



# Why We Need a Coastal Channel from Buenos Aires to Luján, with Beaches and Green Spaces

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**ABSTRACT:** This article answers the question posed in the title. Although it does not pretend to have all the answers, the responses herein are meant to start a discussion among the people of the City of Buenos Aires and the Province of Buenos Aires for the purpose of raising awareness as to the importance of maintaining a natural corridor of waterways by dredging the old river channel from San Antonio and Luján to the City of Buenos Aires, taking advantage of the excavated sediment to shape and give continuity to the riverbank, thus creating recreational public spaces that improve human development and further social inclusion.

## 1 INTRODUCTION

Admiral Storni, the true father of maritime interests, warned that Argentines took for granted those vast blue plains and brown valleys that are the waters that surround and run through their country. Today, as Argentines we can see that he was right to worry and that the consequences of “turning our backs” on the sea and our rivers has not only caused losses for the fishing industry but also, and mainly, to the human capital of the nation.

Today I shall write about the waters that surround the great metropolis that is Buenos Aires, this human conglomerate on the shores of one of the world’s widest rivers, where “its inhabitants are unable to quench the heat, not even with a quick dip.” This, then, is the irony that mocks city and province residents alike, that in the words of Laura Rocha, is a very real “punishment of nature” (*La Nación*, February 6, 2014).

Those over 60 years of age no doubt remember the days of sun and freshwater on the banks of the La Plata River, that, although not the Mediterranean, evokes the same sentiments and sense of nostalgia, so well memorialized by Juan Manuel Serrat:

*“Perhaps because my boyhood continues to play on your beaches and my first love continues to sleep, hidden behind your reeds, I carry with me your smell, your light wherever I go, I am a singer, I am a liar, I like to gamble and I like wine, I have the soul of a sailor. Can I help it if I was born in the Mediterranean.”*

These ideas inspired the pen of Horacio de Dios, who, in a metaphor, imagined the inhabitants of

Buenos Aires living in: “A wall-less living room, with waters that mix together histories and cultures, but not accustomed to having a balcony overlooking the river, nor to enjoy the water and the beach” (*La Nación*, December 1, 2013).

What happened to us? Why, over the course of a few years, have we lost the possibility to enjoy the river? How can it be recovered? What consequences should we expect?

## 2 HISTORY

From the Paraná and Uruguay rivers, 18,000 m<sup>3</sup> of freshwater flow into the La Plata River per second, but these waters also deposit 25,000,000 tons of fine sediment via suspended transport (sand, silt and clay). The Bermejo River alone transports 70 percent of this solid load. Consequently, the delta has been expanding and it is estimated that by the close of the 21<sup>st</sup> century, its coastline will have extended over the length of the District of San Isidro and likely as far as the District of Vicente López.

Experts say that the delta’s encroachment will also impact part of the Emilio Mitre navigational channel, boxing it in, which would necessitate changing the way it is dredged.

It would also increase the sedimentation rate for the ports and yacht clubs of the San Isidro and Vicente López districts, affect the water intake for the General San Martín Plant, possibly causing it problems due to its proximity to the future delta, and, lastly, create a wide range of conflicts associated with ownership of new lands that will be naturally formed.



La Plata River, decreasing the water supply for the coastal zones and limiting other hydrometeorologic contributions.

The consequences of all of these changes also affected the so-called “hidrotermias”, which Cano defines as: “the flow of coastal waters from tributaries and urban drainage that, because of their temperatures and characteristics, flow away from the coast and mix with the other waters of the estuary” (a trait that the Riachuelo lost 220 years ago, according to Cano).



Figure 2: Satellite image depicting “hidrotermia” phenomena in La Plata River. (F.J.Amorrotu)

Figure 2 shows the advance, against the current, of a column of apparently contaminated water from a San Isidro storm drainage, with a wake running counter to the flow of the river that eventually disperses laterally (natural negative exterior convection).

According to Cano, this “natural exterior convection” pushes the waters entering the river towards its center, where, mixing with cooler waters, it changes course by as much as 180°.

In this way, the “hidrotermias” serve an important function along the nearly 16 km of urban coastline, helping to naturally disperse the waters originating from the city while their temperatures differ from that of the waters flowing through the natural bodies of water and channels.

However, the aforementioned lateral dispersion is very slow due to the lack of water depth and speed, and this situation is aggravated by the accumulation of sediment and banks along the sides of the Emilio Mitre Channel.

As previously mentioned, until the late 18<sup>th</sup> century, the Riachuelo was another typical example of waters flowing into the estuary in a counter-current direction. History tells us that this river used to flow parallel to the coast (Paseo Colón) and then turn

toward the river and the ocean. This is how the water used to flow into the river.

Alejo Sarubbi’s thesis (“The Paraná River delta is growing constantly.”), examines the encroachment of the Paraná River delta in order to comprehend its dynamics in terms of its causes (sediment transported by the Paraná River) as well as its consequences.

Perhaps the most relevant piece of information is that the Bermejo River is the source of 70 percent of the solid sediment deposited in the La Plata River.

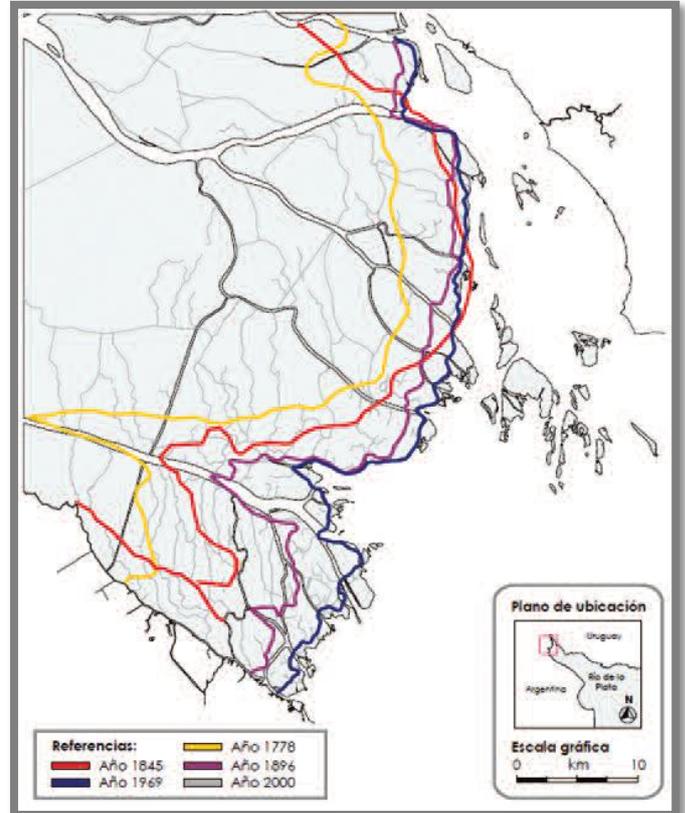


Figure 3: Historical advance of the delta (Sarubbi, A., thesis “Frente delta Río Paraná”).

Figure 3 illustrates the expansion of the delta since the 18<sup>th</sup> century. Its greatest advance is along the coasts of Buenos Aires, leaving Tigre surrounded by islands by the end of the 19<sup>th</sup> century.

One can also appreciate the sharp decrease in the sedimentation that took place during the decade of the '70s, which reveals the impact of the large dams constructed by Brazil along the entire hydrologic system (see Figure 4).

These dams retain the sediments and increase the water depth for navigation and the generation of electricity in some cases (Argentina only had the Yacyretá dam at the time).

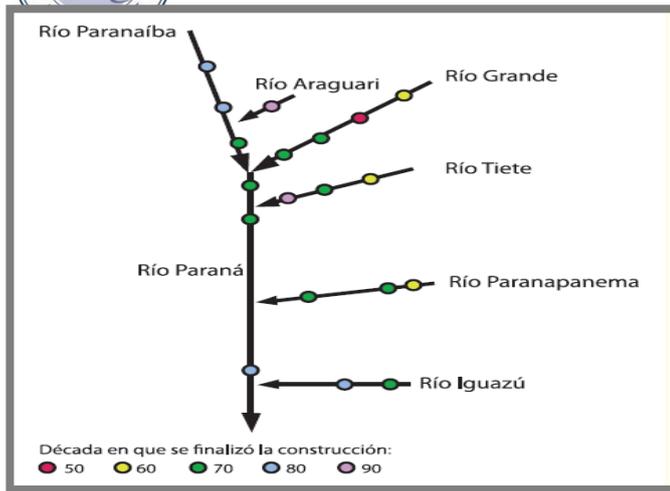


Figure 4: Dams constructed by Brazil

Unfortunately, all indications are that in a century the City of Buenos Aires will have islands off its coast (see Figure 5), with adverse consequences for the environment, water supply and shipping; in other words, for its inhabitants, as we shall see below.

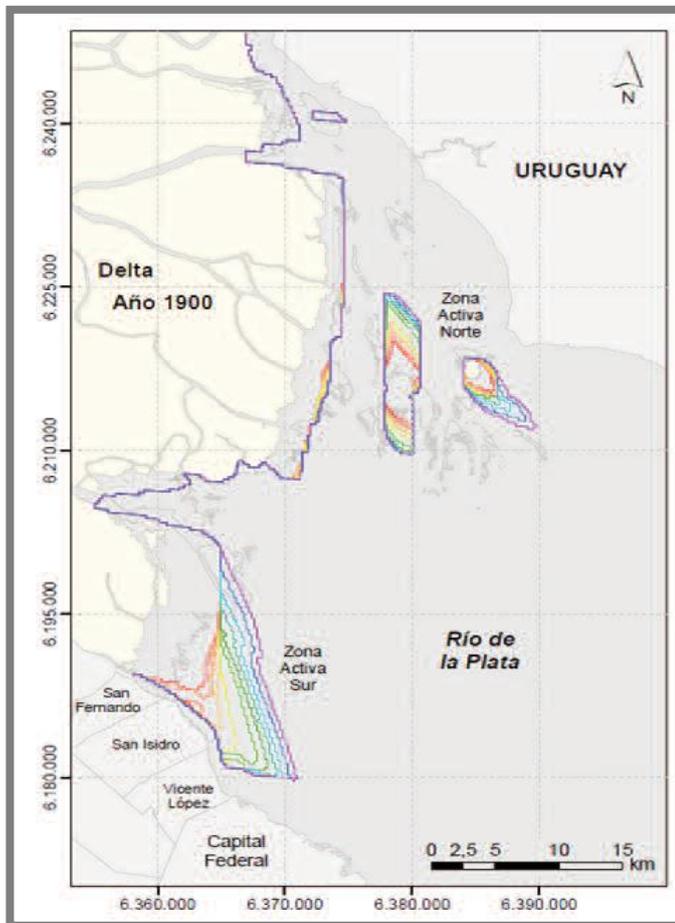


Figure 5: Projected advance of the delta (Sarubbi, A., thesis “Frente del delta del río Paraná”).

Some of the undesirable effects noted by researches include: the Emilio Mitre Channel, being boxed in by islands, will have to adopt a new dredging strategy; the ports and yacht clubs of the districts of San Isidro and Vicente López will lose their natural access to open water and will only be able to receive small crafts; the General San Martín plant may face water intake issues due to its proximity to the delta; and measures should be anticipated to update the land register for the extreme southern area of the delta in order to avoid conflicts as to the ownership of these newly created lands among private individuals as well as municipalities and government entities.

As is likely the case for the reader, who has been patiently attempting to retain the names and places of our fluvial geography, it is opportune at this point to pose a series of questions that I will attempt to answer.

What would have happened if the hydraulic work projects planned for the Bermejo River more than 50 years ago to halt the transport of 70 percent of the sedimentation deposited in the La Plata River had been realized?

Undoubtedly, the advance of the delta would have been slowed, as demonstrated by the data gathered following the construction of the dams in Brazil. This is to say that, although it is late, there is still time to turn around a problem that will result impossible to resolve in the future. Not to do so is to mortgage the future because, as previously stated, the consequences of allowing the Delta to continue to encroach are severe.

What would have happened if there had been awareness as to the harm we are causing to the environment by dumping contaminants and urban waste in the water, and constructing obstacles and structures that affect water quality and interfere with the natural flow of coastal waters?

We would be much better off than today. I will attempt to address some of these issues below.

### 3.1 The Neglect of the Bermejo River

The utilization of the Bermejo River is something Argentines have long dreamed of. For one, by providing the competitive advantage of fluvial transportation to the Paraná-Paraguay waterway, it would allow for the development of a vast cereal- and meat-production area comprised by several provinces, including Jujuy, Salta, Tucumán, Santiago del Estero, Catamarca and La Rioja, and of course the western Chaco and Formosa, with excellent conditions to compete with the Pampa region.



Calculations made more than 30 years ago by Nicolás Boscovich, Ph.D in Economics from the University of Buenos Aires, and published in the Naval Department Bulletin No. 763, maintain that the channelization of the Bermejo River and other works would not only make possible the transportation of as much as two million tons of product to the Paraná River, but also control the flooding that devastates the region on a yearly basis and, additionally, end the drift of sediment that represents 80 percent of the sedimentation that flows down to the La Plata River.

To these benefits we should add the provision of drinking water and water for agricultural and industrial uses, and even the establishment of a port on the border with Bolivia.

Jorge Elías updated these calculations in an article recently published on the website “Nuestro Mar”, and added that the channelization of approximately 1,000 km of the Bermejo River, together with the construction of at least six embanking docks, would make it possible to store 9.5 billion m<sup>3</sup> of water and provide 3.089 billion kWh/year of energy, which would contribute to the region’s industrial growth as well as reduce freight costs, since river transportation is much more economical than either rail or truck.

But without a doubt the most comprehensive study was undertaken by José Daniel Brea and Pablo Spalletti, who analyzed the generation and transportation of sedimentation in the binational Bermejo River watershed.

They affirm that, on average, the Bermejo River contributes more than 100 million tons of sediment annually to the river system encompassing the Paraguay, Paraná and La Plata rivers, making it one of the major sources of sedimentation that flows into the La Plata River.

Work projects planned for the riverbed have the objective of controlling the process of riverbed erosion and thus avoiding the transportation of sediment loads via suspension that has fueled the encroachment of the delta and necessitated the constant dredging of the La Plata River’s navigational channels.

Although these projects would not end the need to maintain the channels, they would lead to the realization of a few of the initial estimates.

For example, the authors indicate that the construction of one of the dams on the high watershed (Las Pavas and Arrazayal on the Bermejo River, and Cambarí on the Tarija River) would cut down the suspended load by 15 million tons annually, which is a relatively small amount but a good start in slowing the delta’s advance on the La Plata River.

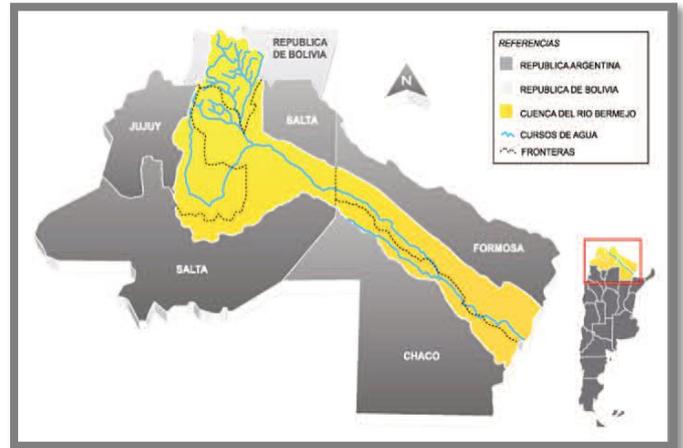


Figure 6: Bermejo River watershed.

#### 4 CONTAMINATION AND FLOODING

Contamination is a cultural problem that has not changed in many decades. The Riachuelo is an example of this. Today, the La Plata River estuary is beginning to suffer the same contamination as the Riachuelo. Without the rapid natural dispersion of water, due to the loss of natural coastal water flow corridors, and the high volume of non-biodegradable solid elements from storm drainages, the situation will tend to worsen.

Obviously, all of this has human and economic costs, but I will primarily discuss the physical and mental health consequences for the population, without going into too many details, which I will leave up to the reader.

The contamination of bodies of water and coastal areas generates a wide variety of diseases and risks for the population, obligating authorities to relocate communities to new areas that are suitable for the construction of housing. News reports on the matter are all one needs to understand the magnitude of the problem.

Floods affect the areas closest to the tributaries and the natural watercourses of the urban hydrological system, which generally manifests the consequences of excessive delays in infrastructure projects designed to avoid flooding caused by rainfall and increases in the river’s water level. The lack of recreational spaces adjoining the river limits the possibilities for relaxation and socialization for large sectors of society, particularly those who lack the economic means to travel to other coastal areas with beaches and green spaces.

All these factors, which affect human social dynamics and behavior, have solutions and I will mention some examples below.

The enclosing of the Maldonado Stream with large pipes and the concentration of its estuary waters before they flow into the La Plata River proved its efficacy in short order, but it also had a positive environmental impact, since it made it possible to



retain a good part of the solid residues that were previously carried directly into the river.

The partial work done on the Reconquista River has also proved effective, despite not having been completed. The rectification of the channel basins, the partial construction of ditches, and the removal of human settlements and outlets for contaminated water along the riverside are beginning to show results, even if just in the reduction of the odors that emanated from the bodies of water.

The continuation of this work is very important and I think it opportune here to share a recollection of mine from several years ago, when, in response to the construction projects Brazil had initiated to build dams and dikes along the tributaries of the Paraná River, some Argentine politicians worried that these constructions and the cities that began to emerge around them, would poison the waters downriver.

At that time, I had the opportunity to navigate along one of the most important tributaries of the Paraná: the Tieté River. Despite the high level of contamination in its waters in the vicinity of the City of São Paulo, some 200 km away one could begin to see the benefits of the containment, navigation, hydroelectric and tourism projects, which put an end to the contamination and demonstrated the importance of preserving water quality.

In contrast, when a society is ignorant of its rivers and distances itself from them, that is when biosystems suffer harm and economic interests take precedence in the face of indifference from governments and the people they represent.

Government leaders ought to listen to the voices of hydrology, water treatment and environmental specialists. There is a vast array of mechanisms to keep dirty waters from reaching the river with its load of solid contaminants. The Maldonado Stream and the Reconquista River are two examples of great advances in this respect, but there are also others, like the projects that can be undertaken for the Medrano, the Malaver and dozens of other storm water drainages, that with reservoirs and intermediate solid waste traps can improve, even if only partially, the quality of the waters that flow into the estuary.

## 5 URBAN HYDROLOGY

The city grows and everyone forgets that nature reacts and defends itself against the barbarism of man; in other words, “the river takes vengeance.” This is the case of the Luján-Reconquista watershed, modified by countless real estate developments, the success of which only time will tell. Let us turn to some numbers provided by respected researchers: the surface area of the Reconquista watershed is 167,000 hectares and shaped like a rectangle with its longer sides stretching from the southwest to the

northeast. It is home to more than 2,500,000 people. The Luján watershed, into which the Reconquista River and its flood relief canal flow, has a surface area of 250,000 hectares.

The entire watershed includes 134 watercourses that total 606 km in length. Both areas have a generally flat and uniform topography, though at its source it sits at an altitude of approximately 30 meters above sea level on average, descending to an average of 2 meters above sea level in the area of Nordelta.

Why is it important to know this? Because, as Amorrortu documents, in the *sudestada* storm of June 5 and 6, 1805, the estuary’s water level climbed 5.24 meters, and in 1936, the Reconquista River’s water level increased by 7 meters; it is clear, then, that any construction built below these levels (for Nordelta it would be 3.6 meters above sea level) would have been flooded.

Again, only a major, continual and sustained planning effort led by the state, accompanied by private interests, can turn the situation around and resolve these problems, which are rooted in the past. We should learn from them so as not to commit the same mistakes, and we should be aware of the future costs in order to foresee what we will be unable to set right later on.

## 6 A PROPOSAL TO REHABILITATE THE COASTAL CHANNEL

The dredging of the old coastal channel would make it possible to refill parts of the coast with non-contaminated sand and sediments for the following purposes.

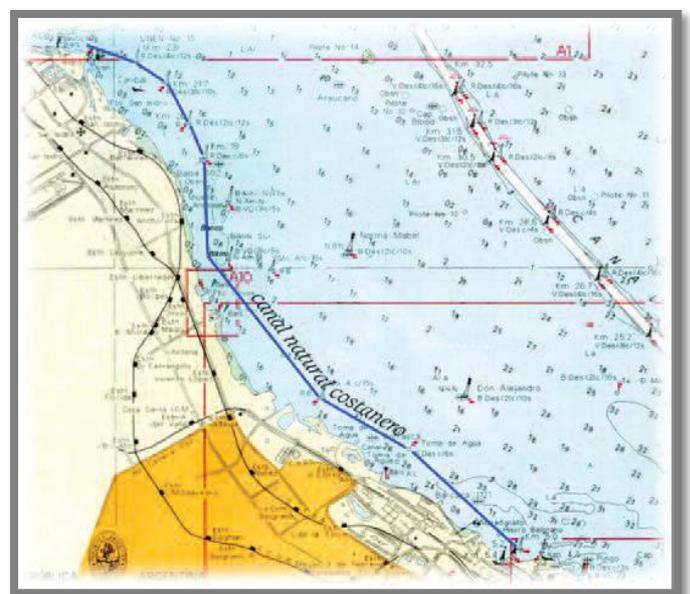


Figure 8: Coastal channel.



First, it would restore the coastline and improve the water flow in the tributaries and drainages, as well as benefit the downriver current by increasing the flow from the Paraná River via the San Antonio.

It would also enable us to recover green spaces and halt the urbanization process and rehabilitate navigation via the coastal channel for transportation, logistical, security and recreational purposes.

A quick calculation of the amount of material to be removed from the channel bed reveals that, if 15 km of channel is dredged from Núñez to the mouths of the Luján and San Antonio rivers at an average width of 50 meters and an average depth of one meter, it would mean the removal of about 750,000 m<sup>3</sup> of sand/sedimentation from the riverbed.

Using a simple calculation of two meters of refill to restore the coastline, we would need to cover a surface of 37 hectares. Calculating the cost of dredging at US\$ 3 per m<sup>3</sup>, an expenditure of US\$ 2.5 million is required, and approximately an additional US\$ 5 million is needed to unplug the San Antonio canal.

On top of these US\$ 3 million, we should add the cost of moving the sand to be used as refill, but in this case the investment would be automatically recovered because the value per square meter of the green spaces and areas for recreation, restaurants and relaxation would far exceed this initial investment.

The availability of new green spaces and beaches along the coast would create opportunities for the municipalities and the province to generate new leases for the activities just described, with a high degree of social inclusion, since the riverside would attract a great number of people.

Additionally, the refill from the channel to be used to expand green spaces along the coast could be supervised by environmental groups, thus creating a set of high-value social and economic benefits for all of the coastline's inhabitants and visitors.

This is nothing new and is consistent with regulations under the dredging policy of the United States, which considers the sedimentation extracted from the beds of waterways as a “resource the use of which ought to be encouraged and directed to benefit the environment.”

Lastly, it would provide an alternative for river navigation and contribute to the auto-dredging of the channel, allowing a large number of companies in the area to ship their products by river.

## 7 CONCLUSIONS

**“We are entering a period of consequences.”**  
– Winston Churchill.

The above quote served to alert other societies, in other times, of the consequences of indifference,

neglect, hypocrisy, resignation and hidden interests. Those of us who knew the river when there were beaches, when we could bathe in it and enjoy the scenery it offered and the smells of its distant source, know the effect the contact with water has on the human body and mind.

Therefore, to younger generations I say work to deserve what nature has given us, and I add what Pope Francis asked of all young people: “Cooperate to resolve the problems of society and do not turn away from them.”

This is everyone's problem. We can neither blame nature nor pretend we can keep it as it was a thousand years ago. Societies grow, they learn and supposedly correct their errors.

The issue of the degradation of our coasts and rivers, particularly the northern banks of the La Plata River, and the loss of river depth as a result of continual sedimentation, is of concern to shippers, but it should also be an even greater concern for society at large.

Many Argentines living near the banks of these grand rivers are unaware of the value of water. They believe that with such a wide river, and despite the Riachuelo being in the condition that it is, these problems will resolve themselves, that nothing bad will occur and that we will always have water to satisfy our needs.

But the reality is otherwise, the delta is encroaching and our great grandchildren will have to live with it right on the limits of the City of Buenos Aires, bringing with it mosquitos and other fauna. The river winds will not be like before and the landscape will be different. Someone will be living on those lands and shipping access to the delta will only be possible via canal.

Our drinking water will also suffer the consequences because the water intake to make it potable will need to be modified due to the proximity of the delta, and possibly new diseases and catastrophes may materialize.

It is assumed that these problems are difficult to resolve. This is not so. For more than half a century, various solutions to these issues have been studied. Suffice it to mention the construction of dikes along the length of the Bermejo River, which would slow the encroachment of the delta by drastically reducing the transportation of sediment and make the river navigable. It is a project that cannot wait!

Possibly, many years from now, someone will read our history, see photographs of these times and find it incredible that we left things as they are.

This is the challenge of our day, and the first step is to share it with you. What do we hope for next?

That it is not too late.