five main rivers (the Salinas, Coamo, Tallaboa, Jacaguas, and Yauco), as well as some small creeks and rivers, that flow intermittently and dry up completely during the dry season (Scarano 1993:17). The main river of Guayama is the Guamaní or Aguamanil, born in the mountains, in the neighborhood of Carite. Many brooks flow to this river, in addition to other minor creeks independent of the river, which flow to the sea. During the droughts, however, most of them dry up completely. Today, the municipality of Guayama consists of 42,997 "cuerdas" of land. Its borders are the towns of Cayey to the north, Arroyo and Patillas to the east, and Salinas to the west, and to the south it faces the Caribbean Sea.

For the people of Guayama, droughts have always been a part of their history, together with the fertility of the land. With this contradictory equation, the inhabitants of the area have endured the climatologic hazards of the southern coast because of the promise of the quality of the

land. For most of the nineteenth century, farming depended on the arrival of the rains at the right moment, especially for sugar cane culture.²⁶ In a letter to Governor Messina in 1864, the Guayama hacendados explained the routine of sugar cane cultivation:²⁷

Usually in January, all the hacendados begin the harvest and continue the grinding if the weather [permits] until they finish in the months of April or May. During this time the hacendados cannot do anything related to the cultivation of the sugar cane; they cannot plant, replant, or lift the chaff that covers the stock, because the drought would destroy the bud and it is necessary to wait until the waters begin which is usually at the end of May or June for these works to be done; many years the planting and replanting are lost because the buds suddenly paralyze, and in a matter of twenty or thirty days the seed that has been planted is lost, and that is why, even with abundant rain, the crop may be small, because the first harvest couldn't be done on time.²⁸

²⁶ The use of irrigation for sugar cane in the Guayama region was quite small both in contrast to the amount of lands dedicated to sugar cane, and in comparison to the extension irrigated in the town of Ponce, also dedicated to sugar cane culture (Scarano 1984). For 1865 the amount of irrigation tracks only covered 610 "cuerdas", compared with the 3,673 "cuerdas" cultivated with sugar cane without irrigation. (Data from the table "Clasificación de la llanura de Guayama en la distribución de su zona agrícola, diciembre 15 de 1865). (Aguas, Leg. 28, Exp. 928, c. 413.)

²⁷ The cultivation of sugar cane in Guayama went back to the 18th century but was not as extensive as it was during the first half of the 19th century. The first reference to its culture is found in Iñigo Abbad's "Historia Geográfica..." in 1772. For more information on the early beginnings of Guayama's sugar cane see Abbad 1979, Córdova 1968, Sued 1983.

²⁸ "Regularmente en el mes de Enero todos los hacendados empiezan la safra y continuan la molienda si el tiempo lo [permite] hasta el mes de Abril y Mayo en que concluyen. En estos tiempo el hacendado no puede hacer nada p.a el cultivo de la caña, ni sembrar, ni resembrar aun, levantar la paja que cubre la cepa, porque la seca destruiría el retoño y es preciso aguardar hasta que empiezen las aguas que por lo regular vienen a fines de Mayo o Junio en cuya época es que se hacen los trabajos, y muchos años son perdidas las siembras y resiembras porque de pronto se paralizan aquellas, y en veinte o treinta dias de seca se pierde la semilla que se ha puesto en la tierra, y es razon porque luego aunque sean abundantes las lluvias es pequeño el cosecho a causa de no haber podido hacerse en tiempo el primer cultivo". (Archivo General de Puerto Rico, Fondo: Obras Públicas, Serie: Aguas (From now on Aguas), Leg. 28, Exp. 928, c. 413.)

Droughts and water were the major concerns of the Guayama sugar hacendados during practically the entire nineteenth century. The low prices of sugar on the world market do not appear to have been a major worry for these hacendados, and are not mentioned in any of the documents I reviewed for the irrigation project, which cover from 1866 to 1873. Nor was this factor ever mentioned in any of the other attempts to revive the project in 1874, 1875, 1891 and 1898.²⁹ The hacendados always blamed the droughts when explaining the sugar cane crisis in the Guayama area.

However, not all droughts were seen as bad. If they were short, they were welcomed because of their beneficial effects on the harvest. But if they were too long they diminished sugar cane productivity, and could upset the well-being of the entire town, its economy and industry. A topographical description³⁰ of Guayama includes an account of the town's droughts:

[Guayama] is very prone to annual droughts that hit with more or less intensity and for undetermined periods. When they are short and occur early in the year, they are beneficial. Since that is the time of the harvest, operations are made easier, and it is possible to prepare the soil better and in less time for planting when the rains

²⁹ I do not intend to say that the low sugar prices in the world market were not important to the hacendados. What I mean is that the Guayama hacendados during that period in Puerto Rico understood that they were unable to increase sugar cane production because of the long droughts, and that this was the main reason they would give when trying to explain the economic deterioration of Guayama.

³⁰ A topographical description was a record of the topography of different towns, in this case in Puerto Rico. It contains a description of the town itself, its agricultural products and resources, rivers and mountains, etc.

begin.

They [the droughts] are the reason why [the town] consumes more foreign provisions than any other town, especially corn meal... some [of the droughts] have left indelible memories in the area because of their grievous results. From 1794 to 1796, the elders say there was one so strong that the inhabitants, having exhausted the resources to support themselves because of the absence of foreign commerce, were forced to migrate, and for this reason there was an increase in the populations of nearby towns. It lasted for three consecutive years, during which time the main river dried up all the way to the Aguamanil barrio, near the riverhead, which had never been seen, nor does anyone remember it to have ever happened before. All the wells and streams also dried up, and most of the cattle died, which was the only asset left to the farms inhabitants: for this reason many abandoned the property of their lands [...]

From late 1841 to mid-1844, [the drought] would have had the same effect on the town, had it not been favored by American commerce which, by bringing provisions and other basic needs to our port, ensured our subsistence, albeit with the sacrifice of the high level to which prices were raised in those cases, but it will still be remembered because of the suffering it caused, worsened by the low prices of fruit,³¹ in such a way that the plantations that in normal years produced [over?] one hundred bocoyes, in '43 didn't even make eighteen, and the situation of the hacendados was so critical that some did not dare request what they needed for their daily sustenance, for fear that the shopkeepers would return their orders. And now [1848] we're going through a second one just as bad as that.³²

³¹ So far, this is the only remark about low sugar prices that I have found in all the documents I have reviewed for this work. This can also explain why there is no mention of low prices during the years 1866-1873, when the irrigation project was attempted. The next big drop in prices came during the 1870s. But there is still no mention of these price changes, and the drought is still blamed for the deterioration of the town's economy.

³² "[Guayama] es muy propensa a padecer sequías que siempre azotan anualmente con mayor o menor rigor intensidad y por periodos indeterminados. Cuando son cortas y sobrevienen a principios del año son benéficas. Porque como esa época es la de zafra hay mayor facilidad para sus operaciones, y es preparar mejor y en menos tiempo el terreno para sembrarlo en la entrada de las lluvias.

"Ellas [las sequías] son causa de que consume [el pueblo] más de otro alguno, viveres extranjeros, especialmente arina de maíz, habiendo algunas que han dejado en el partido recuerdos indelebles por sus funestos resultados. Desde 1794 a 1796, cuentan los antiguos que hubo una tan fuerte, que sus moradores exhaustos de recursos para mantenerse por no haber entonces comercio extranjero, tuvieron que emigrar, aumentándose con este motivo la población de

Throughout the files related to the attempts to establish the irrigation project in Guayama there are many other accounts, by the hacendados of the town as well as municipal and state officers, describing in one way or another the constant presence of droughts.

When requesting permission to study the possibility for an irrigation project, the Guayama hacendados explained their situation with the drought to the governor as follows:

[...] it should be known that agriculture here will perish as a result of the droughts that are frequently seen [in Guayama...] Most sugar cane haciendas in this jurisdiction suffer a yearly loss of at least 35%, if not over 50% some years, caused by the droughts and by now knowing with any certainty when the rains will come so the works may be done with the necessary regularity [...]

Commerce has suffered and continues to endure a great limitation of its operations because the drought has so battered agriculture that it is not possible to count on its harvests, and businessmen fear using foreign credit in agriculture, as is done in other areas, especially in Ponce where the annual balance of trade of its products is quite stable [...]

los pueblos circunvecinos. Duró tres años seguidos, en cuyo tiempo se secó el río principal hasta el barrio Agusmanil, cerca de su nacimiento, lo que anteriormente no se ha visto ni conserva memoria los antiguos que hubiera sucedido entonces. Se secaron igualmente todos los pozos y quebradas, pereció la mayor parte del ganado que mantenían los hatos y era la única riqueza de sus habitantes, por cuya razón muchos abandonaron la propiedad de sus terrenos [...]

"De fines de 1841 a mediados de 1844, ella [la sequía] hubiera producido el mismo resultado a no ser favorecido por el comercio americano, que conduciendo a nuestro puerto los viveres y artículos de primera necesidad para el consumo, aseguro nuestra subsistencia, si bien con el sacrificio de la altura a que se elevaron los precios en esos casos, pero no dejará de conservarse su memoria por la multitud de penurias que causó ayudada de los bajos precios de los frutos de tal modo, que ingenios que en años regulares ¿pasaba? de cien bocoyos, en el de cuarenta y tres, no llegó a diez y ocho, siendo tan crítica la posición de los Hacendados, que varios no [se] atrevían a perder a los tenderos lo necesario para la mantención diaria de su familia por el temor de que les devolviesen los papeletas. Y actualmente [1848] se sufre una segunda igual a aquella". (Topographic Description of the town of Guayama, February 1848, by José Antonio Vazquez. Archivo General de Puerto Rico, Fondo: Obras Públicas, Serie: Obras Municipales, Leg. 27, Exp. 1. Transcript of the original)

The desolating drought suffered for over eight months last year (1863) has put agriculture in a state of such hopelessness that only the realization of the irrigation project can offer it a future once again [...]³³

Various remarks on the gravity of the drought are also found in the testimonies offered to the municipal government during hearings held in 1865 on the public usefulness of the irrigation project:³⁴

[The project] would be a considerable asset to the area because not only would it triple the production of its existing sugar cane lands, but it could also add (almost?) another fifty percent to the lands of the jurisdiction dedicated to this product, which today do not produce anything because of the frequent droughts along the entire coast. [testimony of Fra. co Giol]

...explained that with the present droughts affecting the jurisdiction generally half or more of the harvest is lost. [Testimony of Jesús Ventura Negrón]

...adding, finally, that if the irrigation project fails in this area, he and most of the other hacendados will have to abandon their haciendas because it will not be possible to cultivate sugar cane without water, a [resource] that seems to be abandoning the county a little more each

³³ "[...] es de saber, que la agricultura aqui sucumbirá a fuerza de las grandes sequías que se ven con frecuencia [en Guayama...] La generalidad de las haciendas de caña de esta jurisdicción, sufren anualmente una perdida por lo menos de un 35% cuando no es en algunos años de mas de un 50%, ocasionada por las grandes secas que se presentan y por la ninguna seguridad de cuando empiezan las aguas para hacer los trabajos con la regularidad que es debida [...]

"El comercio ha sufrido y sufre gran estreches en sus operaciones porque siendo tan castigada la agricultura por la seca que no le permite tener seguridad en sus cosechas, temen el traer crédito del extranjero para emplearlos en ella, como sucede en otros partidos y particularmente en Ponce donde se vé es muy poca la diferencia que anualmente presentan sus productos en la balanza comercial [...]

"La desoladora seca sufrida el año pasado de 1863 por espacio de mas de ocho meses ha colocado a la agricultura en un estado de abatimiento que solo la realizacion del proyecto de riego, puede volver a presentarle un porvenir [...]" (Aguas, Leg. 28, Exp. 928, c. 413.)

³⁴ Chapter 4 has a more extensive explanation of the bureaucratic processes mentioned here, what they were and when and where they were performed.

day. [Testimony of Ysidoro Crouzet]³⁵

In its report to the Department of Public Works on the public utility of the irrigation project, the municipality used the current drought situation affecting the area as an argument to favor the project:

Few years did this state of prosperity and well-being last, and only due to the beneficial influence of the rains: as these became less frequent, agriculture began to suffer of course, and the works were done with more difficulty [...] prolonged droughts began to be felt in this locality and the prosperous picture of riches started changing to misery and despondence [...].³⁶

The Messina government was well aware of the distressing situation of the Guayama region in 1866 as a result of the drought. In a letter to the Overseas Minister in Madrid, Spain, Governor Messina favored the project, and portrayed to the Minister the difficulty of Guayama's situation:

The visit³⁷ I [the Governor] recently completed around

³⁵ "[El proyecto] seria un bien considerable para el vecindario en razon a no solo se triplicarian los productos de los terrenos fincados hoy de caña, sino que podria entonces dedicarse al mismo cultivo ¿casi? una mitad mas de terrenos del partido que hoy no produce nada p.r motivo de las sequias frecuentes en toda la costa. [testimonio de Fra.co Giol]

"...espuso que con las presentes sequias que azotan la juridiccion generalmente se pierde la mitad o mas de los cosechos. [Testimonio de Jesus Ventura Negron]

"...añadiendo por último, que si fracasa ese proyecto de regadio con este partido, tanto él como la mayor parte de los hacendados de este tendrán que abandonar sus haciendas puesto que no será posible el cultivo de la caña sin agua, y estas abandonan cada dia mas a este partido [Testimonio de Ysidoro Crouzet]". (Aguas, Leg. 28, Exp. 928, c. 413.)

³⁶ "Pocos años impero ese estado de prosperidad y buen estar debido unicamente a la benefica influencia de las lluvias: empezaron estas a ser menos frecuentes y la agricultura a resentirse desde luego, haciense los trabajos con mas dificultad [...] prolongadas sequias empezaron a sufrirse en esta localidad y el cuadro prospero de sus riquezas convertianse luego en miseria y desconsuelo [...]" (Aguas, Leg. 28, Exp. 928, c. 413.)

³⁷ The Governor refers to the visit colonial governors traditionally made to the Island during their incumbencies. The governors, alone or with their retainers, would visit each "Ayuntamiento" or municipality, and verify the

the Island has demonstrated in practical terms how that once fruitful territory has been ruined by the effects of the droughts, and how imperative is the need to come to the town's aid and attempt to improve its impoverished harvest through the proposed irrigation project so that its afflicted population will not abandon it. It is a matter of life and death that this be completed, for, in addition to being a true public calamity, we would also have to lament the disappearance of most of the revenue received by customs from that locality.³⁰

After the failure of the 1866 irrigation project, the situation of Guayama and its neighboring towns, Arroyo and Salinas, continued to deteriorate because of the recurrent droughts that affected the region year after year. The droughts, together with the geography of the southern coast, its aridity and scarcity of water sources, were driving these towns to a desperate economic condition. In 1874 the government sent a Public Works inspector to study the situation and explore the possibility of bringing water for irrigation to these towns. The Inspector's report describes the topography of the Guayama region to explain its aridity. Here are some of his comments:³⁹

conditions of the towns. They would usually inspect the royal buildings and the churches, and visit the town's priest. They would also hear any complaints or pleas to improve the town, etc. After such visits, the governors would mail the "Ayuntamientos" their orders to correct any problems detected during the visit.

³⁸ "La visita que acabo de girar [el gobernador] á la Ysla me ha demostrado prácticamente cuan arruinado está aquel ferraz territorio por efecto de las sequias y la imprecindible necesidad de acudir á la mejoría de su esquilmo cultivo por medio del riego proyectado para que no lo abandone su atribulada población. Es para cuestión de vida ó muerte y si esta última se consumase, sobre una verdadera calamidad pública habríamos de lamentar la desaparición de la mayor parte de los rendimientos que hoy dá la Aduana de aquella localidad". (Aguas, Leg. 28, Exp. 928, c. 413.)

³⁹ "Las llanuras de Arroyo, Guayama y Salinas que forman la costa del 6.º Depart. constituyen la costa Sud Este de esta Ysla y estan situadas al pie de la falda meridional de la gran division que recorre la Ysla en su mayor dimension y de Este á Oeste. La poca importancia de las estribaciones Sud de la cordillera

The plains of Arroyo, Guayama, and Salinas, which constitute the coast of the 6th Department, are on the southeastern coast of this Island and located at the foot of the great mountainous division that crosses the Island in its larger dimension from east to west. The scant importance of the rivers south of the cordillera and the speed of its tributaries in this area make the waterways of this coast quite unimportant, as most of the rainwater that falls on the Island has its natural outlets on the northern coast. For the same reason, in times of prolonged drought most of the rivers on that coast lose their waters very quickly, because the superficial extension of the mountain skirt that feeds the lowest stage of water of those rivers is too short.

Unfortunately for the region, the government never did anything with this report, and the following year (1875) a group of hacendados from Guayama tried once again to revive the irrigation project of 1866. They sent their plea to the Governor and to the Provisional Deputation. This department wrote a favorable reply to their plea, describing the area's critical situation because of the drought as the major reason to favor the petition. This attempt, however, also failed to achieve any success towards establishing an irrigation system. Nevertheless, here is part of the letter:

The mentioned exposition(?) is based on the ruinous state of those territories due exclusively to the continued drought that has turned that once bountiful plain into a sterile wasteland; and on the impossibility of the proprietors undertaking the irrigation project due to an absolute lack of resources, caused by the same drought, the

y la rapidez de sus vertientes por esta parte hacen los cursos de agua de esta costa de muy poca importancia y que la mayor parte de las aguas de lluvia que caen en la Ysla tengan sus desagües naturales por la costa N. Por la misma razon sucede que la mayor parte de los rios de esa costa en tiempo de sequia prolongada pierdan sus aguas muy pronto, pues es muy corta la estension superficial de las faldas de la cordillera que alimentan con sus filtraciones el caudal de estiage de esos rios". (Aguas, Leg. 28, Exp. 977, c. 413.)

emancipation of the slaves and other causes [...]

The causes that determine the decadence and prostration of sugar agriculture in Guayama, Salinas and Arroyo are true, notorious, and evident; but one among them stands out as the main cause and originator of the others, the obstinate drought that the extended plain on the southern coast of the Island has been going through for a continued period of years. Whether this phenomenon arises from the configuration of the land and the fact that during most of the year the prevailing winds send the clouds towards the mountains, separating them from the plains, or whether its cause is the continuous deforestation of the area, which has destroyed most of the trees, the truth is that the rains have left, and that the ruin of the fields, once rich and flourishing, has become a reality [...]

...[T]he drought itself has come to produce this critical situation, not only because of the very notable reduction which has just about annulled production, but also because to obtain this scant and meager yield it has been necessary to make larger expenditures. For anyone familiar with sugar cane cultivation, it is no enigma that in a year of abundant waters, when these nourish the plants at the right moments, the farmer does not lose his crops, does not need to invest as much in wages to sustain the plantation through its definite and complete development, and the benefits he obtains are represented by a larger harvest and also in money saved in tilling expenses.

Until the year 1856, when there was no shortage of rains, sugar production reached 26.000 bocoyes, and in the most recent harvest reached only 3.000. That difference of twenty-three thousand bocoyes is due exclusively to the drought and with irrigation the product will certainly be greater than in the most abundant years, as the farmers will be able to count on this very powerful tool with the needed regularity and opportunity, which in no way would be offered by the rains.⁴⁰

⁴⁰ "Fúndandose la mencionada exposicion en el ruinoso estado de aquellos territorios debido esclusivamente á la continuada sequia que ha convertido aquella feracisima llanura en prados yermos y estériles; en la imposibilidad de acometer la empresa de riego los propietarios por la falta absoluta de recursos, ocasionada por la misma sequia, la emancipacion de los siervos y otras causas [...]"

"Ciertas, notorias y evidentes son las causas determinantes de la decadencia y postracion con que yace la agricultura sacarina en Guayama, Salinas y Arroyo; pero entre todas descuella como la principal y originaria de las demás, la obtinada sequia que por un continuado espacio de años viene experimentando esta estensa llanura de la costa del Sud de la Ysla. Ya sea que

It appears that for most of the second half of the nineteenth century the drought problem was the sole understandable reason for both the hacendados of the Guayama region and the government to explain the decadence of their agricultural economy, especially in the towns of Guayama, Salinas y Arroyo, all dedicated to sugar cane cultivation. It is difficult to determine whether the chronic droughts that affected the region were due to human intervention on the landscape (the deforestation which occurred during the expansion of the sugar cane plantations in the first part of the XIXth century), or whether they could be the result of a natural drought cycle during the second half of the century. More research is needed before any conclusions may be reached on this matter, but in any case the situation raises

este fenómeno dependa de la configuracion del terreno y de que los vientos reinantes en casi todo el año lanza las nubes en direccion á las montañas, separándolas del llano, ó ya sea que proceda de las continuos desmontes que se han llevado á cabo destruyendo gran parte del arbolado, es lo cierto que las lluvias se han retirado de allí, y que la ruina de los campos, antes ricos y florecientes, han comenzado á verificarse [...]

"...[L]a misma sequia ha venido a producir esta situacion critica, no solo por la baja notabilísima que casi ha hecho nulos los productos, sino que tambien porque para obtener estos rendimientos escasos y mezquinos, ha sido preciso hacer mayores erogaciones. Para todo el que conozca la forma de cultivo de la caña, no es un enigma que cuando el año es abundante en aguas y estas nutren la planta en la épocas oportunas, el agrucultor no pierde su siembras, no necesita invertir tantos jornales en el sostenimiento de la plantacion hasta su definitivo y total desarrollo y los beneficios que obtienen están representados por la mayor cantida de cosecha y además por la economia que realiza en gasto de labranza.

"Hasta el año de 1856 en que las lluvias no escasearon, llegó la produccion de azúcar a 26,000 bocoyes, y en la última zafra, alcanzó solo la de 3,000. Estos veinte y tres mil bocoyes de diferencia se deben exclusivamente á la sequia y es seguro que con el riego ha de ser mayor el producto que en los años más abundantes, por cuanto el agricultor dispone de este poderosísima palanca con la regularidad y oportunidad que necesita y que de ningun modo le ofrecera las lluvias". (Aguas, Leg. 28, Exp. 7, c. 413.)

the important issue of the social and economic consequences of water scarcity on the area and how that affected the sugar cane industry.

The lack of water and the control of water through irrigation, and the ever present references to the droughts found in the documents, testify to the importance of water for the survival of the area's hacendados. This is accentuated by the fact that droughts were a chronic feature of the southern coast, and a very important aspect to be considered by the hacendados regarding their lands and their cultivation. For the hacendados of Guayama, droughts were an unchangeable factor, but they also understood that irrigation was a way not only to save their lands and production, but also a sure remedy to improve and increase their sugar cane production. They looked to Ponce and to the few hacendados in Guayama who owned irrigation channels as examples of the advantages of irrigation to enrich their lands with the benefits of water. In a letter to the Governor of Puerto Rico, advocating for the irrigation channels, they stated:⁴¹

In the district of Ponce where almost all the haciendas enjoy the benefit of irrigation, its advantages have been clearly demonstrated, and even here [in Guayama] where some [hacendados] who have irrigation have obtained very beneficial results.⁴²

⁴¹ Letter from the Guayama hacendados to the Governor (1864).

⁴² "En el partido de Ponce donde casi todas las haciendas gozan del veneficio del riego, estan demostradas las ventajas que produce y aun en este [Guayama] donde hai algunos que se riegan obteniendo resultados muy ventajosos".

On another occasion, the same hacendados made the following comments to the Governor regarding the opposition of other Guayama hacendados to the irrigation project of 1866:

Those gentlemen [Florencio Capó and the co-owners of Hacienda Santa Elena] have an irrigation system established in their haciendas. For those waters they obtain plentiful harvests each year, and therefore feel they have secured a piece of heaven.⁴³

Because water was such a scarce resource on the southern coast, the fights for its control that were generated surrounding the water concessions will come as no surprise. Though I have not found any works that deal with such struggles and conflicts for water in Puerto Rico, the documents exist in the Archives, and should be studied in the future. Guayama may not be the best example of such conflicts, because its problems are on a much smaller scale than the other cases found in the General Archives of Puerto Rico. Nevertheless, for the purposes of this research I will present what is available in the files I reviewed for this study.

Plenty of Land and Little Water: Conflicts for Water Rights

(Aguas, Leg. 28, Exp. 928, c. 413.)

⁴³ "Esos señores [Florencio Capó y los coqueños de la Hacienda Santa Elena] tienen establecidos un riego en sus haciendas. A favor de esas aguas obtienen pingues cosechas anuales, y creen tener asegurado, por lo tanto, un[a] porcion color de cielo". (Letter of refutation from the Guayama hacendados to defend their irrigation project against the objections from other hacendados. January 13, 1866. Aguas, Leg. 28, Exp. 928, c. 413.)

The case-study of Guayama's irrigation project in 1866-1873 doesn't have as many instances of water rights struggles as other cases that I have seen in the General Archives in Puerto Rico. However, it does offer the advantage of providing a broad view of many towns reacting to the effects of such a project in their jurisdiction, and specifically the claims of any community member concerning his water rights and any other concern related to them. Due to the nature of this project, towns from the north side of the island where the river "La Plata" or "Toa"⁴⁴ runs to the sea, had the right to oppose the irrigation project that was proposed for the other side of the island. Those in the same area of Guayama, where the "Guamaní" or "Aguamanil" river is located, also had the right to do the same. For that reason, the Department of Public Works sent a memo to all the "Ayuntamientos" that could be affected by the irrigation project to react in favor or against such an enterprise and send their reports to that office.

The reactions found in the file of this project range from complete approval of the project to absolute opposition to it. Replies are similar to those found in Spain, in the cases of the medieval Valencian "huertas" (Glick 1980), or

⁴⁴ The toponymy of the river La Plata (Spanish name) or Toa (Taino name), depends on the municipality it crosses; different people may use the Spanish or Taino name indistinctly. The same applies to the names Aguamanil (Spanish

in a more contemporary setting, such as the Tehuacán Valley in Mexico (Enge & Whiteford 1989). For some of the hacendados opposing the project, water rights meant ownership of the water, in the same way they owned the land.

They viewed the intentions of the hacendados promoting the project as a violation of their rights, and were willing to fight in the courts against such "robbery". Other hacendados living in the northern jurisdictions feared that taking water from the source of the Plata river would reduce the amount of water running on their side, affecting their water rights, the current uses of the water, or the availability of potable water. The presence of this opposition points to the significance and dynamism of water concessions and water rights during the colonial period in Puerto Rico. The hacendados who wrote to defend their rights were motivated mainly by the economic value they placed on their water rights and their application to industry, for example, sugar cane cultivation or the transportation of sugar products along a river, in the case of the northern side, to reach the sea and the capital market in San Juan.

Little is known about such struggles, both colonial and contemporary, in Puerto Rico, and more research is needed to start to understand the importance of such conflicts in the

development of the sugar cane industry both on the northern and southern coasts of Puerto Rico. Such studies might be useful for future comparative studies with other sugar-producing Caribbean islands, such as Cuba or Jamaica. Perhaps even with Mexico, the southern U.S., and Spain, which have their own history of water rights and conflicts, and also share a Spanish heritage.

Let us return to the opposition to the project. In the file on the irrigation channel project, opposition was grouped by towns. In some cases, individual hacendados mailed their disagreement, and in other towns only the "Ayuntamiento" sent its agreement or disagreement to the government. In the next section, I will follow such an arrangement, and will present the oppositions by town.

Cayey

The most outspoken opponent of the irrigation project was an hacendado named Florencio Capó. He lived in the neighboring town of Cayey, north of Guayama, where the "Cordillera Central" crosses the island from east to west. One of his haciendas was near the Carite river, from where water would be taken for the proposed water reservoir for the Guayama project. This is also where the Plata river is born.

Florencio Capó owned two haciendas, one in the jurisdiction of Guayama, besides the Guamaní river, and

another in Cayey. Before the project was finally approved, this hacendado sent numerous letters of opposition to the government, mainly claiming that the Guayama hacendados were going to steal his water from the Guamaní river. Though he was not the only one opposed to this project, nor the only one defending his water rights, he was the most eloquent voice of opposition to the project. In the end, although he was unable to prevent the approval of the water concession for the Plata river, he managed to stop the hacendados from taking water from the Guamaní river for the irrigation project.

Florencio Capó was against the irrigation project because it included plans to use all the water running through the Guamaní river for irrigation, together with the water to be taken from the Plata river. His argument against such an action was that the waters of the Guamaní had already been granted to other hacendados, including himself, and that allowing such use would violate the water laws that regulated water concessions. He also complained about the adverse economic effect that such a grant would inflict on his own hacienda, if he were to lose his water allotment. In one of his letters to the "Ayuntamiento", he explained his claims as follows:

The waters of the Aguamanil [Guamaní] river and of its brooks and affluents, were all granted in property and possession by Her Majesty and the Superior Government of this Island to the following haciendas= First to the Olimpo

Hacienda which today belongs to me. The property of those waters was obtained for the hacienda by its previous owner D. José Antonio Vázquez and was granted by Her Majesty by royal decree over 10 years ago, and for all that time said hacienda has been in possession of those waters. The Royal Decree to which I refer is the only one on the Island which grants waters⁴⁵ and the same that made extensive to the Island the law with certain modifications, that ruled the Peninsula regarding the use of waters. So, Mr Mayor, if the fine hacendados of Guayama insist on the idea of wanting to strip me of these waters, [...] they are going against Her Majesty's will and against my rights of property, domain, and possession which are irrevocable.= 2nd To the hacienda Tuna by disposition or decree of the Superior Government of this Island= 3rd To the Hacienda Machete which today belongs to several gentlemen of the Succession of D. Pedro Curet[...]

I purchased hacienda Olimpo for fifty thousand pesos, and paid such a hefty sum because it enjoyed the waters of the Aguamanil river; without those circumstances, I would not have purchased it for even ten thousand pesos. The upkeep of an aqueduct costs me many escudos a year, as the river waters often destroy it; and all of that represents today a capital of over two hundred thousand escudos, which I should lose or cede to benefit certain others, who I do not know how to classify but as ambitious and confused; or bad people, who are trying to take advantage of these waters against the will of their owner.⁴⁶

⁴⁵ As far as I know, this claim about water concessions during the XIXth century is not true. Contrary to his statement, many such water concessions were granted all over Puerto Rico during that period. Perhaps he is referring only to the area of Guayama, or only exaggerating his case to try to get more sympathy from the government.

⁴⁶ "Las aguas del río Aguamanil [Guamaní] y de las quebradas, sus afluentes, todas ellas están concedidas en propiedad y posesión por S.M. y por el Gob.o Sup.r de esta Ysla á las siguientes haciendas= Primeramente a la Hacienda Olimpo que hoy me pertenece. La propiedad de esas aguas la obtuvo para esa hacienda su anterior dueño D. José Antonio Vasquez y la obtuvo de S.M. con Rl cedula hace mas de 10 años, todo ese tiempo hace la dicha hacienda esta en posesion de esas aguas. La Rl Cedula que me refiero, es la unica que hay en la Ysla que hace concesion de aguas y es la misma que hizo extensiva á esta Ysla la ley con ciertas modificaciones, que regia en la Peninsula sobre aprovechamientos de aguas. De modo que, Sr Alcalde, si los finos hacendados de Guayama insisten en la idea de quererme despojar de esas aguas,[...] que van en contra de la voluntad de S.M y contra mis derechos de propiedad, dominio y posesion que son irrevocables.= 2.o A la hac.da Tuna por disposicion ó decreto del Sup.r Gob.o de esta Ysla= 3.o A la Hac.da de Machete que hoy corresponde á varios Sres de la Sucesion de D. Pedro Curet[...]

"Yo he comprado en cincuenta mil pesos la hacienda Olimpo, y he dado por ella esa gruesa cantidad porque estaba en goce de las aguas del río Aguamanil: sin esas circuntancias no la hubiera comprado ni aun por diez mil pesos. La

Capó's claim over the Carite river was based on the fact that the plans for the construction of the water reservoir for the irrigation project included expropriating some lands that belonged to him, to his mother and to his uncles, together with the claim that the water that ran through those lands belonged to them. It seems, however, that the claim on the Carite river was less plausible to the government than the one on the Aguamanil river.

Other hacendados in the town of Cayey also opposed the irrigation project. Most of them, like Florencio Capó, feared they would be deprived of their access to and control of the waters of the Carite river. They argued that proximity to the river was an important reason for acquiring their properties, and that that attribute of their estates was the reason for their prosperity. For example, in a letter to the Mayor, D. José Manuel Vázquez expressed that he bought his estate because of its access to the river's water, and that this characteristic of his farm was the reason for his wealth. Another hacendado, D. Ramón ¿Sandauri?, expressed the same concerns to the Mayor. He also opposed the Guayama hacendados entering his property "to form the riverbed and dams needed to carry out the

conservacion de un acueducto me cuesta anualmente muchos escudos, las avenidas del rio me las destruyen con frecuencia; y todo eso importa hoy un capital de mas de doscientos mil escudos, se quiere que lo pierda o que lo ceda á beneficio de ciertos pretendientes, que no se como calificarlos, sino de ambiciosos y aturdidos; ó de mala gente, que trata de aprovecharse de las aguas contra la

project",⁴⁷ and feared that if the water reservoir was built on his land, he would lose "some plantain and coffee plantations, as well as the only pasture his animals have because it is the most level part of the land".⁴⁸ Two other hacendados from the same jurisdiction, D. Manuel Núñez and Melitón Vázquez, also mailed the Mayor, opposing the project with similar claims: they feared losing the water to which they already had access, and losing the prosperity they felt was linked to their access to the Carite river. Manuel Núñez also claimed to have invested in a hydraulic machine for grinding sugar cane that would work with power generated by the water.

Guayama

In the case of Guayama, few hacendados were against the project. What was more common were hacendados with water rights on the Guamaní river informing the "Ayuntamiento" that, even though they favored the project (some were even part of the irrigation enterprise), they were not willing to relinquish their water rights. If forced to, they requested indemnification as stated in the water laws. Nevertheless, as in the case of Florencio Capó of Cayey, Don Joaquín

voluntad de su dueño". (Aguas, Leg. 28, Exp. 928, c. 413.)

⁴⁷ "...para la formación del cause y represas que deben formarse para llevar á cabo este proyecto...". (Aguas, Leg. 28, Exp. 928, c. 413.)

⁴⁸ "...algunas fincas de plátano y café, como también el pasto único que tiene sus animales por ser la parte más plana de dicho terreno". (Aguas, Leg. 28, Exp. 928, c. 413.)

Villodas, co-owner of the Santa Elena hacienda, strongly opposed the irrigation project. He understood that the project would take all the water from the river for the irrigation system, damaging his own hacienda. Like Capó, Villodas feared that if the hacendados were allowed to take 'his' water, his estate would decline and eventually go bankrupt. Here are some passages of the letter against the project sent to the Governor of Puerto Rico:

The Santa Elena hacienda which I represent, comprised of some two hundred and fifty cuerdas of well-cultivated sugar cane, and numerous hands to sustain it, is the first in production in this area and, as a result, has for many years paid the highest subsidiary, and would be reduced today by the project's proponents, to a ruinous state were it to be deprived of the benefits of the irrigation it has enjoyed since 1850. In other words, these hacendados intend to establish an association or enterprise which by virtue of being classified as a public utility would grant them the right to forced expropriation, so that once their needs for water have been met, they might exploit Agriculture with the excess waters [...]

We therefore state that we oppose the irrigation project, and that our opposition is based on the intended stripping of the use we now have of the waters of the Aguamanil river, applied today and for many years to propel and benefit 250 cuerdas of sugar cane, in excellent harvest, with numerous hands dedicated to its works, with a Steam-powered machine recently installed to facilitate the harvesting of a thousand bocoyes of sugar, which will be the crop the Santa Elena hacienda will be able to offer to the hacendados who today aspire to it, who today want to deprive it of the enjoyment of its waters.⁴⁹

⁴⁹ "La hacienda Santa Elena que represento, compuesta de unas doecientas cincuenta cuerdas de caña en el mejor estado de cultivo, y de una dotacion numerosa para sostenerla, figurando en el reparto público de este partido, como la primera en produccion y por consiguiente pagando la mayor cuota subsidiaria desde hace muchos años á esta parte, quieren hoy reducirla los aspirantes del proyecto, al estado ruinoso á que vendria a quedar privada de los beneficios de un riego que desde el año de 1850 tiene en uso y disfrute. Mas claro, pretenden los Sres hacendados fundar una asociacion ó empresa que calificada por obra de utilidad publica, adquieren el derecho de espropiacion forsoza, para una vez

Dorado

This town is located on the northern coast of Puerto Rico, facing the sea. After leaving Cayey, the Carite river is known as the La Plata or the Toa river. In Dorado it is known by the former name, and its outlet is also located in that jurisdiction.

Two of the town's citizens or "vecinos" wrote to the Governor and expressed their opposition to the Guayama irrigation project. The "Ayuntamiento" also sent a report on the project to the Department of Public Works. The letters from the "vecinos" are very interesting. The reasons stated to oppose the project can be described as a chain reaction argument: if irrigation was enacted, and waters from the beginning of the Plata river would be taken for the water reservoir, then the flow of water to the Plata river would diminish; this would bring several adverse effects, such as the salinization of the potable water in wells in the locality; which would in turn make river navigation impossible, and cut off access to the main market

cubierta sus necesidades de aguas, explotar la Agricultura con las aguas sobrantes [...]

"Conste, pues que nos oponemos al proyecto de riego que la oposiciones es fundada en el despojo que quieren intentar sobre el aprovechamiento que tenemos de las aguas del rio de Aguamani, aplicadas hoy y desde muchos años atras á dar impulso y beneficio á 250 cuerdas de caña, en el mejor estado de cultivo, con una dotacion numerosa para sus trabajos, con una maquina de Vapor acabada de instalar para facilitar una recoleccion de mil bocoyes del azucar, que sera la cosecha que puede ofrecer la hacienda Santa Elena a los Sres hacendados que hoy las ambicionan, que hoy la quieren despojar del aprovechamiento de sus aguas

in San Juan, the capital. Here is the testimony of D. Francisco Cantero, a sugar cane landowner in Dorado who lived in San Juan:

Don Francisco Cantero, [...] finds that the project, if carried out, may be harmful to his sugar cane hacienda located on the banks of a brook called Cocal in barrio Mameyal. First, _____?_____ hacienda which like others in a similar position does not have any other quick way to transport products than that facilitated by the navigable brook, which may cease being so once its waters are diminished. In the second place, it has been proven that the entire district becomes ill when the affluence of waters of the Plata river is reduced, _____?_____ in the great droughts, because part of the riverbed becomes exposed, and its emanations are highly noxious, so it must be feared that once [the] waters are taken to benefit the gentlemen from Guayama, even greater damage will be caused to the health of the inhabitants of barrio Mameyal during the dry seasons, and perhaps even during the rainy season. Thirdly and finally, by reason of the proximity to the mouth of the Plata river, there is no potable water in that area, only what little can be kept with difficulty in cisterns due to the nature of the brook, which makes it necessary to go to the Media Luna well, a half league away, to find it, and as soon as the strength of the Plata river is reduced, the effects of the tides will be increased and it will be necessary to go much farther to find water.⁵⁰

Another testimony presented to the Governor was from D.

[...]" (Aguas, Leg. 28, Exp. 928, c. 413.)

⁵⁰ "Don Francisco Cantero, [...] encuentra que ese proyecto si se realiza puede ser perjudicial a su hacienda de caña que se halla situada a las orillas del caño llamado del Cocal en el barrio Mameyal. Primeramente _____?_____ hacienda como las demas situadas de ese modo analogo no tienen otra via espedita para estraer los frutos que es facilitada por ese caño navegable, que tal vez deje de serlo desde que se disminuya su caudal de agua. En segundo lugar esta probado que toda aquella comarca se vuelve enfermiza tan luego como disminuye la afluencia de aguas del rio Plata, _____?_____ en las grandes sequias, porque queda á descubierto parte del caño, y sus emanaciones entonces son altamente nocivas a la salud asi es de temer que tomadas [las] aguas que desean beneficiar los Sres de Guayama, sea mayor perjuicio y no por esta razon de salubridad se irrogara a los habitantes del barrio del Mameyal durante las epocas de seca, y que aun se note en la estacion de las lluvias. Tercera y finalmente a causa de la proximidad de la desembocadura del Plata, resulta que por aquellos lugares no hay aguas potables sino es la muy poca que se conseva en cinternas dificiles se hacen a causa dela naturaleza del caño y que es necesario ir hasta el pozo llamado de la Media Luna para encontrarla, distancia de media legua, desde el momento en que disminuya la fuerza del rio de la Plata, tiene que ser mayor la accion de las mareas y de consiguiente habrá que ir mucho mas lejos á buscar

Santiago Echeveste from the same town. He earned his livelihood ferrying the haciendas' agricultural products along the Plata riverbank, through the "Caño del Cocal" mentioned in the excerpt above. His letter to the government illustrates not only his opposition to the irrigation project, but the role played by the Plata river as a means of communication and for the transportation of products. In a time when good roads to reach the capital of San Juan were scarce, Echeveste's account depicts another function fulfilled by the river, in addition to providing water for farming.

Mr. Santiago Echeveste [...] states: That having dedicated many years to the business of transporting sugar and honey from the haciendas of Toa-Alta, Toa-Baja, and Dorado by navigating barges and rafts through the Plata river, which disembogues at the brook known as 'el Cocal' at the mouth of the Toa; the irrigation project of the Guayama plains, taking for its effects the superior affluent waters of said Plata or Toa river [...] will damage me immensely for the clear and simple reason that by taking the waters [which] today make the river navigable up to a certain point, it will no longer be so in the future, nor will the Cocal brook, which is already difficult enough, having to take advantage of the high tides for its navigation.

It is clear, Your Excellency, that once said navigation is disabled my properties and capital, comprised of my barges and rentals, will be destroyed [...] ⁵¹

agua".

⁵¹ "D. Santiago Echeveste [...] espone: Que dedicado desde muchos años al trafico de la conduccion de azucares y mieles de las haciendas de Toa-Alta, Toa-Baja y Dorado por medio de la navegacion de lanchas y ancones en el rio de la Plata que desemboca en el último punto y caño denominado el Cocal hasta Boca de Toa; el proyecto de riego de las llanuras de Guayama tomando para el efecto las aguas afluentes superiores de dicho rio de la Plata o Toa [...] me origina perjuicios de mucha trascendencia por la clara y sencilla razon de que quitandose las aguas hoy [que] hacen navegables el rio hasta cierta altura, dejara de serlo en lo sucesivo lo mismo que el caño del Cocal que por si es bastante dificultoso teniendo que aprovechar para ellos las subidas de las mareas:

When the time came for the town's "Ayuntamiento" to send its report to the Department of Public Works, however, it reported not having received any reactions against the project, and therefore not having any objection to its construction.⁵² I quote:

[...] this Municipality believes that said enterprise does not in any way affect the common interests of this district, because the part of the Plata River that runs through this town has more than enough water for all the services and irrigation which might be needed [...]⁵³"

Toa Alta

The Plata river, known here as the Toa, crosses through both this town and Toa Baja, which will be discussed in the next section. Although the file does not include any letters from neighbors opposing the irrigation project, it does contain a report from its "Ayuntamiento". This municipality opposed the project because it felt that a reduction of the river waters would affect its main industry, cattle-raising. They also feared it would affect the health of the entire area. The report explained:

Toa-Alta has but the Toa river as a source of abundant

"Comprendese bien claro Excm Sor que inutilizada la navegacion citada quedan destruidas mis propiedades y capital que constituyen mis lanchas y arriendos [...]" (Aguas, Leg. 28, Exp. 928, c. 413.)

⁵² Despite this declaration by the "Ayuntamiento", the Department of Public Works for the island's north coast used the two letters quoted to oppose the project.

⁵³ "[...] este Municipio cree que dicha empresa no afecta en manera alguna los intereses comunales de este partido en razon a que en la parte del Rio de la Plata que corre por este pueblo hay aguas sobrantes para todos el servicio y riegos que pudieran necesitarse [...]" (Aguas, Exp. 28, Exp. 928, c. 413.)

and good quality waters, since the others are brooks and streams of little importance, and mostly of poor quality because their waters are full of lime. The cutting down of trees makes waters scarcer every day, and if the indicated abundant waters are stolen at their source, our river will undoubtedly be emptied during the great droughts, as occurs in Ponce and its haciendas.⁵⁴

Toa Baja

As in the case of Toa Alta, though no hacendado is on file as opposing the irrigation project, the report from the "Ayuntamiento" expresses Toa Baja's opposition for the following reasons:

[...] that if all the waters from the Guamaní river and the superior affluents of the Plata river were absorbed, the latter would lose much of its abundance, undoubtedly producing less vegetation in the plains; and also causing, at high tide, that seawater enter in greater quantities because of the reduced resistance; and hence the need to abandon places used today for obtaining water.⁵⁵

It is important to highlight that the opposition to the irrigation project mentioned up to this point was raised--except in the case of Cayey-- by towns located near the coast. According to the documentation, these towns appear to have had problems with the salinization of the

⁵⁴ "Toa-Alta no cuenta con otro curso de aguas abundante y de buena calidad sino es el río Toa; pues los demás son riachuelos y quebradas de poca importancia en su mayoría de mala clase por estar sus aguas cargadas de cal. Con los desmontes se escasean estos de día en día y robándonos el caudal de aguas que se deja arriba indicado es indudable que nuestro río se agotará en las grandes secas, como sucede con el de Ponce y sus haciendas". (Aguas, Leg. 28, Exp. 928, c. 413.)

⁵⁵ "[...] que absorbiéndose todas las aguas del río Guamaní y las de los afluentes superiores del río de la Plata perderá este mucha parte de su caudal, lo que indudablemente vendría a producir menor vegetación en el terreno de vega; y además será una causa bastante para que en marea plena, el agua salobre entre en mayor cantidad por la menor resistencia; y de aquí la necesidad de abandonar los lugares que hoy se utilizan para tomar el agua". (Aguas, Leg. 28, Exp. 928, c. 413.)

river due to the intrusion of seawater during high tides. Their position contrasts with the reactions from towns located more inland, such as those that I will characterize in the following segments.

Bayamón, Naranjito, Cidra, Barranquitas and Aibonito

When the following towns were asked if they were against or in favor of the irrigation project, they all agreed that Guayama's enterprise would not adversely affect their jurisdictions. In some cases, they even welcomed the project for its potential benefit in protecting them against the powerful floods of the rainy season. All of these towns are located inland, some closer to the "Cordillera Central" mountain range than others.

In Bayamón, the "Ayuntamiento" reported that: "they [the Bayamón hacendados] have expressed that they do not believe they will be harmed by the realization of the indicated enterprise [...]".⁵⁶ Beyond not objecting to the project, the towns of Naranjito, Barranquitas, Aibonito and Cidra felt it might benefit their towns by diminishing the river's waters, and perhaps the force of the floods that regularly befell them. The following quote summarizes this view:

⁵⁶ "los cuales [hacendados de Bayamón] han manifestado no consideran que pueda resultarles perjuicios si se lleva á efecto la empresa indicada [...]". (Aguas; Leg. 28, Exp. 928, c. 413.)

[In Naranjito they say] that they will greatly benefit from the reduction of the waters from the Plata river which in its swells causes considerable losses.⁵⁷

This was the last remark that appeared in the documents in favor or against the irrigation project in Guayama. As I have shown, there were various reasons for opposing the project, especially the protection of previous rights over the waters, as in the case of the Guamaní or Aguamanil river. For the Plata river, concerns focused more on the possible decrease of waters running to the sea, through the different jurisdictions, along this river. But on the other side of the island, there were towns that did not perceive any adverse effect from such a project. In the case of towns located on the mountain range, they even considered that the reduction of water might benefit them by reducing the risk of floods, as mentioned above.

Although this case study does not provide an overall view of conflicts surrounding water rights, it does offer some clues on possibilities for the future study of this topic. As mentioned elsewhere in this work, there are few references, and no works, on water conflicts, water accumulation by the haciendas, or any other related topic in Puerto Rico. There are materials available for research, far beyond the scope of this paper. As explained at the

⁵⁷ "[En Naranjito dicen] que recibiran un gran beneficio de minorarse las aguas del rio de la Plata pues en sus grandes crecidas se lamentan perdidas de consideracion". (Aguas, Leg. 28, Exp. 928, c. 413.)

beginning of this chapter, the importance of such research is based on the fact that water was an important element for the production of sugar cane, becoming even more so on the southern coast of Puerto Rico due to the chronic presence of droughts.

Different towns had diverse experiences with the control of water. For example, as Scarano (1984) points out, the hacendados of Ponce successfully invested in individual irrigation channels for their sugar cane estates, more so than in any other jurisdiction along the southern coast. The case of Hacienda Mercedita studied by Ramos (1981) offers another example of how the accumulation of water through the acquisition of water grants was meant to secure a steady amount of water for the cultivation of sugar cane. These are but small examples of such practices, and more study is needed to develop an accurate picture of their importance during and after the XIXth century sugar boom in Puerto Rico. Also, as shown in this study, not all the towns involved in the sugar industry had the financial capital to invest in such projects, neither individually, as in Ponce, nor by means of a community effort, as attempted in Guayama. I have mentioned elsewhere in this work that few hacendados in Guayama had their own irrigation channels, and those who did defended them fiercely.

The importance of water for sugar cane, from rain or

water courses, is hard to assess with the data derived from these materials. However, what I have found so far indicates that both the hacendados and the government recognized the importance of water for the proper development of sugar cane, and were well aware of the detrimental effects on its cultivation of a lack of water at the appropriate time. They were also well informed on the benefits of implementing irrigation in their fields as a way to counteract the harmful effects of the extended droughts.

Although the Guayama irrigation project was not realized during the XIXth century, its study offers new insights on the sugar cane industry, not only in Puerto Rico but in any other country where geologic and climatological circumstances might make it necessary to secure not only land but also water in order to guarantee the success of their agricultural investments.

Chapter III

Setting the Background: Development of the Spanish Water Laws and Their Implementation in Puerto Rico

As in the case of any legislation during the colonial period, the implementation of the Water Laws in Puerto Rico had its roots in Spain. Most of the legislation was established during the XIXth century. Before then, laws governing water use were found scattered among the different royal orders in Spain and its colonies. The first comprehensive Spanish water laws were issued in 1866. To understand their effect, and subsequent updating in Spain and Puerto Rico, I will begin by reviewing their development in Spain.

Agua y modo de producción, edited by María Teresa Pérez Picazo and Guy Lemeunier (1990), includes several articles on the development of water legislation in Spain. The editors' introduction considers the nature of the water laws and the contrasts between water and land on the issue of privatization. They explain:

The implementation of full private property would be easier for land than for water, as evidenced by the appearance of specific judicial regulation during the XIXth century: the water laws of 1866 and 1879. Both codes introduced numerous limitations on the availability of this liquid element. First, a difference was established between public and private water resources, by virtue of which only the second could be owned, while the first could only be used. The role of the State was also strengthened

considerably, as the care and supervision of the use of waters were delegated upon it; not as beneficiary of a real property right, but as title-bearer of the public functions. This tendency was further accentuated in the law of 1879, which subdivided public waters into two distinct categories: those belonging to the public domain as such, and those belonging to the State.⁵⁸

These water laws gave the State total control over most of the waters, including many which had previously belonged to private owners who then became users of the waters (Pérez & Lemeunier et al. 1990). The change from ownership to usufruct of the public and state waters resulting from this legislation also prompted the development of water syndicates or similar associations wherein groups of proprietors would join to manage the use of water (Pérez & Lemeunier et al. 1990).

The Spanish State had begun increasingly taking control over all water resources through legislation since the feudal period. This control, however, was full of contradictions. Pérez and Lemeunier explain:

Since the feudal order, where juridic-organizational aspects are limited, there is a general tendency towards a progressive accentuation of the role of the institution [the

⁵⁸ "Ahora bien, la implantación de la propiedad privada plena iba a ser más sencilla en el caso de la tierra que en el del agua, como lo indica la aparición de una regulación jurídica específica en el siglo XIX: las leyes de aguas de 1866 y 1879. Ambas códigos introdujeron numerosas limitaciones a la disponibilidad particular del líquido elemento. En primer lugar, se establece la diferencia entre recursos hídricos públicos y privados, por los que sólo se podía ser propietario de los segundos y usuario de los primeros. Además, el papel del Estado queda considerablemente reforzado, ya que, por delegación, debía cuidar y vigilar el aprovechamiento de las aguas señaladas en primer lugar; no como beneficiario de un derecho real, sino en razón de su titularidad de la función pública. Esta tendencia se acentúa en la ley de 1879, que desdobra dicho tipo de aguas en dos categorías distintas: las de dominio público propiamente dicho y las pertenecientes al Estado". (Pérez & Lemeunier et al. 1990:35)

State] in hydraulic matters. Not until the arrival of the enlightened monarchy did State presence start becoming significant. Even then, major hydraulic projects--the construction of channels and pools, drainage and irrigation works, etc.--faced constant opposition at the local level from the prevailing privileged group, and funding difficulties at the national level. For an old-style monarchy, the development of programs of this magnitude had an implicit contradiction with its intrinsic nature: they put into question the privilege, not only in terms of the concrete implications of the works themselves, but also the need to reform the fiscal system to increase revenue. Hence the recourse to debt...

Financial difficulties were even more serious during most of the XIXth century because finances continued to be a problem, despite the Mon-Santillán reform; this impeded the setting in motion of a hydraulic policy deserving of that name. However, throughout the century the idea was crystallizing that the State should intervene more actively in said sphere by developing irrigation projects, and this feeling began to be expressed in the water laws of 1879.⁵⁹

Regarding the contradictions faced by the State during the XIXth century, Eloy Fernández Clemente (Pérez & Lemeunier et al. 1990) discusses the works of Joaquín Costa, a Spanish reformer who for many years proposed various

⁵⁹ "La tendencia general viene dominada por una acentuación progresiva de la institución [el Estado] en las cuestiones hidráulicas a partir del orden feudal, en cuyo seno estaba limitada a los aspectos juridicoorganizativos. Hay que esperar al advenimiento de la monarquía ilustrada para que la presencia estatal comience a ser significativa. Aún entonces, los principales proyectos hidráulicos--construcción de canales y embalses, ejecución de obras de drenaje y regadío, etc.--tropezaron de manera constante, a escala local, con la oposición de los privilegiados de turno, y a escala nacional, con los problemas de financiación. Para una monarquía antiguorremontal, el desarrollo de programas de esta envergadura implicaba una contradicción con su naturaleza intrínseca: el cuestionamiento del privilegio, tanto desde el punto de vista de las implicaciones concretas de los trabajos como de la necesidad de reformar el sistema fiscal para aumentar los ingresos. De ahí el recurso al endeudamiento...

"Las dificultades financieras fueron aún más graves durante la mayor parte del siglo XIX puesto que la fiscalidad continuaba siendo un problema, pese a la reforma de Mon-Santillán; ello impidió la puesta en marcha de una política hidráulica digna de tal nombre. Sin embargo, a lo largo de dicha centuria estaba cristalizando la idea de que el Estado debía intervenir más activamente en dicha esfera por medio de la realización de obras de riegos, y en ese sentido se expresó ya la ley de aguas de 1879". (Pérez & Lemeunier et al. 1990:47)

agricultural reforms calling for increased State involvement in water projects, though without much success. Costa's essays offer a good picture of the XIXth century contradiction between the Spanish State's control of waters and its inability to establish water projects, either by itself or through private investment. From 1849 to 1879, for example, numerous laws were decreed aimed at facilitating investment in irrigation works. Still, the State was unable to find any private investors interested in taking advantage of the aid available for large projects:

the law of 1849 granted a ten-year tax exemption to capital invested in new irrigation; the water law of 1866 extended this benefit indefinitely; and the 1870 law on channels and reservoirs granted the constructing companies

the tax revenue increase obtained as a result of the irrigation, up to a maximum of 30 duros per hectare of irrigated land, and for three additional years the total tax revenue obtained, as compensation for the corresponding interest on said capital during the construction, which represented on average two-thirds of the works' budget... Well despite such an outrageous grant, nobody was tempted and not a single concession was carried out. [Joaquín Costa]

The water law of 1879, which extended the tax increase from 5 to 10 years, did not accomplish much either, nor did the channel and reservoir law of 1883, which offered subsidies of up to 40 percent to companies and 50 percent to irrigation syndicates, and loans of up to another 50 percent at 3 percent interest.⁶⁰

⁶⁰ "la ley de 1849 eximia de contribución por diez años a los capitales invertidos en nuevos riegos; la ley de aguas de 1866 ampliaba ese beneficio a tiempo indefinido; y la de canales y pantanos de 1870 concedía a las empresas constructoras

el aumento de contribución que se obtuviesen por consecuencia del riego hasta el límite de 30 duros por hectárea de tierra regada y tres años más la contribución íntegra a título de indemnización del interés correspondiente a los capitales durante la construcción, lo cual representaba por término medio las

Despite this situation, since 1880 Costa tried through his writings to call for increased State intervention in irrigation projects. At the time, however, official policy opposed any investment in public works. Fernández mentions two officers of the Spanish government, Vicuña (1880) and Cánovas (1892), who opposed governmental investment in public works. Fernández summarizes Cánovas' position as follows:

Cánovas has responded negatively to the irrigation petitions: the budget has been exhausted by the railroads; a drought affects the entire nation, and there is not much point in attending to an insignificant part of the tillable lands; in addition, irrigation is not a moneymaking proposition and only interests certain individuals...⁶¹

This attitude seems quite ironic, especially when contrasted with the amount of legislation enacted on water concessions and irrigation projects. At the same time, the attitude could be a masquerade to cover the financial realities of late XIXth century Spain. In that sense, Fernández quotes an article by P. Tedde on Spanish public expenditures during the late XIXth and early XXth centuries:

2/3 partes del presupuesto de las obras... Pues a pesar de tan escandalosa subvención no se tentó a nadie y ni una concesión se llevó a término. [Joaquín Costa]

"Tampoco logra nada la ley de aguas de 1879, que otorga por 5 a 10 años, el aumento tributario logrado, ni la de canales y pantanos de 1883, que ofrece subvenciones de hasta el 40 por 100 a las compañías y el 50 por 100 a los sindicatos de regantes, y préstamos de hasta otro 50 por 100 al 3 por 100 de interés". (Pérez & Lemeunier et al. 1990:78)

⁶¹ "Cánovas ha respondido negativamente a las peticiones de riegos: el presupuesto está agotado con los ferrocarriles; la sequía azota a toda la nación y no sirve de mucho atender a una parte insignificante de las tierras laborables; además, el regadío no es negocio y sólo interesa a los

The author emphasizes the conditions faced by the State, the high level of debt coupled with the impossibility of increasing ordinary revenue, which impeded allotting larger amounts of resources to other ends, such as social services or supporting the economic infrastructure.⁶²

As shown above, all of these laws had two contradictory faces. They placed the control and management of water resources in the State's hands, but also sought to encourage private investment in water projects such as irrigation channels. This encouragement to private investors could point to the financial incapability of the State to take control of its own resources. As Fernández implies in his article, most of the irrigation projects proposed during the XIXth century in Spain were of such magnitude that few could be completed without help from the State, and in most cases this help was either denied or was too small to be of any real help (Pérez & Lemeunier et al. 1990).

It is interesting to point out that the Water Laws, the major legislation on water control, were enacted during the XIXth century. Pérez & Lemeunier understand that this was the culmination of a long process which can be traced back to the Middle Ages, in which the Spanish government moved towards a greater control of water as one of its most important natural resources. An opposite process took place

particulares...". (Pérez & Lemeunier et al. 1990:76)

⁶² "Destaca este autor el condicionamiento a que el Estado estuvo sometido, por lo elevado de la deuda y la imposibilidad de aumentar los ingresos ordinarios, lo que impidió destinar cantidades crecientes de recursos a otros fines como servicios sociales o apoyo a la infraestructura económica". (Pérez & Lemeunier et al. 1990:85)

regarding the control of land, which gradually passed into private hands (Pérez & Lemeunier et al. 1990).

Nineteenth century Puerto Rico was not exempted from the application of the mentioned water laws. The documentation reviewed does not clearly specify which royal orders on water were applied to the island before the XIXth century. Further research may probably locate this information in the Spanish Archives in Madrid or through the Official newspaper of the colonial government. In the General Archives of Puerto Rico I was able to find some of the royal orders and water laws applied to the island as of 1853.

The main purpose of the royal orders and laws issued for Puerto Rico during the second half of the XIXth century seems to have been the improvement of colonial agricultural enterprises, as this reason is repeatedly stated in the introductions of royal "cédulas" and water laws. Royal orders or laws do not seem to have applied automatically to Puerto Rico. In some cases, the colonial government requested from the government in Madrid that new legislation be applied or extended to the island. Said application would then be granted if Madrid understood that the extension was in agreement with its interests. In other cases, local hacendados could request the colonial government's intervention in bringing to the island

legislation that would benefit them. The metropolitan government could also, on its own, decide to include the overseas colonies under new laws.

Much of the legislation extended to Puerto Rico was meant to stimulate investment in water works such as irrigation. That is the case of the royal order of 1853, the earliest case I found in the archives. The justification for the royal order is very interesting, and illustrates the process and reasons behind this type of legislation. Here is an excerpt of the introduction:

Dofia Ysabel the 2nd....: Know that Don José Antonio Vázquez, an hacendado from Guayama, has requested that the dispositions of the law of June twenty-fourth of the year eighteen hundred and forty-nine, in effect on the peninsula, be made extensive to this Island, which exempts from taxation capital invested in irrigation works and artifacts deriving their power from them, and of course that a channel be included in its effects which he has already built to make use of the waters of the Aguamanil river, by means of which he was able to fertilize the fields made sterile by the prolonged droughts, which application in both cases was supported by the Supreme authorities of this Island, considering it extremely beneficial for fostering agriculture itself and also as a just reward for Vázquez's zeal and industry; having ordered that the President of my Council of Ministers open the appropriate file, having heard the opinions from the Treasury and Overseas sections of the Royal Council, and having in mind the opinion already expressed by the Overseas section, which I saw fit to consult, I am convinced that many other proprietors on the Island, especially in the districts of Guayama, Salinas and Coamo-bajo, may achieve the same advantages and progress noted in the file as obtained by the mentioned Don José Antonio Vázquez, if they are opportunely encouraged by these exemptions, which will stimulate them to begin works that necessarily require the use of considerable capital, always requested for the well-being and prosperity of the faithful inhabitants of the Island...⁶³

⁶³ "Dofia Ysabel 2.a....: Sabed que Don Jose Antonio Vazquez, hacendado de

This is the same royal order mentioned by Bonnin (1984) in her thesis. From this excerpt of the justification we can briefly note the process followed by the hacendado: first, he went to the local government of the island to request the implementation of a law that existed in Spain; the colonial government then made its recommendation and requested from the metropolitan government that the law be applied to the island.

Several points are emphasized in the justification. First, the interest that the Spanish Crown and the colonial government had in generally improving the agriculture of the island through legislation offering incentives to local hacendados for investment in irrigation works. The presence of droughts in Guayama is also mentioned, an area where a major irrigation project would later be attempted. This

Guayama, ha solicitado que se hayan extensivas á esa Ysla las disposiciones de la ley de veinte y cuatro de Junio de mil ochocientos cuarenta y nueve, vigente en la peninsula, en que se decláran exentos de tributos los capitales invertidos en obras de riego y artefactos, que tomen de ellas su fuerza motriz, comprendiendo desde luego en sus efectos un canal, que tiene ya construido con el fin de aprovechar las aguas del río Aguamanil, por medio del cual consiguió fertilizar los campos que prolongadas sequias habian esterilizado, cuya solicitud en sus dos extremos fue apoyada por las autoridades Supremas de esa Ysla, considerandola sumamente benefícosa para el fomento de la agricultura de la misma y como una justa recompensa del celo y laboriosidad del Vazquez; habiendo mandado instruir el oportuno espediente por la Presidencia de mi Consejo de Ministros, oido el parecer de las secciones de Hacienda y Ultramar del Consejo Real, y con la presencia de la que posteriormente me ha espuesto el de ultramar, á quien tuve por conveniente consultar, convencida de que otros muchos propietarios de la Ysla, con especialidad en los distritos de Guayama, Salinas y Coamo-bajo, podrán lograr, segun espediente resulta, las mismas ventajas y adelantos que ha obtenido el mencionado Don Jose Antonio Vazquez, si opurtunamente se les alienta con algunas franquicias, que les estimulen á emprender obras, que necesariamente requieren el empleo de capitales de consideracion, siempre solicite por el bien y la prosperidad de los fieles habitantes de la Ysla...". (Royal Order regarding irrigation inserted in "La Gaceta de Puerto Rico", Saturday, October 29, 1853. Aguas, Exp. 952, Leg. 188, c. 464)

problem is constantly mentioned during the entire XIXth century in practically all the documents I have reviewed regarding the southern part of the island.

As mentioned earlier, in 1866 the Spanish government decided to extend its recently approved water laws to Puerto Rico. The decision was meant to regularize all water legislation on the island and improve the good use of this resource, especially for agricultural purposes. The law was temporary, and was subject to modification to conform to the island's geographical realities. Like its counterpart in Spain, the law regulated the acquisition and use of all waters by private users. It differentiated public and private waters, the obligations of the State and private users, and established specific procedures for acquiring water grants for agricultural and manufacturing purposes or any other use. The justification states:

By royal orders of May 21st of 1862 and April 10th of 1863 all regulations were remitted to Your Excellency [the Governor General of Puerto Rico] regarding the distribution and uses of public waters for private benefit currently in effect on the Peninsula, which in the absence of any other special stipulation govern all related matters in this province [Puerto Rico]; and this was done with the object of formulating and remitting a project geared towards regularizing such an important area of the public wealth. With the purpose, therefore, of finalizing the records and achieving complete and uniform legislation with the Peninsula on this matter, to the extent possible within the conditions of that island, the official Gaceta is attached with an insert of the water laws of the third day of the current month, so that hearing the corporations deemed convenient, without excluding the Council of Administration, Your Excellency may propose a similar project for that territory under your command, and of course follow in the

interim your instructions until the approval of whatever modifications may be introduced as a result of the above mentioned project...⁶⁴

The following year, 1867, another royal order was issued, specifically related to the "protection of works for the use of waters". This royal order illustrates the importance for the metropolitan government, at least on paper, of promoting agriculture in the Spanish colonies by facilitating private investment in water works. As mentioned by Fernández Clemente (Pérez & Lemeunier 1990), this royal order also exemplifies the Spanish government's current policy on water projects. The order and its justification briefly explain the history of legislation related with water use, and the benefits of water works for improving agriculture and the public wealth of the nation. It states that from that time on, any water project would be given a high priority by the government. Later we shall see the irony of these words, when not even all these "aids" were enough to make possible a large irrigation project such as the one proposed in

⁶⁴ "Por reales ordenes de 21 de Mayo de 1862 y 10 de Abril de 1863 se remitieron á V.E. [Gobernador General de Puerto Rico] todas las disposiciones relativas á la distribución y aprovechamientos de aguas públicas en beneficio particular vigentes en la Península, por las cuales á falta de otras especiales les vienen rigiendose los asuntos del ramo en esa provincia [Puerto Rico]; y esto se hizo con objeto de que se formulase y remitiese un proyecto encaminado á regularizar tan importante ramo de la riqueza pública. A fin pues de terminar los expedientes de manera que resulte una legislación completa y uniforme con la Península sobre el particular, en cuanto lo consientan las condiciones de localidad de esa isla, es adjunta la Gaceta oficial en que inserta la ley de aguas del tres del actual, para que oyendo á las corporaciones que juzgue conveniente, sin prescindir del Consejo de Administración, proponga su V.E. un proyecto de planteamiento de la misma en ese territorio de su mando, y se atenga desde luego interinamente á sus prescripciones mientras se aprueba las modificaciones que en ella puedan introducirse á consecuencia de la formación del proyecto arriba citado...". (Aguas, Leg. 188, Exp. 2790, c. 464)

Guayama.

Royal Order of July 11, 1867 on the protection of works for the use of water[...] The Government of Your Majesty, which wishes to promote by all available means the development of the public wealth and the well-being of the inhabitants of the overseas provinces, has turned its attention towards the use of waters, of vital interest for agriculture, and which through the prudent use of irrigation will obtain larger and more varied products and harvests than the ordinary; and believes that regarding said works it should limit its actions to facilitating them as much as possible and reducing the sacrifices industry must make to [complete?] them. Although the importance of the good use of waters has been recognized since ancient times, and great works carried out to that end, not until a little over thirty years ago did uniform legislation or practical treaties exist which might regulate this matter. The same is not true today, and with the support of confirmed research we can confidently undertake this type of improvement and obtain notable results, further enhanced by the development of communications and the expansion of the railroads which, by facilitating the exploitation of productive localities, have created the need for increased production.

The establishment of irrigation demands different conditions, according to the localities where it is applied.[...] It is more difficult to establish irrigation in the Overseas provinces where groundwaters are scarce, where no snow feeds the rivers, where rainfall is irregular and generally extreme, as are the temperatures corresponding to the latitudes 20, 18 and 14, the approximate locations of the islands of Cuba, Puerto Rico and the Philippines. On the 21st of May of 1862 all the water laws in effect on the Peninsula were distributed to the islands to study which of them might be adopted; on the 10th of April of the following year, provisional application of all pertinent legislation on the Peninsula on this subject was extended to Cuba; and before that, on the 9th of July of 1853, the exemptions allowed in the metropolis to capital invested in irrigation works were also granted in Puerto Rico; but none of these regulations had the expected success, be it that the moment was not timely to stimulate production or for some other reason, and the businesses that undertook irrigation works did not obtain any significant results. The Government hopes that the recently adopted measures and those decreed today on this matter with the elements which exist on the

islands will have the most favorable success.⁶⁵

Of all the dispositions stated in the royal order, the last three are the most important for the hacendados interested in investing in irrigation projects:

Seventh. The processing of all irrigation records will be accelerated by granting them priority in the corresponding State offices. Eighth. In addition to the exemptions and privileges granted for this type of works by the law of August of last year [1866], each record will include a proposal of all others that may be granted without immediate prejudice to particular interests which fall within the resolution of the Government. Ninth. The Superior Civil Government will also propose all those

⁶⁵ "Real Orden de 11 de Julio de 1867 sobre protección á obras de aprovechamientos de aguas[...] El Gobierno de S.M., que desea promover por todos los medios que estan a su alcance el desarrollo de la riqueza pública y el bienestar de los habitantes de las provincias ultramarinas, ha fijado su atención en cuanto se refiere al aprovechamiento de las aguas, asunto de vital interés para la agricultura, que, de la prudente aplicación de los riegos obtendrá mayores y mas variados productos y cosechas mas regulares que la de cultivo ordinario; y cree llegado el caso de iniciar los trabajos de este género limitando su acción a facilitarlos cuanto sea posible y á disminuir los sacrificios que la industria debe hacer para [¿completarlos?]. Aunque de antiguo fue conocida la importancia del buen empleo de las aguas y se ejecutaron grandes obras para conseguirlo, hasta hace poco mas de treinta años no han existido legislación uniforme ni tratados prácticos que pudieran servir de norma en la materia. Hoy no acontece lo mismo, y merced a los estudios verificados se marcha con seguridad en esta clase de mejoras y se obtienen en ellas notables resultados, a los que no han poco el desarrollo de los medios de comunicación y el crecimiento de las vías férreas, que, facilitando la explotación en las localidades productoras, han creado la necesidad de acrecentar la producción.

"El establecimiento de los riegos exige condiciones diferentes, segun las localidades a que se aplica.[...] Mas difícil es el establecimiento de los riegos en las provincias de Ultramar donde las aguas superficiales escasean, donde no existen nieves que puedan alimentar rios, y donde las lluvias son irregulares y generalmente estremadas y la temperatura cual corresponde á latitudes de 20, 18, y 14 grados, a que aproximadamente se encuentra cada una de las islas de Cuba, Puerto-Rico y Filipinas. En 21 de mayo de 1862 se circuló á todas las islas la legislación de aguas vigentes en la Península á fin de que se estudiase la que en ellas pudiera ser adoptada; en 10 de Abril del año siguiente, se dispuso también la aplicación á Cuba, con caracter de interinidad, de cuanto regia en la Península sobre el asunto; y antes en 9 de Julio de 1853 se consedieron en Puerto Rico á los capitales invertidos en obras de riego las mismas gracias, que á los destinados con este objeto en la metrópolis; pero estas disposiciones no tuvieron el éxito que de ellas se esperaba, ya porque no habia llegado el momento oportuno de dar impulso á la producción ya por otras razones de indole diferentes, y las empresas que acometieron trabajos de riego no consiguieron resultados alguno de importancia. Espera el Gobierno que las medidas recientemente adoptadas y las que hoy se dictan en el asunto y los elementos que existen en las islas tendran éxito mas favorable". (Aguas, Leg. 188, Exp. 28, c. 464)

measures judged conducive to the fastest development of irrigation works on that island.⁶⁶

A good example of how these laws and royal orders were applied to Puerto Rico is found in the file created by the colonial government on the Irrigation Project in Guayama. In the process of attempting to make possible the project, the hacendados, through the colonial government, requested different types of financial assistance and changes in the conditions of the approved water grant and project, such as more tariff exemptions, additional grace periods to fulfill their deadlines with the government, and others. An example of this:

The Queen has issued on this date [the 25th of July of 1868] the following Royal Decree:

Having considered the petition from the irrigation concessionaires of the jurisdiction of Guayama of the Island of Puerto Rico, in which they request they be allowed to grant use of the waters to Don Ricardo Alberto Moll of the London establishment for a period of thirty two years, counted from the day the works are completed and the landholders can begin irrigating their fields, for a fee of one hundred and twenty-eight escudos per hectare, and in which petition they also request a six month extension to begin the works: Considering the reports on the matter from the Inspection of Public Works and the local Administration recommending the approval of the petition: Considering the letter from the Superior Civil Governor dated on the 20th of June recommending a favorable resolution to this matter.

⁶⁶ "Sétima. La tramitación de todos los expedientes de riego se llevará con la mayor rapidez considerándolas como preferentes á cuantos se cursen por las oficinas respectivas del Estado. Octavo. Además de las gracias y privilegios que se otorguen á esta clase de obras por la ley de Agosto del año proximo pasado [1866] se propondrán en cada expediente todas aquellas que puedan concederse sin perjuicio inmediato para los intereses y de los particulares y sobre los cuales recaerá la resolución del Gobierno. Noveno. Se propondrán tambien por ese Gobierno Superior Civil cuantas medidas se juzguen conducentes el mas rápido desarrollo de las obras de riego en esa isla". (Aguas, Leg. 188, Exp. 28, c. 464)

Considering the water laws of the 3rd of August of 1866 applied to said Island by Royal Order of the 8th day of said month. Considering the appropriate Cession Decree dated the 27th of November of 1866. Considering that article 18 of the statement of conditions of said Cession states that it falls upon the Government to resolve matters regarding transference, and the great convenience of granting it in this case, as it will allow the realization of a project that will considerably increase the wealth of the jurisdiction of Guayama: [...] Considering that the six-month extension requested over the three indicated in article 2 of said statement of conditions for commencing the works is found to be perfectly justified by the special conditions of that Island. In response to the proposal presented by the Minister of Overseas, I hereby decree the following: [three articles follow granting what was described in the above excerpt].⁶⁷

This excerpt illustrates the steps taken by the Guayama hacendados to change the conditions of their water grant and project. It also exemplifies the willingness of both the colonial and metropolitan governments to aid the hacendados in accomplishing their irrigation project. The reasons why

⁶⁷ "La Reina (q.D.g.) se ha servido expedir con esta fecha [25 de julio de 1868] el Real Decreto siguiente:

"Vista la instancia de los concesionarios del riego de la jurisdicción de Guayama en la Ysla de Puerto Rico, en la que solicitan se les permita ceder el usufructo de las aguas á Don Ricardo Alberto Moll del comercio de Londres durante el período de treinta y dos años, á contar desde el día en que terminadas puedan los propietarios regar sus campos, abonando el cánon de ciento veinte y ocho escudos por hectarea y en cuya instancia se pide además seis meses de prórroga para dar principio á los trabajos: Vistos los informes emitidos en el asunto por la Ynspección de obras públicas y Dirección de Administración local aconsejando se acceda á la solicitud de los interesados: Vista la carta del Gobernador Superior civil de fecha 20 de Junio próximo pasado recomendando la favorable resolución de este asunto. Vista la ley de aguas de 3 de Agosto de 1866 aplicada á aquella Ysla por Real orden de 8 del mismo. Visto el Decreto de la concesion de que se trata de fecha 27 de Noviembre de 1866. Considerando que según el art.o 18 del pliego de condiciones de dicha concesion corresponde al Gobierno resolver sobre su transferencia y que el presente caso es de la mayor conveniencia acceder a ella, pues permitirá la realización de una obra que ha de producir una considerable aumento de riqueza en la jurisdicción de Guayama: [...] Considerando que la prórroga de seis meses que se solicita á los tres marcados en el art.o 2 del espresado pliego de condiciones para dar principios á los trabajos, se encuentra perfectamente justificada por las condiciones especiales de aquella Ysla. A propuesta del Ministro de Ultramar, Vengo en decretar lo siguiente:..." (Aguas, Leg. 28, Exp. 928, c. 413)

the hacendados had to request these changes will be explained later in discussing the process for obtaining a water grant.

The other documents I gathered at the Archives are two legislative proposals, one on the process of granting permits for the use of public waters and the other which updates the previous water law. Neither set of documents was included in the final legislation, but their purpose was to adapt Spanish legislation to the geographical differences in Puerto Rico. Due to time constraints, I was unable to further examine "La Gaceta" to determine whether these projects were later approved. The Water Law of 1885 was approved, however, as the introduction of the island's current Water Law found at the Library of the University of Puerto Rico's Law School explains that our present law continues to be the same as the one approved during that period, albeit with numerous amendments added through time.

The documents on the legislative proposal on the granting of permits for the use of public waters are from 1883 and 1884, for the Spanish and Puerto Rican versions, respectively. The idea seems to have been to use the Spanish version as a model for the Puerto Rican one, eliminating a few articles and dividing others into several articles in the Puerto Rican version. The purpose was to establish a complete guideline on how the colonial

government was to deal with water concessions, in much greater detail than what was included in the Water Law of 1866. Instead of stating generally where to direct requests for water grants and some of the conditions needed for their granting, this project specifically listed the documents required in order to apply for a concession, who could request one and who couldn't, and many other details which will not be considered here.

Like the above project, the Water Law of 1885 was also divided into two set of documents, one for Spain and the other for Puerto Rico. The law of 1885 did not differ too much from the law of 1866. It included almost all the same articles, adding a few and splitting others into more than one. The later version, however, does emphasize the island's colonial status, stating that the granting of all major water concessions would be made by the Minister of Overseas and, ultimately, by the King or Queen of Spain.

As mentioned at the beginning of this chapter, the Water Laws of both 1866 and 1879/85, gave the State complete control over public waters and also determined the management of private ones. Unfortunately, there are no works on the implementation or the effects of these laws on the island in the XIXth century. Though an undertaking of such magnitude is beyond the scope of this work, I will attempt to portray how these water laws were used in the

process of granting the water concession for the Irrigation Project in Guayama.

Chapter IV

Irrigation and Bureaucracy in XIXth Century Puerto Rico: The Guayama Case Study

To talk about water and bureaucracy, and not to talk about Karl Wittfogel, would make this study incomplete. In his book Oriental Despotism (1957), he established the connection between these two words as he developed his famous hydraulic theory on the association between bureaucracy and irrigation. He argued that the development of successful irrigation systems on any scale depended on the rise of a bureaucratic hierarchy that would manage the construction and maintenance of physical infrastructure, as well as the processes of irrigated agriculture. The development of irrigation thus enhanced bureaucratic power, which in turn became the core of State power in ancient agrarian societies such as China, India, and Egypt. Wittfogel characterized the political economy of the governments that arose in societies dependent upon irrigation as "agromanagement totalitarianism", and labeled the type of government "Oriental Despotism" (Lees 1994:363).

Although Wittfogel's theories have been criticized since they were first proposed, his influence on the study of irrigation and the rise of the State and the role of bureaucracy, continues to this day. Even where scholars

have been critical, they continue to use his concepts of centralization and the emergence of bureaucracy in their analyses of the social organization of irrigation systems. Most scholars agree that even though irrigation is neither the most important nor even a necessary element for the emergence of the state or civilization, it is still one of the elements that must be taken into account due to the reflection of social organization and its complexity that may be derived from the management of irrigation systems (Ramos 1995 //unpublished:12). Though I do not intend to address the origins of the state, I find Wittfogel's proposition on studying the role of bureaucracy in the development and management of irrigation projects quite appropriate for this study. In this sense I am also following Susan Lees' (1994) suggestions for the reconsideration of Wittfogel's work in view of the new evidence provided by development studies regarding the effects of bureaucratic intervention on the development and management of irrigation projects in Third World countries.

Her article presents a literature review of "findings of ethnographic studies pertaining to development projects, reintroducing Wittfogel's idea that increasing technology can lead to bureaucratic abuse" (Lees 1994:362). She argues that the development of large-scale irrigation projects and their bureaucracies did not necessarily result in effective

systems, as these types of projects can result in good management and usefulness, or in mismanagement and abuse. Though her article is aimed at reintroducing Wittfogel's ideas to the archaeological debate on irrigation systems, I believe it can also be used to examine the role of bureaucracy in the Spanish colonies. Bureaucracy was a vital part of the colonial state's structure in Puerto Rico, especially since all land and water grants had to be considered by the Spanish Crown. Obviously, neither Spain nor Puerto Rico can be labeled as hydraulic societies, but as mentioned in the preceding section, water and its control were major concerns for the Spanish State, both in the colony and the metropolis. The state's authority over most waters and interest in promoting private investment in irrigation projects was certainly reflected in the development of the water laws in Spain and their extension to Puerto Rico. Though rather indirectly through these documents, examining the role of the colonial and metropolitan bureaucracy will offer a more complete picture of the use of water for agriculture, especially in the sugar cane industry. More research is needed--not only in Puerto Rico but also in Cuba and the Philippines, where the same laws were implemented--as there exist no studies, that I am aware of, dealing with the effects of the implementation of the water laws in the Spanish colonies or the role of

bureaucracy in those processes.

For the purposes of this section, I will look at the procedure for approving a water grant through the documentation generated in the case of the Guayama hacendados. I want to show the steps that were taken within the colonial bureaucratic apparatus, how long it took to approve the concession, and what channels the hacendados needed to go through to obtain permission for the grant.

The bureaucratic system in the colony of Puerto Rico was divided between the local authority of the "Ayuntamientos", and the state level, represented by the different departments of the colonial administration-- Customs (Aduana), the Treasury, Public Works, etc.--and ultimately by the highest authority on the island, the Governor. Most bureaucratic work was done on the island, but some had to be sent to Spain for consideration by the monarchic bureaucracy or ultimately by the "Cortes" or the King or Queen. The laws established certain limits, beyond which higher approval was required. This was especially true for land and water grants (Water Laws of 1866 & 1880).

In the case of the water grant sought by the Guayama hacendados, they first had to write a letter to the Governor through the "Ayuntamiento" requesting permission to begin a study for an irrigation project, stating why it was needed and how they intended to use the water. This letter was

written on November 5, 1864 and sent to the Governor through the "Ayuntamiento" of Guayama. The "Ayuntamiento" forwarded the letter on November 8, with the comments it felt necessary to add. Three days later, the Governor granted the permission through a decree which was forwarded to the "Ayuntamiento" of Guayama on November 15, which should then notify the hacendados and also the official newspaper, "La Gaceta". News of the study was published on November 19. The process, from the moment the hacendados sent their letter until the governmental decree, took eleven days through the bureaucratic channels. The decree gave the hacendados a year to complete their studies for the irrigation channel. They would then have to submit to the government all their sketches and other related documents as well as the budget for the project, in order to justify the need for the waters of the Plata and Guamaní rivers.

On November 9, 1865, the hacendados submitted to the Governor the results of all the studies for the irrigation project. They hired an English engineer named E. Webb to conduct a feasibility study and to estimate the cost of the project for the hacendados. The hacendados requested the water grant and permission for the irrigation project based on the results of that study. In their letter they also requested that, if the project was approved, it be granted

the tax exemption of 1853;⁶⁰ that the project be declared a public utility; that construction materials be tax exempt; and to receive a subvention for 4% of the cost of the works during 14 years.⁶⁹ On November 2nd, before requesting the grant, the hacendados had gone to the "Ayuntamiento" and created an irrigation society with all those interested in investing and participating in the project. They also gave the hacendados Jesús Ma. Texidor, Wenceslao Lugo Viña and Juan Vives legal authority to represent the group in the proceedings necessary to complete the project. Three days after the government received the hacendados' letter, a memo was sent to "La Gaceta" to announce to the public that the Guayama hacendados had the intention of using the waters of the Plata and Guamaní rivers for irrigation. Since these rivers had previous users, all the towns through which they passed had to be informed of the project so that they may express any objections. A 30-day period was granted for reactions for or against the project to be communicated through the "Ayuntamientos", which would then be forwarded to the Department of Public Works for analysis and comments, and sent to the Governor for the final decision. The memo was also published in all the areas of the municipality of

⁶⁰ This partial tax exemption would allow them, during a period of 10 years, to continue paying state or municipal taxes at the prevailing rate for the year they were granted the water concession for the irrigation channels.

⁶⁹ This last request was never answered or even acknowledged by the government, but all the other requests were granted. In correspondence

Guayama and all the towns on the north coast through which the Plata river flowed, to assure that everybody would have access to the information on time.⁷⁰

In addition, the Director of the Department of Public Works wrote to Guayama's "Ayuntamiento" and requested that it send a report to the Department recommending whether or not the irrigation project was worthy of being considered a public utility.⁷¹ To this end, the "Ayuntamiento" was asked to gather the following information: the price of the different types of lands and the prices of the products, in this case, sugar, rum, molasses, etc. After gathering the information, the "Junta Municipal" was to meet and send its report to the Director of Public Works by the stated deadline.

During the following 30 days the hacendados of the municipality of Guayama, in favor or against the project, were called to testify. As had been requested by the Director of Public Works, the hacendados offered testimony about their properties, their crops, how much of their land was dedicated to sugar cane and other crops, their profits during good and bad years, who had irrigation channels, and how much of the land was suitable for irrigation, etc. During the same time, the other municipal councils held

regarding this project years later, the government rejected the idea of awarding monetary aid to any project of this kind.

⁷⁰ The memo may be found in Aguas, Leg. 28, Exp. 928, c. 413.

inquiries to determine their position on the project proposed by the hacendados of Guayama. Proceedings were held at the "Ayuntamientos", and overseen by the "Corregidor", that is, the mayor of each town and the town's secretary, who recorded all the testimony and proceedings.

After the thirty days had passed, the municipal council of Guayama met and discussed the arguments in favor and against the project, and drew up its report answering the questions posed by the Director of Public Works, including the testimonies of the town's hacendados before the "Ayuntamiento".⁷² The report from Guayama was very interesting. Besides answering the Director's questions, it explained the region's financial situation and how strongly the town's "Ayuntamiento" favored the project. It also mentioned the concerns regarding the project's possible effects on existing water grants and offered some suggestions to protect them.

The report was sent to the Department of Public Works and the corresponding regional offices. The Department used its own engineers to analyze the project, sending them to the field to confirm the viability and need of the works proposed by Webb. Having done this, the Department of

⁷¹ The letter may be found at Aguas, Leg. 28, Exp. 928, c. 413.

⁷² It is interesting to point out who the members of the "Consejo Municipal" were: "Corregidor Presidente- Manuel Gonzales; Vocales- Fernando Albertos, Canario Matos, *Jose Gual, Ramon Padró, *Ciprian Blondet; Caballero Sindico- *D. Joaquin Villodas". Persons identified by a [*] favored the approval of the project and that it be considered "de utilidad pública".

Public Works sent its own report to the Central Government, together with those from the "Ayuntamientos", stating its opinion on the project. Here is a small excerpt from that report:

Anyone who has ever been in Guayama knows the aridity usually found in its territory, in contrast to the heights of the mountain range which divides the North and South coasts of this Island. Regardless of how little agricultural knowledge one might have, anyone can be easily convinced of the benefits to be obtained from the properly watered sugar plant, just by comparing the lands that receive water daily in this fertile plain, with those lacking in the use of water.⁷³

The Central Government in turn further studied the project and consulted with the "Intendencia General de Real Hacienda" (equivalent to an Internal Revenue Service), and the "Administración Central de Rentas, Aduanas y Lotería" (customs house) of Patillas, through whose port the region of Guayama sent its products overseas. These two departments were asked about fiscal matters related to the grant, such as tax exemptions and whether or not the concession should be entitled to them. Both departments agreed that the water grant should be approved for the benefit of the entire area of Guayama. The only objection from the "Real Hacienda" was that the tax exemption for

⁷³ "Es conocido de todo el que una vez haya estado en Guayama la sequedad que ordinariamente se observa en todo su territorio en contraposición con lo que sucede en el alto de la cordillera, que divide la costa Norte y Sur de esta Ysla. Por poco conocimiento agrícolas que se posean, fácilmente se convence cualquiera de los beneficios que pueden obtenerse en la planta de azúcar, cuando halla regada ordenadamente con solo comparar los terrenos que se hallan en el día regados en esta fértil llanura con lo que carecen del aprovechamiento de aguas". (Aguas, Leg. 28, Exp. 928, c. 413)

construction materials was not included in the law. Although the customs office also recognized that such an exemption was not allowed by the law, its Director recommended that the Crown be asked to make an exception in this case, to give that exception to the hacendados, pointing out the long term benefits to the public revenue of constructing the irrigation project.

After all these inquiries were completed, and the administration council sent its favorable recommendation to the Governor of the island, the Governor wrote to the Minister of Overseas and requested that the project be recommended for approval by the Crown. In his letter, the Governor explained the difficult situation faced by the territory due to the drought which for so long had afflicted it and diminished its agricultural production. He highlighted the advantages of the irrigation project, which would be the first of its kind in the colony, and expressed hope that if it was approved other hacendados might follow the example, helping to improve the overall well-being of the island.

The entire process I have explained took almost 5 months to be completed. Seven months after the Governor's letter of April 2, 1866, the Spanish Crown responded. A letter dated November 27, 1866, sent through the Minister of Overseas, and signed by Isabel II, Queen of Spain, was

accompanied by a decree authorizing the concession of the waters of the Plata River for use by the irrigation project in the jurisdiction of Guayama. The letter also granted the tax exemptions requested by the hacendados, and stated the conditions the concession would have to meet in order to maintain the grant. Furthermore, the project would have to follow all the instructions of the recently published Water Law of 1866 and adhere to its prescriptions.

Counting from the time the hacendados requested permission for the irrigation study, the entire process up to the approval of the concession took just over 2 years. During most of the process, and especially through the papers produced by the government, there was a general agreement on the usefulness of the irrigation project. From the Guayama "Ayuntamiento", to the different departments where the project was discussed, the Governor's letter to the Minister of Overseas, and finally the Queen's decree, all agreed that this project could provide a solution to the dire situation of the district of Guayama. There was a general consensus among government officials that the financial situation of Guayama had been affected for a long time by the yearly droughts that seized the region, and diminished the productivity of sugar cane.

Summarizing, although not complex, the process of granting the water concession to the Guayama hacendados was

a long one. There were hardly any objections to the irrigation project, and the overall feeling in both the colonial and metropolitan administrations, was that the project offered the best solution for Guayama's financial situation. There was also hope that once the project was completed it would encourage other hacendados from other towns to invest in this type of large scale project which might help increase colonial agricultural productivity. As mentioned previously, this attitude was in tune with the metropolitan position of promoting private investment in these projects, while retaining the final say on them in the hands of the State. Nonetheless, in the documentation that I have reviewed there appeared to be a genuine interest that this project would succeed with the help granted by the government, and with the loan the hacendados had requested from an English Commercial House, they thought they would be able to accomplish the project.

The goodwill from the Spanish Crown was maintained throughout the process, both before and after the concession was granted. As mentioned in the preceding chapter, on several occasions the Guayama hacendados requested grace periods to fulfill their obligations. The grace periods were granted each time, and the reasons for granting them always included the importance of helping to complete the project. However, it is important to point out that the

government was only willing to help by granting the hacendados tax exemptions, speeding up the grant process, and allowing grace periods, if needed. Although there was no explicit opposition to providing financial help during the first attempt at the irrigation project, during the second attempt in 1876 by "Sres. Duque de Santana, D. Pedro Virella y D. José Sabater", the government both in Puerto Rico and Spain was more straightforward in its resistance to the idea of paying for or subsidizing the project. A communication from the Minister of Overseas to the Governor of Puerto Rico clearly stated that the only assistance the hacendados would receive for their project was the type of help provided during the first attempt.

Concluding from said reports that both the Diputación Provincial and the Economic Administration of said Island agree on discarding the idea that the State carry out and exploit these irrigation works on its own... the Economic Administration feels that at this moment it is not possible to accept said terms, taking into account the state of the Island's Treasury, its future production and its financial commitments [...] good financial principles indicate that the State should not pay these costs, one way or another, for executing a work that, regardless of its utility, will benefit but a single area of this Island. Considering how inopportune it would be, in several senses, to commit the State to construct a project of local interest for approximately seven hundred thousand pesos, in a province which still lacks public works of the greatest importance to the general interest, and whose Treasury for a long time will only allow that these works be constructed very slowly... October 8, 1876.⁷⁴

⁷⁴ "Resultando en dicho informes que tanto la Diputación provincial como la Admon Económica de esa Ysla estan conformes en desechar la idea de que el Estado ejecute y explote por su cuenta despues dichas obras de riego... la Admon Económica juzga que en la actualidad no es posible aceptar semejante medio, atendido el Estado del Tesoro de la Ysla, sus rendimientos futuros y los compromisos que sobre el pesan [...] Considerando que en buenos principios

If practically everything that the Guayama hacendados requested for their water concession was granted, including changes to the concession to help them complete their project, then why was it never finished? This is the question I will explore in the following section.

The Turning of the Wheel: What Went Wrong with the Guayama Irrigation Project

Before the irrigation project was approved by the Spanish Crown, the Guayama hacendados had already made arrangements for a loan to finance it. E.B. Webb, the British engineer who had developed the plans and sketches, worked for an English Commercial House and offered the hacendados financial to build the project. By the time the concession was granted, the hacendados had signed all the loan documents and were awaiting the money to pay the government for the deposit necessary to begin construction.

But three months passed, and the government did not receive its deposit nor was the project begun. The government revoked the concession. Three months later, on October 12, 1867, the Queen again granted the same concession to the

económicos no debe el Estado costear ni por un medio ni por otro de los propuestos, la ejecución de una obra que cualquiera que sea su utilidad, no ha de beneficiar sino á una reducida comarca de ese Ysla. Considerando lo inconveniente que sería por muchos conceptos el empeñar al Estado en una construcción de interes local, de unos setecientos mil pesos de coste, cuando esa provincia carece aun de las obras públicas mas importantes de interes general, y cuando su Tesoro no permitira en mucho tiempo sino el que se

Guayama hacendados. But new conditions were added: the new deposit was 14,000 "escudos" (1% of the project's cost at that time), and the hacendados were only given 15 days to pay it, to be counted from the date when the decree was published in "La Gaceta".

In a letter to the Governor on November 17, 1867, the Guayama hacendados responded to some questions concerning their situation with the Commercial House. Here is a fragment of the letter:

In response to the questions posed by Your Excellency in the last section of said letter, we would like to point out that pursuant to one of the stipulations of the provisional contract arranged in England between our representative Mr. Juan H. Blondet and the director of the British company, Mr. R.A. Moll, which became definitive after having been ratified by our company, said company should send here a delegate authorized to finalize pending negotiations, receive our mortgages, make the one percent deposit required by the current water law, and carry out whatever else is necessary for the success of our irrigation.

Now, the mentioned contract grants a period of three months to accomplish all of this; but that term does not begin to run until such time as our ratification reaches London. Hence, having been sent with the last bundle to England, we estimate that the term will begin to run as of the first day of the coming month of December. Therefore, we need until the end of the following February; that is to say a period of three months, to fulfill the requirements set out in the Royal Decree of the 1st of October past, and it is this leeway that we petition that you see fit to grant us.⁷⁵

construyan estas obras con gran parsimonia... Octubre 8 de 1876". (Aguas, Leg. 28, Exp. 928, c. 413)

⁷⁵ "Contestando a las preguntas que se sirve hacernos V.E. el último apartado de su referida carta, debemos manifestarle que con arreglo á una de las estipulaciones del contrato provisional ajustado en Ynglaterra entre nuestro representante Dr. D. Juan H. Blondet y el jefe de la compañía inglesa Mr. R.A. Moll, contrato que se ha hecho ya definitivo por haberlo ratificado nuestra empresa, debe enviar dicha compañía un delegado suyo con poderes suficientes

As this excerpt shows, the hacendados' letter not only explained their situation with the Commercial House but also requested an extension for their deadline. The reason was simple; because of the distance between Puerto Rico and England, they needed time for the delegate of the Commercial House to confirm the contract and bring the money for the deposit. The additional time was granted, and the deadline was moved to February. But on February 22, S. Moret and Jesús Ma. Texidor wrote another letter to Carlos de Roja⁷⁶ explaining their situation and asking that he intercede with the Governor to request another extension. Their letter states the reasons for this request:

Very respected Sir: As partners in the Guayama irrigation enterprise, we are honored to communicate to you that we have just received a letter from Mr. R.A. Moll, partner and director of the English company that is to provide the funds for the establishment of said irrigation, and another letter from Mr. E.B. Webb, head engineer of said company. These gentlemen inform us that for some time now they have had appointed a commissioner to be sent to this Island, who had not been confirmed due to the adverse effects of the exaggerations printed in the British and

para terminar aqui la negociaciones pendiente, recibir las hipotecas que debemos otorgar, hacer el deposito del uno p% que dispone la ley vigente de aguas y practicar en fin, cuanto mas sea necesario para el éxito de ntro. regadío.

"Ahora bien, el mencionado contrato concede el término de tres meses para llevar á cabo todo esto,; pero ese término no empieza á correr, sino á partir de la llegada de nuestra ratificación á Londres. Así es que, habiendo salido esta por el último paquete inglés, calculamos que comenzará á contarse desde el día primero de Dicbre próximo. En este concepto necesitamos hasta fines de Febrero entrante; es decir un plazo de tres meses para poder llenar los requisitos que exige el Rl Decreto del 1.º de Octubre último y este respiro es el que suplicamos á V.E. se digne concedernos". (Aguas, Leg. 28, Exp. 928, c. 413)

⁷⁶ It is not clear from the letter what position was held by this person, though he might be an officer from the Central Administration. This inference is from a note I found later in the department's file, having to do with the reply to another letter from the Guayama hacendados requesting another extension.

American newspapers regarding the disastrous effects on Puerto Rico of hurricanes and earthquakes: but that in view of the positive reports we have sent them on how little the area of Guayama has suffered from these calamities, they have decided together with the other members of said British company to definitely send their representative, who should have left England on the _____?_____ of the seventeenth of this month, in possession of the funds necessary to consign the deposit required by the current water laws, and prepared to carry out with us the remaining arrangements that will precede the channeling.

Since cholera might delay the prompt arrival of said commissioner from Saint Thomas to this Island, we plead that you take into account these circumstances in case we are delayed a few days in fulfilling our obligations.⁷⁷

The letter refers to hurricane Narcise, and an earthquake which followed soon after.⁷⁸ The hacendados were successful in convincing the English investors that there was nothing to fear, and got confirmation that they would receive the money they needed. They also received confirmation that Moll's representative was on his way to deliver the money

⁷⁷ "Muy respetable Sor: Como socios de la empresa del riego de Guaya.a, tenemos el honor de poner en conocimiento de V.S. que acabamos de recibir una carta de D. R.A. Moll socio director de la compañía Ynglesa que debe suministrar los fondos p.a el establecimiento del mencionado regadío, otra carta de D. E.B. Webb Yngeniero principal de la misma compañía. Estos Sres nos participan que hace tiempo tienen dispuestos un comisionado para enviarlo á esta Ysla, que hasta ahora no lo habian verificado á causa del mal efecto producido por las exageraciones de los periódicos ingleses y americanos acerca de los desastres ocasionados en Pto Rico por los huracanes y terremotos; pero que vistos los buenos informes que les hemos remitidos sobre lo poco que ha sufrido el partido de Guayama en estas desgracias, se han decidido de acuerdo con los demas individuos de la mencionada compañía Ynglesa á despachar definitivamente á su representante, el cual debió salir de Ynglaterra por la _____?_____ el dia diez y siete de los fondos necesarios para la consignar el deposito que marca la ley vigente de aguas y practicar de acuerdo con nosotros las demas diligencias que han de preceder los trabajos de canalizacion.

"Como quiera que la enfermedad de del cólera podría dilatar la pronta venida del referido comisionado de San Thomas á esta Ysla, suplicamos á VS. se sirva tener presente esta circuntancias para el caso de algunos dias de atraso en el cumplimiento de nuestras obligaciones". (Aguas, Leg. 28, Exp. 928, c. 413)

⁷⁸ The name of the hurricane appeared in a newspaper article found in another file on a second attempt, by other Guayama hacendados, to carry out the

and finalize the deal. But they needed time for this representative to get to Puerto Rico.

It would appear that the extension was again granted, because Texidor and Vives would write another two letters requesting more time to pay the deposit. In both, the delay in the commissioner's arrival to Puerto Rico was explained by the presence of cholera on the island of St. Thomas, since the English steamer needed to stop at this port before going to Puerto Rico. On May 23, 1868, Texidor and Vives informed the government that E.B. Webb, Jr. had arrived on the island, and that the hacendados were ready to take the deposit to the Capital in San Juan. When they finally did so, on June 12, eight months had passed since the decree was issued and sent to the island.

The various delays were not due to lack of interest or commitment on the part of the hacendados, but to difficulties in their negotiations with the English Commercial House, natural disasters, and then an outbreak of disease on a neighboring island. And their luck held throughout this time, as the government granted them one extension after another. It is interesting to point out, however, that in all those months, the hacendados were apparently incapable of raising locally the 14,000 "escudos" needed for the deposit. It could be argued that they were

hoping to benefit from the extensions as a way of stretching the time they had to begin working on the construction of the irrigation channels. But in either case, their behavior emphasizes the hacendados' lack of liquid capital, and also the government's willingness to grant them all the time necessary to obtain the money from their English investors.

When the decree granting the water concession was finally published in "La Gaceta", it proclaimed that the water grant was in the name of the Guayama hacendados, and gave them the usufruct of the waters of the "La Plata" River for the irrigation of their sugar cane fields. Yet only a couple of weeks later, the hacendados' representative Jesús Ma. Texidor wrote to the Governor and requested that their water concession be transferred to Ricardo Alberto Moll, director of the Commercial House in London that had agreed to lend them the money to construct the irrigation project.

Texidor argued that the magnitude of the project was beyond the hacendados' resources, and there was not enough financial capital available on the island for such a large scale enterprise. It is most interesting to discover that the hacendados had already transferred their rights to Mr. Moll in Guayama on June 5 (one week before the deposit was paid), and the transfer included all the stipulations that Texidor explained in his letter to the Governor. I don't know whether the hacendados made the transfer knowing that

they would be allowed to do so, or whether they were gambling with both the Governor and their investor. In addition to the transfer, Mr. Moll also wanted to change some of the conditions of the decree. He wanted the transfer to last 32 years, after which the 99-year concession would revert to the hacendados for the remaining 67 years. He also requested an additional 6 months to begin work on the irrigation project. Finally, Mr. Moll asked that the price per hectare be lowered from 165 "escudos" to 128 "escudos", because he planned to increase the amount of land that the project would irrigate.

Since some of the requested changes drastically altered major points of the grant, the metropolitan government had to authorize the changes, and did so on July 25, 1868. Time continued to pass, but construction did not begin. In a letter dated February 2, 1869, D. Guillermo Lindergren, representative of Mr. Moll in Arroyo, requested more time to start work on the irrigation project. He explained that they hadn't begun building because the disturbance of the events of the past September in Spain (the "Revolución Gloriosa"), had delayed his London business partners from sending the money necessary to continue the project. He requested a 4 to 6 month extension so they would not lose the water concession. The extension was granted and September 16, 1869 was set as the new deadline to start the

project.⁷⁹ Finally, on September 15, the "Corregidor" of Guayama informed the government that R.A. Moll's associates stated they had begun work on the irrigation project on September 11. Unfortunately, a year and a half after the works were started, employees of the Department of Public Works were attempting to confirm that the project has been completed in accordance with the stipulations of the water concession when they discovered that, contrary to the dispositions agreed to by R.A. Moll, the works had barely begun. As a consequence, the concession was suspended again.⁸⁰

This time, the Guayama hacendados couldn't save the concession or the project. When their investor R.A. Moll died unexpectedly, the irrigation project was left in the air with no other investors interested in it. The hacendados explained their situation in a letter to the "Corregidor":

The undersigned, notified and duly aware of the content of the preceding document, express: that Mr. R.A. Moll, irrigation concessionaire of Guayama, died in England during the year 1870, and that the British company established by said gentleman has advised through letters dated on the past 1st of February 1st and 16th of April, signed by Engineers Mr. E.B. Webb, Gotto, and Beesley, that they have been unable to obtain the funds necessary for the execution of

⁷⁹ Aguas, Leg. 28, Exp. 928, c. 413.

⁸⁰ "Habiendo espirado en 13 de Marzo último el plazo prefijado para la terminación de las obras del canal de riego de Guayama, que solo han sido ligeramente iniciadas por cuyo motivo es procedente la caducidad de la concesion, se servirá U. preguntar al representante del concesionario lo que tenga que alegar acerca del particular". Copy to the Corregidor of Guayama of the report by the "Inspección General de Obras Públicas". (Aguas, Leg. 28, Exp. 928, c. 413)

the works, and consider their obligation and that of the contracting hacendados from Guayama to have ended.

They also state that the annulment of the concession should help them in their efforts to cancel the liens granted to Mr. R.A. Moll which still mortgage their haciendas, and that they are currently doing everything possible both in France and the United States to procure the necessary capital and be able to construct the mentioned irrigation works on their own [...].⁸¹

Under these circumstances, the government decided to cancel the water concession and confiscate the deposit, as established in the decree. After this, the Guayama hacendados couldn't make the project a reality. Various other attempts were fruitless. As with the original concession, they lacked the necessary capital.

In the particular case considered in this work, I suspect that Mr. Moll, was never able to gather the capital needed to finish work on the irrigation project. Though I don't have enough evidence to fully explain why this might have happened, it can be argued that Mr. Moll and his associates in London constantly gambled with time, trying to put together the money to fulfill his obligation with the

⁸¹ "Notificando los Sres que suscriben del contenido del oficio que antecede y enterados detenidamente manifestaron: que D. R.A. Moll concesionario del riego de Guayama falleció en Inglaterra durante el año de 1870 y que la compañía Inglesa constituida por aquel Sor ha participado en cartas del 1.º de febrero y 16 de Abril ppdo, firmadas por los Yngenieros D. E.B. Webb, y los Sres Gotto y Beesley que no han podido conseguir los fondos necesarios para la ejecucion de los trabajos y dan por terminados su compromiso y el de los Hacendados contratantes de Guayama.

"Hacen tambien presente á V.S. los que suscriben que la declaracion de caducidad de la concesion debe ayudarlos en los pasos que estan dando para alzar las hipotecas que tenian otorgadas a D. R.A. Moll y todavia gravan sus haciendas, y que estan practicando actualmente las mas activas diligencias tanto en Francia como en los Estados Unidos para encontrar el Capital presupuestado y

Guayama hacendados. The only money that the hacendados actually received from Mr. Moll was the 14,000 "escudos" for the deposit, and 800 "pesetas" that were used to begin construction of the dam. It is hard, if not impossible, to say whether Mr. Moll would have fulfilled his commitment to the Guayama hacendados if he hadn't died, but the events in the aftermath of his death tend to show that Mr. Moll never had the money he promised, and kept buying time to try to collect it through his associates when death surprised him.

In this sense, the hacendados' expressions regarding the situation after Moll's death are quite revealing:

They also explain that when Moll died, his heirs were minors, and his business affairs were in such a sad state that nobody _____?_____ straighten said affairs, for fear that the expenses which would need to be made would surpass the existing capital.⁸²

Proving this argument fully would require more research, but in this case it seems difficult to blame the hacendados or the government for the failure in accomplishing this project. It can be said that the government--in Puerto Rico and Spain--and the hacendados did what was within their reach to make the project possible. Neither the island's business class nor the government had the capital needed for this huge project. In the end, the hacendados' belief that

construir por su propia cuenta las obras del mencionado riego [...]" (Aguas, Leg. 28, Exp. 928, c. 413)

⁸² "Explican también que cuando murió Moll dejó una sucesion menor de edad y sus negocios en tan mal estado que no ha habido persona alguna que _____?_____ arreglo de los asuntos de la sucesion temerosa de que los gastos que haya necesidad de hacer superen al capital ecsistente". (Aguas, Leg. 28, Exp.

the London Commercial House would provide the means to build their irrigation project that would save their own businesses proved mistaken. In this case, the foreign investor failed the "criollo" hacendado. The Guayama hacendados were able to keep their haciendas, and didn't have to pay any mortgage to the London Commercial House.⁸³ But that unfortunately did not save the project nor any of the attempts to revive it, at least during the XIXth century.

928, c. 413)

⁸³ This, however, did not change the financial situation of Guayama. The drought continued to affect it for many years, and its economy never recovered its lost splendor. There were three other attempts at the project led by different hacendados during the Spanish domination, in 1874, 1875, and 1891, but nothing came of them beyond the granting of exemptions and other paperwork. There was one final attempt before the closing of the XIXth century, in October 1898, three months after the U.S. invasion. But the project, though approved, was never accomplished either. In 1907, Carlos Blondet, son of Juan H. Blondet, presented a proposal for an irrigation project which was approved in 1908, and for which bonds worth \$3,000,000 were issued (Bagué 1963). This paper will not address the XXth century outcome, but it is important not to forget that history did not stop at the boundaries set for this research paper. Though the XIXth century irrigation project was never built, the process continued into the XXth century, raising its own questions to be researched.

Conclusion

The importance of water for sugar cane in the southern region needs to be investigated further. My research so far has found that in the case of Guayama, water for sugar cane cultivation was perceived as an important part of the agricultural life and well-being of the town. The disruption of the rain season pattern⁸⁴ felt by the Guayama hacendados during the second half of the nineteenth century, together with the chronic presence of droughts year after year, stresses the relevance of water for both the hacendados and the government. As explained in Chapter 2, people with water concessions coveted their water, as did for example Cayey's hacendado Don Florencio Capó and Guayama's hacendado Don Joaquín Villodas. They defended their water concessions against the irrigation project by all means available to them. Their opposition to the project reveals their belief that their waters were their property, and any attempt to diminish or usurp their water rights was seen as an act of robbery that damaged their economic interests.

Unfortunately, the information derived from these documents regarding water practices and, more importantly, water struggles is not enough to allow us to generalize. We

⁸⁴ By disruption of the rain season I am referring to those years when the rains came later than expected.

still lack a clear and complete picture of these practices and of their importance in the balance of power between hacendados in Guayama or elsewhere. More research is needed to assess whether or not there was a tendency among sugar cane hacendados to accumulate water as a means of increasing sugar cane productivity and enhancing their economic position. What I have found so far are declarations by some hacendados linking their wealth or prosperity to their water concessions, and some statements claiming that the accessibility of water was an important reason for acquiring certain properties. But there are not yet enough cases to confirm the existence of a trend towards the acquisition of water, like land, as a means of comparative social and economic improvement. In the accounts I have found in the documentation, there are, however, some suggestions in that direction.

It would be helpful to expand this picture by considering the hacendados of Ponce and their use of irrigation in their sugar cane haciendas. The comments by Ramos (1981), Bonnin (1984) and Scarano (1984) included in Chapter 1 indicate not only that these hacendados used irrigation extensively for sugar cane cultivation, but also that they had the capacity to invest in these channels to increase the productivity of their sugar cane fields. The extent and importance of the use of irrigation has been

neglected, not only in the study of Ponce, but for all the sugar cane districts in Puerto Rico during the entire XIXth and XXth centuries. This contrasts with the study of land for the sugar cane industry, not only in Puerto Rico (Scarano 1984, Martínez-Vergne 1992, San Miguel 1989) but also in Cuba (Moreno Fragnals 1976), to cite but a few cases.

Although I can hardly conclude that control of water explains the stratification of the hacendados' social class, I feel it can be argued that water and land were both elements to be considered within the larger picture of power in the southern region, not only within a town (like Guayama), but maybe also between regions (like Ponce and Guayama). The comments made by the proponents of the Guayama irrigation project, included in Chapter 2, regarding Ponce's prosperity and the ability of its hacendados to use irrigation to improve their sugar cane fields, as well as those by the few hacendados in Guayama who had their own irrigation channels, are suggestive and call for further research.

Other findings in this work refer to the role of the colonial and metropolitan state before, during and after the first attempt at the irrigation project. As discussed in Chapters 3 and 4, the many political transitions of the Spanish government are reflected in the different laws,

royal decrees and positions of its government officers throughout the XIXth century. Martínez-Vergne (1992) argues that in the case of Puerto Rico, Spain's colonial policies are as important as economic circumstances to explain the island's development and the decline of its sugar cane industry. She says:

[...] it would be irresponsible to dismiss market conditions as irrelevant to an analysis of local successes and failures, to emphasize what Spain did and did not do to help the sugar industry become firmly established is imperative. To anticipate my argument, the plans of agricultural analysts in Puerto Rico to weather market crises invariably depended on the commitment of the mother country to build infrastructure for the sugar industry. The extent to which Spain responded, then, directly affected the success of the projects proposed (citations omitted). (Martínez-Vergne 1992:5)

The Guayama Irrigation Project and the later attempts at its realization showed the genuine interest of the Spanish government between the 1850s and the 1870s in encouraging and facilitating irrigation projects with the ultimate goal of increasing and improving colonial agriculture. This purpose, however, only went as far as encouraging and facilitating. There was no intent by the government to contribute monetarily or to undertake by itself the construction of any irrigation system, at least in Puerto Rico. As mentioned in Chapter 4, during the 1876's attempt the metropolitan government clearly rejected assuming any monetary responsibility for the irrigation project, as was requested by the hacendados of Guayama, Salinas and Arroyo.

Even during the first attempt in 1865, when the hacendados sought a grant, together with tax exemptions, for the construction of the irrigation system, the request for the grant was completely ignored while the exemptions were allowed and one was even issued expressly for that project.

In sum, though both the colonial and metropolitan governments were willing to promote and expedite water concessions for irrigation purposes in order to improve the colonial economy, they weren't nearly as eager to invest treasury funds in the colonial infrastructure. They preferred to rely on private investment,⁸⁵ in this case the hacendados' capital, or more usually the loans they might make to invest in such projects. It is clear, though, that the island's treasury was not capable of investing in projects of such magnitude, as pointed out by the Minister of Overseas in the case of the 1876 proposal. He added that the "Ayuntamientos" could not invest either, and finally discarded the idea altogether, referring to the project's local character and uselessness to the rest of the island. As mentioned in chapter 2, this position is not distant from Eloy Fernández's (Pérez & Lemeunier 1990) explanation of the

⁸⁵ As Stephen Webre (1990) explains in his article "Agua y sociedad en Santiago de Guatemala, 1555-1773", this practice was not unusual in the Spanish-American colonies. Webre illustrates some of the strategies used by the "cabildo" to build aqueducts for the city. One of these was to promise private investors some special privilege in order to persuade them to carry out the works, avoiding the use of the cabildo's treasury for such constructions. As Webre explains, however, this arrangement did not always solve the problems, since private investors were often unable to fulfill their commitments.

Spanish government's attitude towards similar proposals in its own country. The dependency of the Puerto Rico colonial government on the metropolitan policies and treasury is another important consideration. Even when the island's government might be willing to help in such a project, as the "Diputación Provincial" was in 1876, the final decision was always in the hands of the Spanish government.

Even with all their limitations, the colonial and metropolitan government at least aided the Guayama Irrigation Project by expediting the process, and ultimately granting all the permits needed for its completion. But even with that help, the project was never realized. The reason for this failure was the incapability of the Guayama hacendados to find the capital necessary to build the project. As described in the second section of Chapter 4, the Guayama hacendados tried to obtain a loan from an English Commercial House to construct the irrigation project. Though they did find an investor who granted them the considerable loan they needed--and later on transferred their concession to him--, in the end nothing was achieved.

The hacendados just got the necessary money to pay a deposit and start some works. Until the cancellation of this concession, the project was plagued with delays in getting the loan money from the lenders to the hacendados, in turn keeping the landowners from paying the government

the deposit needed to start the project.

After the sudden death of R.A. Moll, the hacendados were unable to find another investor. This points out two different problems. First, because of the enormity and prohibitive cost of the project, the Guayama hacendados could not find on the island the financial capital they needed, making it necessary to look outside the island. In the second place, though they nominally did find an investor, he never seems to have had available the entire amount of cash, despite all the concessions and advantages granted to him by both the hacendados and the government. When he died, there were no other investors willing to risk investing in this project. After their permit was revoked, the Guayama hacendados couldn't find new investors, and their efforts to obtain financial help from the State always failed.

Much research is still needed to expand our knowledge of the importance of water in the shaping of the sugar cane industry, as well as the possible ramifications to the different spheres of XIXth century Puerto Rican society. And this kind of research, I might add, is also necessary for the twentieth century. This study is a modest contribution to the beginning of this type of inquiry.

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