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Spanish Hydraulic Policy in the 19th and 20st Centuries

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Abstract

From 1850 onwards, the need to modernize agriculture was first raised in Spain. The politicians of the time realized that to achieve this objective, it was necessary to have more water available to reduce the dry land areas and allocate them to production. Some politicians such as Mendizábal, Azcárate, Costa Martínez, and their followers, proposed the obligation to build reservoirs so that sufficient water could be available.

Keywords

Spain, Politics, Hydraulics, 19th and 20th Centuries, Agriculture

1. Introduction

The subject of this essay must be considered from 1812, since the Cortes of Cadiz were held in that year. The parliamentary sessions were held on the nearby island of León, a place that was not accessible to the French troops that were invading all of Spain at that time. These were the glorious times of Napoleon Bonaparte, who disappeared from Spain in 1814, and who is not the direct subject of this essay. The War of Independence meant a stagnation for social activities that affected hydraulics.

The parliamentary sessions of the Cortes of Cadiz created awareness regarding what we commonly call public works (González de Posada, 1986: 55-77). At that time, the social situation in Spain was not ideal for developing projects that involved hydraulic works. It was necessary to wait for better times; however, although timidly, the first steps were taken to modernize, and update irrigation applied to agriculture. There was a need to raise many issues with water management in mind to try to solve any problem that affected its management.

Traditionally, the ownership of the water that flowed through Spanish rivers

was shared by different owners, as many as there were human settlements along its course (Junquera Rubio, 2006: 125-154). The Cortes of Cádiz eliminated this context and decided that all water was the property of the state. This was the desire, but that reality was reached much later (Junquera Rubio, 2018: 159-186; 2023). The practical policy, which emerged after the Cortes of Cádiz, responds to a constant confrontation between King Ferdinand VII, and the leaders of the Liberal Party.

In those years at the beginning of the 19th century, Spain lacked reservoirs to store the water it needed for agriculture, which was the economic base of the population; for this reason, drought was an element that had to disappear so that the condition of society in general could improve. Most Spanish families depended on the products of the countryside, and the economy can be considered purely subsistence, since the surplus was scarce. Poverty and misery were two very general images at that time.

On May 3, 1823, Spanish politics was governed by the liberals, who were in power between 1820 and 1823, a period known as the Liberal Triennium. The regulations enacted are known as the *Clarifying Act* and its objective was to put into effect the decisions of the Cortes of Cadiz; that is to say, these three years correspond to what Josep Fontana understands as follows: "*a period of exceptional importance because it was during this period that the reforms published in Cadiz from* 1810 *to* 1814 *were first put into practice*" (Fontana, 1979: 31). Regarding water, management has changed since it went from being the property of traditional lordships to local communities deciding on this resource (Junquera Rubio, 2023: 365-540).

Between 1823 and 1845, political decisions on water had their difficulties. Internal events led by the famous *pronouncements*[1], and the emancipation of the American colonies impacted the Spanish authorities, and public opinion at the time. Government crises prevented progress regarding the importance of water, and drought continued to be an important part of the agricultural landscape that was eager for irrigation. This context would allow the minister Juan Álvarez Mendizábal to assure in 1836 that "*Spain will not be rich as long as the rivers flow into the sea*" (La Iglesia, 1920: 34). With this statement, he indicated that it was necessary to build reservoirs.

On August 3, 1866, the entitled *Dominions and Use of Waters Act* was enacted. It was the first Spanish code on water, and on June 13, 1879, the *Water Act* appeared. These legal norms come from various situations, but the following are important: 1) creation of private companies that required water for their operation; 2) increase in irrigation infrastructure to improve agriculture, and its performance; 3) appearance of the railroad in the second half of the 19th century.

In 1865, hydrological knowledge of Spain appeared for the first time, and it gave rise to the specification of hydrological divisions, and Manuel Lorenzo Pardo

[1]The word "pronunciamiento" should be understood as the uprising of a military leader against his rulers. It was a common occurrence in the 19th century (González Calleja, 1991: 979-980).

would later say the following about them: "*At that time there were some organizations called Hydrological Divisions that were mainly in charge of studying the river network; They were transformed into Hydraulic Works Divisions in order to undertake the works of the Plan* (*of* 1902), *naturally beginning by preparing the projects for the works involved, but the essential and basic function that was beginning to offer interesting results and had very meritorious works was abandoned. The gauging service was not resumed until sometime later, leaving a period uncovered, precisely the one needed for the drafting of projects. These were made without a basis, or with such a weak and unsafe basis, that success was miraculous*" (Lorenzo Pardo, 1933: 22).

In 1879 the first *Water Act* was promulgated. In those years, King Alfonso XII reigned. The main reason was to have this regulation to control the enormous demand for water resources to be used for industry, agriculture, and the generation of electricity, which was beginning to be an important product with a large market. Curiously, direct State intervention in public works was still excluded, and concessions to private companies were favored, especially if they were foreign (Junquera Rubio, 2023: 545). These data were present in the newly enacted Law, although the custom was much older.

José Echegaray, in the preamble to the Decree of bases for the legislation of public works of November 14, 1868, points out that all works should be conducted and awarded based on the law of supply and demand (Frax Rosales, 1996: 513-528). This context was the one that worked for any award, and this is how it was applied when the *Irrigation Canals and Swamps Act* was drafted, which opted to make concessions to private companies (Ortega Cantero, 1992: 335-364).

The first stage of the Restoration[2] appears as the indisputable moment to consolidate the irrigation policy initiated almost half a century earlier. This period is also known as the one in which the concept of hydraulic policy was coined, applied to a set of political, economic and social measures that had irrigation as the axis on which any action to eliminate drought had to revolve, since the lack of water was understood as a plague that attacked the entire country.

While the Restoration lasted, the so-called Regenerationism emerged, which is a political, and social movement that was born to modernize Spain, eliminating the backwardness in which it was found, and adapting it to the advanced situation, putting it on par with other European nations. The most representative leader was Joaquín Costa Martínez, whose motto was: "*School, pantry, and seven keys to the tomb of El Cid*". From an ideological point of view, Regenerationism was represented in all the political movements of Spain at the end of the 19th century (Saz, 2016: 4). Joaquín Costa Martínez is considered the man of irrigation, and the staunch enemy of drought, which is why he fought against any setback that pre-

[2]The history of the Restoration responds to three moments: 1) Reign of Alfonso XII (1874-1885); 2) Regency of Maria Cristina of Habsburg-Lorraine (1885-1902); 3) Reign of Alfonso XIII (1902-1923). The most influential politicians were Antonio Cánovas del Castillo, and Práxedes Mateo-Sagasta y Escolar (Dardé, 1996).

vented its realization, since his objective was to have water available for agriculture and modernize it (Costa Martínez, 1911).

In 1883, the *Large Irrigation Areas Act* was enacted, popularly known as the *Gamazo Act*, as Germán Gamazo was the minister in charge of implementing it. The important thing about this legislation was that it introduced that from that moment on, the state would oversee building all the works destined for irrigation: reservoirs, irrigation ditches and the start-up of new organizations such as the so-called Irrigation Unions. Private companies could continue to enter the business, but the management of any public work would reside in the hands of the state. The most important thing was the State intervention in the planning of irrigation, which had to be available to the new criteria based on the colonization of the countryside, and its modernization.

In 1889, the Hydrological Service was created, which was the first organization with the capacity to manage water from the state. These criteria were then completed with the promulgation of regulations in 1900 for the emergence of the Hydraulic Works Divisions. In these contexts, Joaquín Costa Martínez's criteria on irrigation were still valid, and these positions were increased by his disciple Ricardo Macías Picavea, who also developed his theories on hydraulic policy (Macías Picavea, 1899; Tierno Galván, 1961).

At the end of the 19th century, politicians believed that Spain would modernize by expanding agricultural areas, eliminating dry land, and introducing irrigation (Junquera Rubio, 2018: 159-186). The industrial issue and applying hydraulics to generate electricity are later elements, and from the beginning of the 20th century. Politicians did not deny industrial needs, but those of irrigation were the priority at that time.

Hydraulic policy appears as a tool that would allow all the problems of the Spanish countryside to be solved. The transformation of traditional extensive agriculture into modern, and intensive agriculture would allow the overall and balanced development of the country and, on the other hand, would help to slow down the process of social polarization, and mitigate the proletarianization that was beginning to manifest itself in the Spanish countryside.

In this sense, Joaquín Costa Martínez's hydraulic policy included an important social component. The increase in population endangered the traditional structure of property. Regenerationism suggested that agrarian reform should be moderate but should be conducted without pause. One of the criteria was to convert peasants, day laborers and artisans into small farmers by providing them with state lands that had previously had to be converted from desert to irrigated (Costa Martínez, 1911). These disadvantaged groups would support the hydraulic policy proposed by Regenerationism, since it was also thought that this would make social conflicts disappear.

The fundamental intellectual work of this period was the Water Act of 1879, which sought, among other things, to achieve administrative uniformity. As a legal norm, its objective was to regulate exclusively terrestrial waters, applying a

very progressive character to them, since it established a preference for river channels to use their waters for agricultural irrigation and not for navigation and transport of goods, since these aspects were being transferred to the railway (Embid Irujo, 2001: 59-99).

In this sense, this norm provided sufficient elements to regulate the Irrigation Communities, providing them with many benefits. These Communities were constituted as public law corporations, and their objectives were to ensure the efficiency and fair distribution of waters destined for irrigation. These procedures are still in force today.

In 1883, the *Large Irrigation Areas Act* was passed, known, as I have said before, as the *Gamazo Act*, which was to be the starting point of an official policy that stated that state subsidies would be provided for the execution of public works, favoring the construction of reservoirs and irrigation ditches to divert water to agricultural plots. This law was enacted to regulate the model of aid to be provided, but also because of the failure of the system of concessions to private companies (Alonso Moya, 1951: 29-73).

2. Water and Reservoirs from 1850 to 1940

The need to build reservoirs in Spain is an idea from the 19th century. There have been reservoirs since Roman times, but they were small, and for centuries, the need to build them was not mentioned. A notable fact, which influenced the irrigation policy, comes from the Confiscation of Church Property[3] by Mendizábal, the minister who had pronounced the slogan already mentioned: "*Spain will not be rich while its rivers flow into the sea*" (La Iglesia, 1920: 34). This statement served to stir consciences and people began to seriously think that it was a vital necessity to have water reservoirs.

In the first Spanish Constitution, the one that came out of the Cortes of Cádiz in 1812, the need for a single code that had the capacity to act equally in any part of the country was raised. It must be remembered that this word was then understood to refer to the metropolis, ignoring the representatives of the American and Asian colonies. Towards 1880 this idea began to take shape, and in 1889 the first Civil Code was promulgated, from which many laws would be derived. Mendizábal's expression is intended to summarize that fresh water had been a constant problem in Spanish history, to the point that it seemed an impossible issue to overcome without this natural resource. Based on Gumersindo de Azcárate (1879-1883, II: 381-382), a man formed in the spirit of Krausism, and a jurist qualified as a liberal, Jordi Maluquer de Motes coined the term *depatrimonialisation*. This term is obtained from two previous words: *disentailment* and *disengagement*, since both were known in the second half of the 19th century, a time

[3]By Disentailment (Confiscation of Church Roman Properties) we must understand the expropriation of the properties of the Catholic Church to sell them and deposit cash into the state coffers. It is called Mendizábal's because he was the one who carried it out, but the process had been attempted before Napoleon's invasion (Tomás & Valiente, 1972).

when the lack of possibilities to irrigate barren fields was a pressing problem (Maluquer de Motes, 1983: 79).

At the end of the nineteenth century, and with legislation already in force to be applied, a disentailment of water resources began so that they would pass into a single hand, that of the state, because nobody thought that this resource could ever be privatized (Junquera Rubio, 2006: 125-154). The political tendency, in this respect, was to annul local institutions, and establish a single administrator of all river waters. Once this objective was achieved, the next step was to dam them as soon as possible so that they would not reach the sea without first fertilizing dry fields, thus converting them into irrigated land to alleviate hunger, need and poverty.

Let us be clear that the process of modernizing Spanish agriculture (and many other activities that are not the subject of this essay) comes from the time of Charles III, who knew how to surround himself with enlightened ministers willing to collaborate so that the Spanish nation could walk with its head held high. Unfortunately, this monarch was succeeded by Charles IV, whose intellectual abilities left much to be desired.

By 1889, the year in which legislation was to be enacted that would allow the state to act as best those who manage it saw fit, the second confiscation of land was still taking place, that of Pascual Madoz, which was applied to expropriate the communal property of the towns of Spain, an action that had a great resonance in rural areas (Flórez de Quiñones & Tomé, 1924).

At the end of the 19th century, intellectuals, politicians, lawyers, and economists wanted Spanish agriculture to be modernized at all costs and to be put on the same level as that which they observed when they travelled through other European countries. On the other hand, society in general was convinced that the solution had to come from the state.

It must be considered that since the middle of the 19th century, magazines[4] were published with great punctuality focused on showing the most innovative advances to Spanish farmers. Although the intention was good, it must be recognized that at that time most of the Spanish peasant population was still illiterate, which is why education was required and it began to have a name with the promulgation of the Public Instruction Act, popularly known as the Moyano Act[5]. An important obstacle appeared in that the global Spanish society was of a traditional stamp, distrustful, and little given to changes with respect to what it did not control beyond its own doors.

In the area of water, and its use to better manage agriculture, and increase its production, it was understood that it was the government in power that should promote any renewal. However, state agencies lacked financial means, and always

[4]The best known were the following: 1) Agriculture (Madrid); 2) Development. Journal of agriculture, industry, commerce and public works (Madrid); 3) Journal of practical agriculture, rural economy, horticulture and gardening (Barcelona).

[5]The *Moyano Act* favored the creation of schools and the possibility of having a teaching staff for all of Spain (Ministry of Education, 1979, II).

depended on private initiative. Let us be clear that a work as important at the time, as was the construction of the Canal de Isabel II, to supply water to the population of Madrid, the then director general of Customs, in charge of providing the relevant permits, awarded two kilometers of pipelines to Spanish companies, while eight to English companies (Sánchez Melado, 2007: 67-68). This fact must be understood as a cultural trait in which the foreign was valued above the national.

In the mid-nineteenth century, a hidden war had been declared between private initiative and state action; that is, there was more divorce than good marriage between the two sides. This is detected because "*the few works built by private initiative and the economic failure of some companies that could not obtain an acceptable interest for the capital invested in construction determined that at the end of the sixties and beginning of the seventies the first criticisms of the liberal approach of non-intervention of the State occurred*" (Villanueva Larraya, 1991: 221-222).

In the years from 1850 to 1900, and regarding the water business, which is part of this essay, a powerful voice emerged that was willing to reform Spain from regenerationism. The one who launched the preaching was none other than Joaquín Costa Martínez, who demanded to have water at all costs. He was a politician who did not want this resource to be lost in the sea and therefore required the state to act in the matter and conduct works. The reforms he proposed were set out in many of his written works and in his speeches in Parliament (Costa Martínez, 1898; 1902; 1904).

State intervention would be possible as soon as the *Water Act* of 1879 was in place, because water resources should be assets administered by the State (Benet, 1984: 273); furthermore, the regulations should be useful to order, control and administer the collective regimes of public waters (Pérez Pérez, 1992: 201).

Once the law came into force, another complementary law became necessary, which was the *Irrigation Act* that appeared in 1883. However, at the end of that century and the beginning of the twentieth, the areas to be irrigated in Spain were far from reaching one and a half million hectares, and as already noted, large projects were far from being started (García-Badell Abadía, 1963: 169).

At the beginning of the 20th century, those responsible for agriculture were clear that only what is now the autonomous community of the Valencian Country met certain expectations, because its fields had a notable network of irrigation ditches built throughout the second half of the 19th century (Calatayud Giner, 1993: 47-92).

Joaquín Costa Martínez was the person who "hammered" the most on water issues. In his time there were supply canals for irrigation, but he considered them insufficient because there was much more dry land than irrigated land. In this sense, he fought for the state to assume the powers to manage water resources with healthy intentions of improving agriculture.

The thinking of Joaquín Costa Martínez is focused on what he understands is hydraulic policy aimed at providing water to dry land to make it fertile (Costa

Martínez, 1904). Likewise, in the face of the protectionism imposed by landowners, and speculators, he would defend an intensive agriculture with the capacity to achieve the highest productivity (Costa Martínez, 1902).

His opinion is concretized in a few budgets: 1) to increase the area of pastures, and double the livestock; moreover, the latter should be at the service of agriculture; 2) to reduce the area devoted to cereals, but with crops that allow to compete in yield with Russians, and North Americans, who were the great producers of the late 19th century, far surpassing Argentina; 3) to introduce fish farming in Spain. To these aspects, it should be added that the fulfillment of these budgets would slow down transoceanic emigration, which was beginning to have a notable social impact at that time.

The question that everyone has asked themselves many times, and which must include Joaquín Costa Martínez, as he is a more than qualified man, is the following: was the Spanish State capable of undertaking the works that were requested of it at the end of the 19th century, and beginning of the 20th century? Wars require extraordinary expenses, and Spain had to face them to defend its last colonies in America and Asia, with the result that it lost them, so the treasury was more than ruined, and needed to wait until 1906 to have liquidity, and from that date the construction of dams to store water increased. There were also civil clashes.

This bonanza does not mean that the state had sufficient liquidity to undertake the works that Joaquín Costa Martínez, and his followers wanted. In this sense, there are a series of criticisms of his thinking, to the point of considering it utopian and unrealizable, as well as populist; what is more, even if they could have been undertaken, how far would the execution have gone? In those days of the 19th century, the preaching that irrigation was the solution was already at least naive, and I have already expressed myself in this sense some time ago (Junquera Rubio, 2006: 125-154). However, I understand that there are many listeners willing to be followers of populism, at least temporarily, because "the average Spaniard loves wheat more than preaching."

One of the best-known critics of Joaquín Costa Martínez's approach is Eloy Fernández Clemente. This scholar believes that Costa Martínez made a poor analysis and that, despite having political experience, as a member of Parliament, he lacks the budgets to achieve the desired objectives (Fernández Clemente, 1989; 2000). At the beginning of the 20th century, it began to be seen that the state was going to become the controller of public works, especially hydraulic works, because Francisco Silvela became president of the Council of Ministers, and he chose Rafael Gasset to be the head of the agriculture portfolio. This was influenced by the fact that he was a convinced follower of Joaquín Costa, so it could be assumed that hydraulics, and irrigation would be the subjects to which he would immediately refer.

From 1900 onwards, the state became increasingly interventionist, and this was reflected in the investments it financed and how it controlled them. There is no

doubt that public spending increased from year to year and, let us say, from the dictatorship of Primo de Rivera until 1990 it rose from 10% to more than 34% of the gross domestic product (GDP). Despite the many crises experienced in a century, some analysts point out that "*the characteristics* (Pazos Gil, 1982: 281-323) *of public spending show that the State's interventionism in Spain was more cautious when its actions required budgetary credits than when it only had to approve laws that did not require disbursements*" (Comín, 1996: 693).

The Ministry of Agriculture proposed a new hydrological plan that was approved on April 25, 1902, when José Canalejas was already minister. This project had the objective of conducting 296 public works in two sets: canals and reservoirs, and the official objective was that upon completion of these, irrigation would be extended to 406,602 hectares in the Guadiana basin, and another 327,000 in the Ebro basin. The problem it generated was extensive when it was executed. It lacked general perspectives and objectives, but not specific ones, and for this reason it will be said that "*the country expected a hydraulic policy plan, and what resulted was a catalogue of canals and reservoirs, almost all of them isolated, without any relationship, even within the basin itself, some of them frankly incompatible with each other*" (Lorenzo Pardo, 1933, I: 20). From this statement it can be deduced that failure went hand in hand.

The failure, according to Lorenzo Pardo (1933), came from the fact that what had been executed until 1933 did not reach 12% of what had been programmed in 1902; furthermore, he admits that most of the projects have been carried out in the Ebro basin, and mainly in Aragon and points out as a criticism that "*there are quite a few hectares that are old improved irrigation lands, where there are hardly any conduction works, and others that have imperfect channels, and a preparation that makes them cheaper*" (Lorenzo Pardo, 1933, I: 36).

The Gasset Plan remained in force until 1926, the year in which the Hydraulic Confederations were created, one for each important river and it can be assured that its criteria held up until 1936. The basins are intended to apply the specialized services in each one of them and establish the pertinent improvements (Fanlo Loras, 1996: 177).

What was clear, from the beginning of the 20th century, for the government in power, was the desire to end the drought. Legislation was a constant in this sense, and satisfactory proof of this emerged in 1907 when the *Colonization and Internal Repopulation Act* came into force. The minister Augusto González Besada promoted it. The first area to benefit from this legislation was the Guadalquivir basin, because the conflictive social aspects that existed in Andalusia were considered.

The administration at that time understood, and so expressed the director of that project to be developed in Andalusia, that it would succeed in stopping the exodus of day laborers, which was supposed to occur. Enrique Martínez y Ruíz de Azúa, who held that position, pointed out that for "*the transformation into irrigated land, great difficulties will arise that can only be smoothed out with an exaggerated parceling, distributing the land among intelligent settlers. Great diffi-*

culties will arise in carrying out this enterprise, but nothing should deter the Administration, which will see the prosperity of Andalusia assured when the works are finished" (Martínez & Ruíz de Azúa, 1907: 10; Mata Olmo, 1984: 193-222).

The regulations were intended to put an end to the Andalusian latifundia, but those in charge of carrying them out came up against a wall that is still standing today; that is to say: good intentions were one thing, and the real political possibilities of achieving the expected objective with them were another.

The possibility of transforming the Andalusian latifundia, the cortijos, began to be drawn. Now, a path can be drawn on paper, and it is beginning to be done if there is no particular interest that prevents it. The administration wanted to increase production, improve economies, and eliminate social differences in Andalusia, but this objective was not achieved; on the contrary, it is still in force despite the improvements.

History shows us that the state can propose initiatives and, in this case, considering how things were in 1911, especially after July 7 of that year, the day on which the Cortes Generales[6] promulgated a regulation on the construction of large hydraulic works whose cost should be covered by the state. Well, the economic situation of the treasury did not allow any to be done, so it was necessary to resort to private capital if it was necessary to build a dam for a reservoir, for example, that is, the so-called private initiative continued in all its splendor (Ortega Cantero, 1984: 122-123).

A novelty that emerged in 1913 was the convening of national congresses to assess the irrigation and works that had been done, and those that had not yet begun. Curiously, this type of meeting brought together people from the Spanish regions most affected by the drought, who came encouraged by the preaching of Mendizábal, Costa Martínez, and others who wanted not a drop of water to go to the sea without first having fertilized barren fields.

The first of these was held in Zaragoza, and the figure of Joaquín Costa Martínez was present at all the meetings and presentations; what is more, his brother Tomás made sure that he remained alive among the participants. The Aragonese controlled this event, and from it came the commitment to hold others in other important cities that had problems with water. Nobody prevented this type of meeting. The king, the dictator Primo de Rivera, the republicans, conservatives, etc., fully supported this type of meeting. Those affected by irrigation met again to discuss in 1918 in Seville, in 1921 in Valencia, in 1927 in Barcelona, and in 1934 in Valladolid. The civil war interrupted these meetings.

A study of these meetings can be found in Antonio López Ontiveros (1992: 263-307). The first meeting produced a commitment to solve the problem of irrigation in Aragon, with the prerogative that the irrigation communities would assume a leading role, and even a certain control over the water, thus promoting a decentralization of this, an aspect that was proposed by Manuel Marraco, and had fol-

[6]National Assembly (Parliament).

lowers (Marraco, 1914: 50-65; Fernández Clemente, 2004: 11; Townson, 2012). An important event was the creation of the Hydrographic Confederations, which took place on March 5, 1926. They were launched as Hydrographic Trade Union Confederations, and this organization was promoted by the Directorio of Primo de Rivera. The start-up was done as "*an original organizational formula conceived to promote the promotion, construction, and operation of hydraulic works by the beneficiary users themselves with the collaboration of the State*" (Fanlo Lores, 1986: 178).

It must be admitted that it was one of the creations most cherished by the dictator, who followed the criteria programmed by Joaquín Costa Martínez, since he understood that he should assume many criteria of regenerationism. This entity advocates that the hydrographic basin should become the unit of exploitation, and those who depend on its resources should act in the elaboration, financing, and exploitation of the works that are projected to achieve all the programmed objectives. The case was to improve what already existed and to expand as much as possible the surface to be irrigated; what is more, Manuel Lorenzo Pardo, the architect of this decision, came to consider it a scandal that the Ebro River alone dumps 20,000 million cubic meters into the sea (Lorenzo Pardo, 1933, II: 31). As regards the content of this essay, the Duero Hydrographic Confederation, created in 1927, offered projects so that the Directorate of Primo de Rivera could improve the Castilla canal, which had returned to state ownership in 1919, and which was now proposed to be converted to irrigate dry land (Helguera, 1988: 153).

An added problem to the constructions destined for irrigation was that they had to also serve to generate electricity, an aspect in which Spain was as deficient or more than in irrigation. It must be considered, in view of the writings made on the subject, that in Spain the consumption of electricity began with the arrival of the twentieth century, when it was possible to begin to count on a cable network to transport the fluid as far as possible from the generating centers to the consumption centers (Sudría, 1987: 320).

On the other hand, electricity is much cleaner than that of thermal origin (González Posada, 1986: 59-60); consequently, from 1930 onwards, this considerable demand began in urban centers, since, until then, and even later, the electric current had been provided by some traditional flour mills that had a generator to fulfil this task (Junquera Rubio, 2005).

A clear example of this is offered by the fertile Ribera[7] of Órbigo, where electric power began to be provided after the end of the Second World War. In towns of some notoriety, such as Veguellina de Órbigo, this possibility arrived at the end of the 1940s, and beginning of the 1950s, when the company ELSA (Eléctricas Leonesas) began to supply it. Previously, this provision came from the so-called Molino de Abajo[8] (Junquera Rubio, 1993). Consequently, the electric companies were interested in building reservoirs because they would put their turbines there

[7]Ribera (Basin).
[8]Flour mill located in the southern area.

and make a good business.

When the dictatorship of Primo de Rivera ended, Spain entered a political, economic, and social collapse. The years prior to the Second Republic, which began on April 14, 1931, have been summarized by Ortega Cantero as "*the panorama that the Second Republic found in terms of hydraulic policy, and transformation into irrigation, and that was far from being satisfactory*" (Ortega Cantero, 1984: 122-126).

At the beginning of the 1930s, and with reference to three decades earlier, what had been done was rather little, because the surfaces to be irrigated barely exceeded one million hectares, and the percentage did not reach 7% of what was planned to be put into irrigation (Jiménez Blanco, 1986: 90).

The Republican authorities eliminated the Confederations, and created the Hydrographic Associations, suppressing the functions that the former had had; they also closed the Ministry of Public Works, and created the Ministry of Public Works on December 16, 1931. In a few days, numerous institutions that had been more prosperous passed away. Indalecio Prieto, as Minister of Public Works, played a notable role at that time, and in the problems discussed here.

Indalecio Prieto put legal regulations into effect on April 13, 1932, and with them he first stated, "*the express intention that the State carry out the necessary work to irrigate certain areas dominated by hydraulic works*." This regulation has been evaluated as "*a relevant link in the long history of hydraulic policy*," because "*it outlines for the first time an integrative, and coordinated conception of state intervention*," and "*poses a clear convergence of the respective orientations of hydraulic policy, and the policy of internal colonization inaugurated in* 1907" (Ortega Cantero, 1984: 122-126).

Analyzing things, and their development, what Prieto wanted to achieve was the national project that had been dragging on since 1902. Consequently, the laws that were promulgated by the Cortes Generales could no longer be novel, but they served to fulfill the objectives that had been proposed but that no one had achieved. And in this sense, it was a novelty. He was rejected when he proposed transferring water from the Tagus to the Guadiana (Díaz Marta, 1969: 54). And this issue remains unresolved because every time a project of this type is discussed, regardless of who it affects, controversy continues to this day.

The public works conducted during the Republic meant obtaining three times more water from reservoirs than during the entire period of Primo de Rivera. All the basins benefited and increased their flows (Díaz Marta, 1969: 45). This does not mean that there was no controversy; on the contrary, there was strong controversy, as recognized by Manuel Lorenzo Pardo himself, who was a man dedicated to water policy from the beginning, and who received criticism from everyone, especially from the leaders of the Duero basin (Lorenzo Pardo, 1933).

The Republican projects, and plans can be evaluated and, at this point, can be done without prejudice. As regards irrigation, the Republicans agreed on approaches with those who were previously involved in water issues. The problem

that arose, in practice, was none other than the misunderstanding that existed between the leaders who managed each hydrographic basin, because equality was mostly rejected (Ortega Cantero, 1992: 363-364). The question, today, remains the same: has this criterion changed or is it still stagnant, and in force as it was more than a century ago?

It must be recognized historically that all the plans proposed by the central administration, including those developed by Manuel Lorenzo Pardo, which in their time were the best, and most scientifically appropriate, were rejected, and continually torpedoed by the large landowners of each, and every one of the basins. These land magnates, heirs to the purest, and most faithful medieval feudalism, showed their rejection, as Gabriel Tortella rightly points out, because they did not want a "*technical agrarian reform*" and because they assumed in their positions that the availability of water for irrigation would shatter their large estates (Tortella, 1994: 238-239). This should also be understood as being typical of any change for improvement that shakes the centuries-old stability of a few.

Influences, "connections" and "tips" destroyed many family, and social desires. This can be clearly seen in the few existing photographs from the end of the 19th century, and until after the Civil War of 1936, which are still awaiting doctoral theses that reveal everything they show, which is not exactly opulence but much poverty. In this sense, in the Republican era, although many leaders did not want it, Mendizábal's assertion remained alive: "*Spain will be poor as long as its fresh water is lost in the sea*."

What was clear for half a century was that the landowners did not want reforms or improvements and if these came it was in dribs and drabs and because they could not delay them any longer. Antonio Gómez Mendoza offers figures that cover from the beginnings of the irrigation policy, in 1850, to the times of the Second Republic, in which he shows that the swamps, reservoirs, irrigation systems, etc., evolved at a snail's pace; what's more, when many of them had to be put into operation, they could not be put into operation because they required prior repair. This is detected by evaluating the possible capacity and the real available capacity. (**Table 1**)

Table 1. Number of reservoirs built in Spain between 1850 and 1935, classified according to capacity, and actual water stored.

Years valued	Constructed reservoirs	Capacity in thousands of cubic meters
1850-1900	19	287
1901-1910	18	758
1911-1920	44	2 251.8
1921-1925	15	643
1926-1930	31	1 487.5
1931-1935	34	2 592
Total	161	8 019.3

Data extracted from Antonio Gómez Mendoza (1991: 201-202).

There are no constructions in the years of the Civil War. The assessment that can and should be made of the period from 1850 to 1935 is that state investment was made, but slowly; moreover, it can be said without any passion that what Joaquín Costa Martínez explained in his book *Oligarquía y Caciquismo* was acting, perhaps, more in the shadows than in the light of day, by those who wanted to slow down the process on the one hand and speed it up on the other.

After 1940, the Franco dictatorship accepted the construction of reservoirs as a challenge. But if we evaluate the period from 1931 to 1935 without complexes, we see that 34 reservoirs were built in the national territory compared to 37 that were built during the 40 years of Franco's government, who is described as the "*man of the reservoirs*"; moreover, it has been studied in depth that the actions of the leaders of the Second Republic exceeded in capacity those of the dictatorial stage by a percentage of six to four (Gómez Mendoza, 1991: 201-202).

And before concluding this section, it must be recognized, although it is also a short chapter, that hydroelectric constructions also favored the creation of an industrial fabric in some areas, because Spain was eminently agricultural until 1960. In this respect, the assessment provided by Antonio Cubel must be considered: "*the public works projects developed in the first third of the twentieth century contributed to the growth of Spanish industrial production*" (Cubel, 1997: 78).

3. Water and Reservoirs between 1940, and 1980

In the history of Spain there are times destined for reforms, and counter-reforms. Some of this occurred during the forty years of Franco's regime, especially in the first stage that ended around 1958-1959, when the objectives programmed in 1939 were already far from being achieved. The Civil War brought two Spains together that thought differently. As regards reservoirs, swamps, irrigation, etc., it was demonstrated, before the war was over, that in principle the victors were against the decisions taken during the Second Republic, which should therefore be annulled, and return to the spirit of the early 1930s and, if possible, go back in time to find the first impulses; that is to say, those that had been started after 1900.

The victors criticized and rejected everything that had been done between 1931 and 1936 and, in this sense, everything that had been done should be destroyed. I repeat everything should be destroyed except one thing. Nobody from Franco's regime gave the order to destroy the 34 reservoirs built by the Republicans, and especially by Indalecio Prieto. No irrigation canals or anything that could affect the structures built during the Second Republic were touched. Criteria were modified, which is logical on the other hand, from the side of the winners, but nothing more. What was attacked was the agrarian reform put in place by the losers, especially in those regions where rural conflicts were a historical constant: Andalusia and Extremadura.

The Franco regime had just been established in Burgos in April 1939, although it had already been in operation in that city before, when the so-called General Plan for Public Works was promulgated, which, about irrigation, took up the cri-

teria of Manuel Lorenzo Pardo. The legislative activity in this regard was frenetic because in June of that same year, another regulation oriented towards irrigation appeared, and in December, the *Bases for Colonization of Large Areas Act* appeared; that is, the so-called plans for Badajoz, Tierra de Campos, Los Monegros, and others that were beginning to be considered.

In the first two decades, from 1939 to 1959, criteria emerged that were called "colonizing processes" because they had a "*high national interest*." The objective was to generate a "*profound transformation*" in the economic structures that were present in the "*large tracts of land*" and that forced the state to be aware of its execution, that private initiative was overcome and that made "*the technical, financial and legal support of the State necessary*" (López de Sebastián, 1970: 108-109).

Undoubtedly, the objectives proposed, and to be achieved were focused on cleaning up marsh areas to make them productive, in the large extensions of dry land that had to be transformed into fertile land; that is, up to now there has been no new development that was not in the "papers" of the men dedicated to water and irrigation since 1850. Furthermore, it is expressly stated that the required and necessary works will be carried out so that irrigation is possible where it is not yet possible (López de Sebastián, 1970: 108-109). In the opinion of several scholars, and analysts, the proposals made in this regulation contain a considerable influence from the plan proposed by Manuel Lorenzo Pardo (1933) (Ortega Cantero, 1984: 149), and more than one is surprised that now the large Andalusian landowners accept that their lands must be irrigated, and that they do not refuse as in the times of the Second Republic (Mata Olmo, 1984: 205-206).

The body in charge of carrying out all these works will have "sufficient" autonomy to act and will be none other than the National Institute of Colonization (INC), created in October 1939, and dependent on the Ministry of Agriculture. However, the fact that landowners in Andalusia have changed their mind's regarding irrigation does not mean that they were willing to accept the social participation, and involvement of their day laborers, for the simple reason that anything that might smack of social and citizen participation is rejected by the regime, and even more so if things were to raise any social demand proposed by the agricultural unions. The only union is the vertical one, and not one more.

Twenty years after the victory, in 1959, the regime returned control over the construction and operation of hydraulic works to the Confederations and, a year later, "*a slow but progressive recovery of the participation of the users of the Confederations began. First, in the auxiliary and consultative bodies […], and later* (*another twenty years had to pass, until* 1979), *access to the governing bodies, that is, to the Assembly*" (Fanlo Loras, 1996: 181-182); That is, when Franco was already dead, and the period of democratic transition had begun.

The actions of the National Institute of Colonization have been evaluated by Carlos Barciela as a resounding failure, because this scholar understands that the irrigation, and colonization projects "*were not adequate for the circumstances*

that the countryside experienced during the 1940*s. This inadequacy is reflected in the lack of complementary inputs for irrigation* (*fertilizers*, *select seeds*, *machinery*)*; the lack of support systems for the diffusion of new irrigation technology* (*research*, *agricultural extension*, *credit*)*; the existence of traditional alternatives that were less expensive*, *and much less risky that allowed maximizing the return on existing investments while minimizing risks*" (Barciela, 1986: 408-410).

This opinion is corroborated by Francisco José Martínez Mesa, for whom what the National Institute of Colonization did "*was to buy land and encourage the profit motive of the large landowners*", since, in that first Francoist stage, the one described as autarchic and isolated, "*the landowners were the only ones who had the technical*, *and economic means to undertake the works. The risks were minimal*, *because they kept* 72*% of their land*, *compared to the profits. Because if*, *on the one hand*, *they put better-paid crops under irrigation*, *on the other*, *by facilitating the creation of small plot-holder villages […]*, *they assured themselves of abundant*, *cheap*, *and valuable labour*". In total, therefore, "*more than* 50*% of the irrigated lands passed to large landowners; the difference in size of irrigated properties became more pronounced; the number of settlers established turned out to be very limited; between* 1939 *and* 1951, 26,024 *settled on dry land*, *and* 1,404 *on irrigated land*, *with the consequent very high cost and*, *what is more important*, *the surface area finally transformed and improved*, 85,017 *ha.*, *between* 1939 *and* 1951, *was quite far from the most gloomy forecasts*" (Martínez Mesa, 1997: 141-142). Cristóbal Gómez Benito points out something identical (Gómez Benito, 1995).

I have already indicated previously that the Republicans built 34 reservoirs between 1931 and 1935 and that the Franco regime surpassed this figure by only three, reaching 37. However, the latter represented, in relation to the previous ones, and in terms of water storage capacity, a tenfold increase in all that was available between 1850 and 1935, as expressed in detail by Gabriel Tortella (1994: 239).

The major works to be carried out will be carried out in Extremadura and Aragon. In the first region, the Badajoz Plan is being developed with the intention of continuing with a second one that will be called the Cáceres Plan. Between 1939 and 1956, "*some* 235,000 *hectares*" are opened to irrigation (Díaz Marta, 1969: 65). One of the objectives of the "social" Franco regime was to eliminate poverty, and misery of centuries through an intense reform granting land and water (Pérez Rubio, 1995: 483). This aspect was nothing new in 20th century Spain because these measures had already been proposed from 1932, when the construction of the Cíjara dam on the Guadiana River, and the Montijo canal, also in Badajoz, were proposed, which were completed in 1956 and 1957, respectively. But the regime's propaganda sells them as its works from beginning to end (Díaz Marta, 1969: 47).

On April 7, 1952, an Act was enacted that required four years of prior studies. It focused on a plan for works, colonization, and electrification of the province of

Badajoz, "*with the objective that if the land did not fulfill its social and economic function it was because* […] *it lacked adequate exploitation for the possibilities it had, generating high agricultural unemployment, little variety of crops, social inequalities, etc. The result was a tremendous failure*" (López de Sebastián, 1970: 318-336; Díaz Marta, 1969: 68-71).

It should not be ignored that the spirit of Joaquín Costa Martínez was still alive, and Francoism was considered his heir when it came to expanding irrigated land. Between 1950 and 1970, irrigation was increased notably, doubling, and tripling this possibility depending on the location. Having water in quantity was a problem to be solved since 1850. This was a constant historical claim. In the Duero basin, by 1955, the Castilla canal had already achieved a good network of canals, and with them the irrigated surface could be expanded, especially with the canals called Pisuerga, Palencia, la Retención, and Macías Picavea; what is more, navigation in these channels is disappearing, and will end up becoming something destined for leisure (Helguera, 1988: 153-158).

The construction of reservoirs and marshes was seen as something good in all sectors, even in those that rejected the regime. In this respect, the electricity companies were always waiting to be able to have one more turbine, and increase electricity production, and this is how Abraham Guillén should be understood when he says "*if we build large reservoirs throughout Spain, we will have electricity to create a powerful light, and heavy industry, mechanized agriculture, and a national transport network with the lowest operating costs in Europe, which today is one of the most expensive and poor*" (Guillén, 1963: 55).

Unfortunately, there was sometimes bad news regarding the construction of dams, such as that of January 9, 1959. That day the Ribadelago dam in Zamora burst, and it did not generate more death, and devastation because the Sanabria lake was able to absorb the excess. This event marked the beginning of what later came to be called "*hydraulic catastrophes*", which generated much criticism of the quality of the construction, the geological studies carried out, etc. To this catastrophe we can add that of Torrejón el Rubio, which occurred on 22 October 1965, that of Cedillo also on 22 October 1972, and that of Tous ten years later, on 20 October 1982. I will return to these details later. It was clear that this month was disastrous for the hydraulic projects of the regime that had already been carried out.

By 1959, the so-called *Economic Stabilization Plan* had been imposed. Driven by a desire for European recognition, Franco's regime knocked on the doors of the then European Common Market, and even had an extraordinary minister as ambassador to the European institutions. Having already had international recognition from the Western bloc, the regime requested that the World Bank send technicians to evaluate the situation in Spain, and indicate what paths remained to be taken, and what defects in the system required rectification.

The report, which is digitalized, and can be freely consulted, came to say that Spain's economic management was disastrous, and that the impacts on agriculture

were not adequate for it to function well. Curiously, the irrigation section is described as extremely expensive, because the hectare of land planted with wheat, potatoes, etc., except for beetroot, had a very high cost, so rectification is recommended (Cabo Alonso, 1984: 245).

It is clearly stated that agricultural production with reference to water consumption produces crops that are considered very expensive; moreover, the same report adds that there is no room for private initiative. By this time there were already technicians, especially economists, in all the ministries, and they already had a certain social support. This is not the time to make a broad reflection, although it requires it, to evaluate the criticisms coming from the World Bank, and the contributions from within. The technicians sent by the banking institution quickly, and well detected the desire that had existed since 1850 for irrigation to be a good thing, and that was how the Spanish understood it; furthermore, the Report clearly states that "*the social aspects of irrigation policy are in agreement with the Report, but that they judge it to be erroneous to consider irrigation as the great panacea of agrarian social policy*" (Ugarte del Pino, 1963: 239).

In the long run and in the short run, between the content of the World Bank Report, and the criticisms of sociologists, and economists mainly, I believe that, at that time, Ramón Tamames' position was the most judicious when he opines that "*the Bank's criticisms of our agrarian policy are excessively timid*"; furthermore, he also points out that the "*reorganization of our irrigation policy […] will have to come from those who really have it in their hands*" (Tamames, 1963: 155-156).

In a short period, irrigation projects were cancelled or carried out at a slow pace. From 1962 onwards, the dynamics that existed a decade earlier began to slow down, because state investment had been reduced, which had to be replaced in part by private investment, and by the introduction of new crops (Wright, 1980: 33-34).

The regime considered certain recommendations from the World Bank Report regarding the excessive zeal placed on irrigation and made a change to ensure profitability. Consequently, a plan was established with many resolutions, including "*first of all, those aimed at finishing projects in the execution phase, giving preference to those in which the work already carried out is more than* 50 *%. Other works that had been started were then included, which offer the best capital-product ratio, and, among them, those that will have the greatest influence on the volume of agricultural exports*" (Prados Arrarte, 1965: 250-251).

In the last years of the Franco regime, the *Agrarian Reform and Development Act* was passed in 1972, with very specific recommendations to be carried out by the National Institute of Agrarian Reform and Development (IRYDA), since large-scale works require other complementary works, new techniques, and business knowledge. Recommendations aimed, above all, at breaking "*the inertia of the farmer in the face of such a radical change in cultivation systems, and tillage methods, especially if they affect large areas that were previously dry land*" (Pazos,

1992: 299-300).

There was one pending issue, which would be inherited by the governments of the transition to democracy and later. This was none other than the transfer of water from one basin to another, a thorny issue that, as soon as it began to move, created a lot of noise, and then a lot of silence on the part of whoever proposed the initiative.

Francoism disappeared with Franco, although it had some subsequent repercussions. The dictator's death coincided with a considerable energy crisis that needed to be addressed. In a long quote, Ramón Tamames explained it thus: "*in the meetings at La Moncloa there was consensus on the energy crisis as one of the most pressing problems, both because of the high, and growing national consumption of energy, as well as the strong dependence on external supplies, and its inevitable impact on the balance of payments. To resolve these problems, the Moncloa Pacts promoted the policy of energy conservation, and savings, the diversification of supply sources and, above all, the use of own resources in the areas of nuclear power, hydroelectricity, and coal. All the measures related to this end would be included in the National Energy Plan* (*NEP*)*. At the same time, in the line of rationalization, it was decided to create a new body for the coordination of all the activities of the state in this field, thus uniting the separate parts of CAMPSA, Butano, Enagás, Empetrol, etc. This was the antecedent of what would later become the INH*[9]*, set up in* 1981 […]*. In the same direction of rationality, it was proposed that the state would promote the grouping of the large electrical companies in no more than half a dozen entities. It was also recommended to recover for the public sector the powers of the private company Unidad Eléctrica, S.A.* (*UNESA*), *in terms of distribution, and transport of electric energy throughout the national territory, which would be the origin of the Spanish Electricity Network* (*SEN*)" (Tamames, 1995: 155-156).

When the recently restored democracy is discussing these issues, the reality is that the *Water Act* of 1879 was like a distant memory, because since that date there had been many achievements. Juan Benet points out that in little more than a century, with the help of 700 large dams, some 40,000 cubic hectometres have been regulated, four times the natural capacity that the territory offers to the inhabitants for their consumption, the ravages of droughts, and floods have been alleviated, and irrigation has increased by three million hectares. But the next challenge is to reach 60,000 cubic hectometres per year, and five million hectares of irrigation.

And for this "second hydraulic development" in Spain, a new *Water Act* is needed (it was approved in 1985), with the following bases: 1) The continental waters of the Spanish territory, running or static, surface or underground, constitute a public good and their use must be subordinated to the general interest; 2) The State, through its agencies, will manage the water with management unity; 3) The hydrographic basin, as a management unit, is considered indivisible; 4) The

[9]INH (National Institute of Hydrocarbons).

management of the public hydraulic domain will be carried out in obedience to the National Hydrological Plan, and the hydrological plans of basins; 5) A National Water Council will review, and report on both kinds of plans; 6) The opening of underground sources will be subject to the corresponding state authorization: the owner of the land will have priority over any other user; 7) The conservation of the good condition, and quality of the waters will be the responsibility of the Administration (Benet, 1984: 278). With these summarized budgets we arrive at 24 July 1998 when the government approved a Decree to regulate water in Spain for the next 20 years, that is, until 2018. However, there was a lot of opposition, and discouragement, because the autonomy of Castilla-La Mancha, governed by José Bono Martínez, opposed many wishes of the government of Felipe González Márquez, despite being from the same political party, they did not reach an effective agreement.

When a new government of the Popular Party comes in, the panorama does not seem extremely attractive. Minister Isabel Tocino will say that there are no resources to do all the necessary works; moreover, to make it clear, she will say "*that appearing on a list does not mean that they will be executed*." Consequently, the White Paper on Water is drawn up, delivered to the ministers at the Council on 31 July 1998, as a basis for the future, and long-awaited National Hydrological Plan.

This document was immediately criticized by critics who suggested that its development would depend on private initiative, that it lacked an environmental impact assessment (according to the socialists), and that it enshrined a hydraulic policy based on cement and concrete (according to the environmentalists of Greenpeace, CODA, and SEO) (Mardones, 1998: 19). On 5 January 2000, as Minister of the Environment, Isabel Tocino declared that the National Hydrological Plan was "*technically finished*" and that it would be necessary to wait until the next legislative period due to the lack of financial resources.

4. A Particular History of a Reservoir: The Barrios De Luna Reservoir

The various Spanish landscapes, and especially those of the high mountains, are home to more than 700 reservoirs. For sentimental reasons, because I was born in a nearby place, I am going to tell a little of the history of how a specific project that is in sight was developed: the reservoir called Barrios de Luna, in the province of León, and in the northwest of Spain.

The drought, one of the traditional ghosts of Spanish history, made an appearance again, curiously, in an area that is described as Humid Spain. After two long years of not a drop of rain, and less snow than necessary, the reservoirs, especially the one in Barrios de Luna, began to collapse continuously. The decrease in water reserves has allowed ruins of some of the villages that were flooded after the dam was closed before 1956, the year in which it began to supply water for irrigation, to come to light.

This reservoir has been in the news on television, in the press, on television and radio talk shows, etc. It was no wonder if we consider that the farmers of the middle, and lower Órbigo believed that the water resource was already assured for life. But the atmospheric reality has shown that this illusion can be broken at any time; rather, today it would be good for these farmers to think about planting or sowing crops that consume less water, since hybrid corn consumes between four and five times more than wheat, for example, and this is the most frequent plantation in the entire Ribera del Órbigo.

On Sunday, September 10, 2017, the *Diario de León* published, in the culture section, a journalistic essay by Verónica Viñas, entitled Swamped Heritage. The content deals with the reservoir of the Barrios de Luna, recalling that to achieve this it was necessary to flood 16 towns[10] in the central mountain of León, all of them irrigated with the waters of the Luna River until then. Before the date of publication, other media outlets have dedicated time, and space to highlighting the absence of water in what we can call the "*bottom of the reservoir*."

Of the towns mentioned, only one, Miñera, now has many ruins from the past, which are visible, which can be touched, caressed, the streets of the old town can be seen, the willow trunks that were used to delimit the properties of each of the neighbors, etc.; you can even see the remains of a small mill.

On October 5, 2017, I visited these places, and walked through the dried mud at the bottom of the reservoir, since at that time the reservoir contained a quantity of water of about 5.5 hectometers compared to the 47 it already had on December 25, according to the website of the Duero Hydrographic Confederation. This means that the scarce rain and snow, until then, have improved a little the terrible situation in which almost all the reservoirs of the Cantabrian Mountain range were on their southern slope.

This fact brings us back to the issue of drought, and its evolution as a serious problem since 1850; that is, since the time of Isabel II, as I have been showing in the previous pages. In this sense, it must be clear that the many towns that were left under water forever were submerged for the sake of the collective common good of the farmers who were yearning for water for their fields, and for the sake of the little industry that could be generated later.

I think it is my duty to add a little to this subject, which has nothing romantic about it; what is more, the reservoir of Barrios de Luna, like the other 36 that were built during the Franco regime, has nothing to do with a pharaonic work of Ancient Egypt, as Verónica Viñas states in her essay. But no reservoir is pharaonic because all of them were made with the objective of having water, but not to be cemeteries. And the majority of the nearly 700 that are scattered throughout Spain, including the 37 from the Franco era, were not conceived as a work like the pyramids near the Nile, but to satisfy the need for water.

[10]The 16 villages are: Arévalo, Campo de Luna, La Canela, Casasola, Cosera, Lagüelles, Láncara de Luna, Miñera, Mirantes de Luna, El Molinón, Oblanca, San Pedro de Luna, Santa Eulalia de las Manzanas, Trabanco, Truva y Ventas de Mallo.

What is more, if it is about plundering, all the reservoirs fit that description, even those that are planned, and not finished. In the province of León, we have the example of Oliegos, in La Cepeda[11], which not only disappeared under the waters of the Tuerto River, but its inhabitants were transplanted to Foncastín, to a farm located near Tordesillas.

At that time, 1945, the families were taken from the Porqueros railway station on a train that would take them to Valladolid. The people were housed in the Felipe II hotel in that capital for one night, and the next day they were taken by bus to the Foncastín farm. The houses promised by the National Institute of Colonization existed only in the imagination, and they began to be built a year after the great exodus. The first shelters turned out to be the granaries of the farm on the previous property, which the Marquis of Conquistas had sold to the institution. The whitewashed houses and the church were delivered in installments over the next four years, some even after 1950, and were paid for by the exiled *Cepedanos*[12].

The wagons carrying the animals, and belongings continued their journey to Medina del Campo, and from there they began the "journey" on foot, and with carts. The current residents of Foncastín, who left Oliegos at the age of four and five, point out the poor management carried out by the National Colonization Institute throughout the process. The cows, oxen and other animals made the journey with difficulty because it was unfamiliar terrain. Various additional data can be found in Ángel Cabo Alonso (1997: 18-32).

Another thing is to evaluate the ethics with which the property, and people were treated. There, of course, the development that was carried out and how it was carried out is open to criticism. In this sense, I agree with Verónica Viñas's opinion on this matter, and with Ana Villanueva Fernández, author of a doctoral thesis, available on the Internet, which deals with the heritage that was looted, and lost forever: because the ruins of Miñera can be seen, but what disappeared will never be seen again.

In all honesty, what is observable today are few testimonials that remain because they were sold before the flood, many of them by their owners, many of whom I have spoken to on several occasions. And those who did not liquidate their properties were sold by people from the National Institute of Colonization or the Leonese Electric Companies.

The journalistic essay points out that the amount dispensed by the state reached the figure of 175 million pesetas of the time, and with these pesetas all the expropriations that had been made previously, and by means of a file were paid. These events forced a massive exodus from all the settlements that were going to be flooded. The possibilities of new residences were sought in other places in the province of León, and even outside of it. Those who chose to settle in places in the middle and lower Órbigo were called *pontoneros*, not *pantaneros*, which would have been more correct (Junquera Rubio, 1993).

[11]La Cepeda is a region in the province of León.

[12]By Cepedanos we must understand the native residents of the La Cepeda region.

It is possible that the expropriation files were developed in accordance with the prices set for the time, and for traditional farms, meadows and houses (Fernández Uzquiza, 1942). In them, nothing has been detected about the so-called movable assets, which were notable in all these towns, because they had a more than notable livestock heritage, and a part of this was mentioned in passing (Teijón Laso, 1948: 3-50; 1949: 231-309, 452-507).

It should be clear that the documentation presented for expropriation was prepared by agricultural engineers, not by economists, for example. In the case of Luna-Órbigo, one of the leaders in this action was Juan José Fernández Uzquiza, who always acted on the low side so that the state could save as much as possible; moreover, all the recommendations he added focused on paying the lowest possible price for any urban or agricultural land to be expropriated (Fernández Uzquiza, 1949).

That said, and romanticism aside, exoduses take no account at all the feelings of those who are forced to embark on a path that they never know where it will take them, and even less so how it will go. At my age, I have to admit that I have read many books and essays focused on social justice and I have seen with my own eyes many injustices in Latin America and in the countries of the African Sahel, and I have tried to provide data on some of them (Junquera Rubio, 2020; 2022; Junquera Rubio & Pastor Martínez, 2016); well, I must admit that social justice is a fully desirable objective, but throughout human history I believe that it has never been achieved with equity. I say this because there were responsible people at the National Institute of Colonization who believed that the amount quoted by the state was excessive (Fernández Uzquiza, 1949).

The reservoir of Barrios de Luna began to store water, and by mid-June 1951 it already had significant reserves. The dammed resources meant, for the farmers of the middle and lower Órbigo, the possibility of having water in abundance. And this reality allowed the *norias*[13] that had been working for eight previous decades to be put to rest. Those who depended on the land for their subsistence understood that the moment had come for their redemption. No one thought that this resource would ever be exhausted or almost exhausted, as is happening today.

Shortly after the first water reservoir was started (the reservoir has a capacity to hold 308 hm^3, and a surface area of 1130 hectares), a notable catastrophe occurred: the rupture of the Ribadelago dam, which occurred, as already noted, on January 9, 1959. This event generated collective alarm in the towns settled in the middle Órbigo, which went into collective panic at the supposed possibility of something similar happening. For a long time, it was common among the peasants of the area to approach the riverbed to see if it was rising or not.

The death of 144 people in the province of Zamora forced Franco's government to order a review of all the dams built by him, since these painful events became known, despite the censorship always eager to minimize negative events. The press has paid tribute later, but at the time it was not done. The inspection of the

[13]Waterwheel.

dam of the Barrios de Luna reservoir, which is 96 meters high, detected a fissure and the same was reported to the relevant authorities. Immediately afterwards, a complete repair was ordered, and because of the report carried out it was possible to learn that an employee of Ginés Navarro's company was prosecuted for appropriating materials, especially cement, which in those years was a product that was controlled by the state.

The investigation into the containment dam, coupled with the panic and protests of the residents settled in the villages downstream, forced the administration to build a few kilometers downstream a dam known as *Selgas de Ordás*, because it is around that town. It was built to stop the possible rupture of the Barrios de Luna dam, and to minimize as much as possible the possible catastrophe. It was built in 1963 and was later also used to provide water for irrigation.

That said, many of those expropriated sought accommodation in the middle and lower Órbigo. In the villages below Benavides de Órbigo they were called *pontoneros*, and not *pantaneros*[14] (Junquera Rubio, 1993). This group had cash to buy houses, and farms to be exploited.

On the other hand, it must be considered that the Barrios de Luna reservoir, in reference to the various crops, and pastures, was to have the mission of providing a permanent flow of water and regulating the river channels to banish once and for all the floods that occurred during the thaw, and that flooded farms and towns, causing damage. The system of secondary channels comes from the impact generated by the ploughing carried out by the Roman Empire, which needed to open new extensions of land to be used for cereal and to be able to feed the workers of *Las Médulas*, for example. Later, during the Repopulation period, there was a need to continue expanding the canals intended to provide water for irrigation (Junquera Rubio, 2006: 125-154; 2008; 2023).

When a project was launched to facilitate the irrigation of the Páramo, which for a time was called Vega del Caudillo, there was a need to establish a temporary industry in the Veguellina de Órbigo area to make concrete canals through which irrigation water could flow on the large surfaces that until then had been wastelands. This company was called PRECON S.A.

Curiously, in the autumn of 2017, the availability of water has lowered expectations to reach unsuspected limits at the time when the dam was built; that is, resources were at a minimum, and alarm has spread at a regional level, as fear of running out of water spread as the maximum volume of water stored became an urgent need. In the latter case, agriculture, livestock, and people would have no choice but to emigrate in masse, and disappear, because the banks of the north of the province of León, without becoming desert landscapes, would become wastelands without water.

Solutions? At first glance, the solutions seem climatological; that is, they depend on rain and snow, and if these two elements fail to materialize, social, political, and economic problems will arise again. No one can live without water resources,

[14] *Pontoneros* would derive from bridge, and *pantaneros* from reservoir.

and however regrettable it may be, humanity has no magic solutions. What can be stated with certainty is that, since the late 1940s, rainfall and snowfall patterns have been declining, while global warming has been increasing. In those distant times, the streets of any Spanish town were white and icy during the winter months, and each resident had to clear a path so that others could travel through the streets of their town; but that is now history.

That said, it seems that, a century and a half later, Joaquín Costa Martínez's thinking has not become obsolete. Let's see what solutions current politicians offer, politicians who promise much and deliver little. I don't think we have to wait much longer, as the drought is becoming entrenched globally and this phenomenon doesn't seem likely to subside in the coming years; rather, it will intensify. To this climatological fact, we must also consider negative human activities such as the following:

1) establishing new industries with their corresponding facilities, which consume considerable quantities of water.

2) current agricultural practices in developed countries consume much more water and create areas that endanger habitats with protected species.

3) the desire to expand irrigated areas often necessitates the installation of sprinkler irrigation systems, which draw water from the subsoil and reduce water consumption.

These and other actions do not help maintain stable water courses because they diminish and dry them up (Guillet, 2000: 713-725). The water problem is currently a global issue. For example, the last two hundred kilometers of the famous Colorado River in the United States are now saltwater that has entered through its mouth in the Gulf of California. This impact has occurred because, on both the left and right sides of the river's natural channel, farmers have extracted freshwater from the water table, allowing more seawater to enter than it should.

Another example is the industrialization of agriculture in China, which, in the last 25 years, has dried up more than 28,000 secondary rivers (Junquera Rubio, 2024). Chinese authorities, aware of this problem, are trying to solve it by transferring water from southern to northern regions through a network of canals to offset this loss. It is hoped that they will succeed (Tenenbaum, 2024). Water was and continues to be a scarce resource, and we must care for and protect it with great care, or our lives will be in danger; indeed, without water there is no life. I don't know if this essay can serve as a wake-up call, since that was my intention when I set out to write it. I believe I have fortunately trained several students who have responded well to my teaching, especially those living in the African Sahel, who are willing to fight for a better and more balanced world despite the many problems they face. Fortunately, some current technologies allow me to communicate with them. Let us all remember that without water there is no life.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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