

RIALB DAM RESTITUTION PLAN

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1 INTRODUCTION

The Rialb dam was completed in the year 2000. The dam is located in the North-eastern Spanish region of Catalonia, on the river Segre, a tributary of the largest river in the Iberian Peninsula: the river Ebro. The project is a multi-purpose one and will bring with it considerable economic benefits. Namely, it will increase the supply of water to 200,000 people; it will consolidate and extend irrigation facilities to more than 100,000 hectares of land ; it will afford an efficient defence against the floods caused by the river to the towns located downstream of the dam and it will allow a replacement flow to be generated, as well as an average hydroelectric output of more than 100 million Kw/h, a year.

However, the construction of the dam meant that 25 Km of river course would be wiped out and that 1,500 hectares of land and three population centres would be flooded, in addition to the destruction of public services and ecosystems within that area. As a result, the affected parties and the local public opinion strongly opposed the project during its first stages (from the public enquiry stages until the project was approved). The opposition was fuelled by the proposed uprooting and relocation of population centres and by the demonstrations in defence of the singularity of the area, under the environment protection banner.

In addition to these arguments, common to the construction of many dams all around the world, there were other arguments with a higher ideological content. In addition, there was the opposition of the rural areas to Barcelona becoming a megalopolis, and a possible beneficiary of the flow of water regulated at Rialb.

Furthermore, during the evaluation and assessment of the environmental impact, the social aspects involved were unsatisfactory handled, due, in part, to the opposition to the project as a whole and to the controversy raised in the area. Consequently, once the project was approved, and prior to the commencement of the works, the preparation of a plan of action by the Administration became a necessity. This plan, in addition to being an attempt to influence public opinion about the dam project, would imply the definition and materialisation of those initiatives that would enable the feasibility, survival and development of the area thanks to, and not in spite of, the resulting new reservoir.

Besides, this plan should be drawn up in close co-operation with, and with the participation of, the affected towns.

2 POPULATION AND LAND

The main impact caused by the project will be the wiping out of four population centres: Tiurana, Miralpeix, Basella and Castellnou and a considerable disruption on three other municipalities. The area of the Municipalities not affected by the flooding consists mainly of forest land and has a scattered population. There are only two population centres worth mentioning, in the vicinity of the reservoir,: Ponts and Oliana, each with a population of about 2,000 people. The population of the remaining centres does not exceed 1,200 people, all told.

The area is thinly populated and has a high proportion of old people, as demonstrated by the fact that the proportion of the population under 14 ranges between 50 and 75% of the average for Catalonia. Small municipalities have lost almost 50% of the population who lived there 40 years

ago, while the two main population centres in the area are a natural destination for people, with more than 90% of the population born outside them. Chart n°1 shows the evolution of the population in the different population centres.

In an attempt to profit from the compensations and as a sign of social reponse, the census of population in the village of Tiruana saw a significant increase, between 1981 and 1991, when the strongest opposition to the construction of the dam took place.

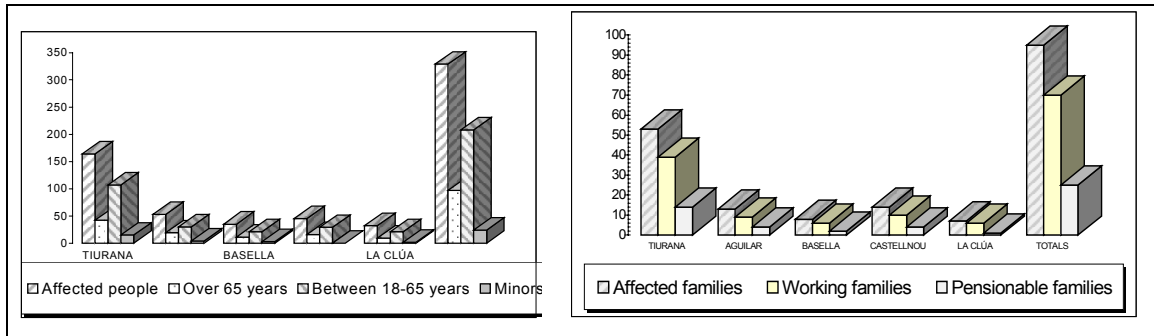


Figure N°1. Housing Affection: involved families

On a different subject, it is important to point out that 65% of the population in the region was, from a statistical point of view, in a situation of full unemployment, including housewives. The proportion for minors was similar to that, while the rate among old pensioners was slightly higher. In the small municipalities, farm workers exceed 50% of the overall working population. This rate goes up to 72.5% in Baronía de Rialb. Generally speaking, the area shows clear signs of depression, because of its over-dependence on industries that rely heavily on international trade. The farming industry is going through a crisis in the area, which is nothing but a microcosmos, where the problems of the farming, livestock and forest sub-industries are reflected, at a reduced scale. The alternatives go from the reduction of production costs to the abandonment of the traditional crops, which, at any rate, explains the cuts in farm jobs.

The activity in the forest sub-industry is characterized by a high fragmentation of plots and owners, both present in large numbers. Under these conditions, the creation of a co-ordinated management to take advantage of the outside cyclical circumstances which, at one time or another, promote some of the different values inherent to forests, has been difficult to achieve.

Animal husbandry maintains income at an acceptable level, thanks to the cattle and pigs kept in stables, a practice, which has vastly proliferated at the expense of extensive animal husbandry.

As for the other economic activities, they are only present, in a significant way, in the two main population centres, through small and medium-size businesses, among which, two fish farms and a household appliances plant are worth mentioning. The Services industry relies upon the flow of tourists, on their way to the mountains, although they do not stay in the region for long.

Due to the scarcity of resources, the population levels and the economic activity, in several of the towns, lie below the threshold at which they can be reasonably managed, for which reason, and regardless of the construction of the Rialb dam, some kind of administrative re-organization would have been necessary.

3 COMPLEMENTARY PLAN OF ACTION

On the basis of the situation described above, the preparation of a Plan of Action, concurrently with the construction of the dam, within the scope of the Municipalities was made a priority.

The purpose of the plan was to make people stay in the area, once the reservoir was in operation, through an economic model for the territory, based upon a balanced growth to maintain and increase the employment opportunities. The increase in employment would be based in the Services industry, in the maintenance of the small industrial structure, with its environment-friendly practices and upon a farm industry that made the most of the natural resources and of the opportunities created by the reservoir.



Figure 2. Rialb dam vision

The preparation of the plan went through several stages. During the first stage, a diagnosis on the location of the area and on the opposition to the project was prepared and attempts were made to ascertain the claims of the population, through surveys and work sessions with the representatives from the Municipalities. During the second stage, and on the basis of the above information, a development model was prepared. This model contained six plans of action and each plan included, in each case, a definition of the individuals responsible for the plans, be them public entities, central, regional, provincial or local governments or private entities and finally their implementation.

Apart from this, legal and administrative advice was offered to the Municipalities, as well as those urban and economic suggestions that could improve their situation.

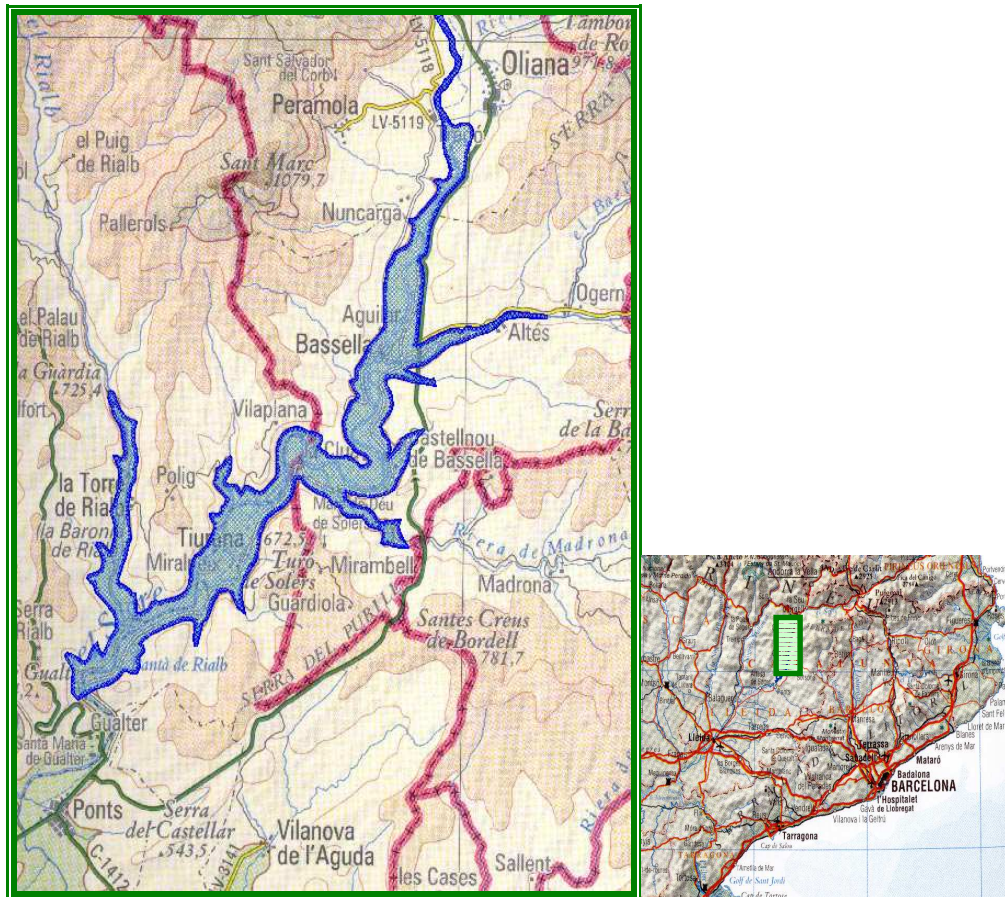


Figure 3. Affected Area

During the diagnosis stage, it became clear that the opposition to the project was an element of cohesion for those that had been separated by administrative land divisions, for those who suffer the crisis in the farms and for those who did not benefit from the fruits of economic growth. The Rialb dam strengthened their own identity and that of a shared land, which was used as a source of wealth by the population. It was the response of a small community not resigned to become decadent, in the face of adversity. On the other hand and from an economic point of view, Spain is a free-market economy where the market imposes its own laws in accordance with industry rules. This liberalization poses a great challenge and at the same time constitutes an added difficulty for the underprivileged, be they people or regions. In these cases, the State can only help with the solution of those problems by investing in education and infrastructures, while the chances of direct help are small, given the cuts in the budget, the international commitments and the statutory regulations.

During the second stage, all the parties involved helped with the definition of the model of economic growth. This model is based on the premise that, in order for the rural population to stay in the area, jobs must be created and women must be involved. To this end, alternative solutions had to be found for the survival of family business, engaged in several activities. These alternatives, once accepted by the farmers, would persuade them to abandon the autarkic model and press ahead with the technological changes associated with the conservation of the land, the improvement of the landscape and the revaluation of the forest activities. Besides, the creation of jobs should be based upon the tourist industry, that would take advantage of the assets with which the area is endowed, such as the climate, the scenery, the abundance of water and the artistic and cultural values. This offer would be aimed at the type of tourist that enjoys a simple life in the open air and non-competitive sports, among which fishing, canoeing and mushroom picking would be some of the most representatives.

Using this economic model as a framework, five plans of action were prepared that addressed the following aspects: land planning, the creation and improvement of infrastructures, the preservation of the natural and cultural resources, a program of economic growth and finally a special plan of action. The budget for the entire program amounted to 120 million dollars. Out of these, the highest amount (70% of the total budget) corresponded to the infrastructure program, followed by the program for economic growth (26% of the total) and by the program for the preservation of the natural and cultural resources (4% of the total).

Three priorities were established: the first involved the urgent restoration of the infrastructures and services affected by the reservoir; the second addressed the implementation of the program for economic growth and the third covered those actions which were neither urgent nor essential for the promotion of small economic projects.

However, the issue of compensations, relocation of people and compulsory purchase of the area flooded by the reservoir, had to be addressed at the same time as the definition of the plan of action.

4 COMPULSORY PURCHASE POLICY

Few fundamental values in modern societies can be detached from the economy, and even those that can, still depend upon it to the extent that almost everything can be quantified in terms of loss of opportunities. Therefore, spare time has an economic sense, because man is a consumer of leisure commodities, culture has an economic sense, because it increases the chances of finding a job and even filial love has an economic sense, because it increases the capacity to work to improve the family fortunes. However, these generalisations cannot be made when entire populations are wiped out, because in addition to the direct and specific impact caused by the disappearance of 1,500 hectares and of the annual work units, inherently social aspects are also involved.

It should be pointed, however, that, in addition to the irreversible transformation of the land by the reservoir, there is another deep transformation on the way for the people not affected directly by the first, as a result of the new measures on farm policy issued by the European Community.

To determine the amount of the compensations, a committee was set up at the Lérida Civil Government. This committee was briefed periodically on the valuation criteria applied to rural property, to houses and to the general facilities in place in the population centres. The committee was also briefed on the criteria used to determine the type of compensation for the inconveniences caused for different reasons. In this connection, attempts were made to redress the injustice caused by the fact that housewives were regarded, for statistical purposes, as unemployed. This assumption did not do justice to the decisive economic role played by women, within the families subject to relocation and to the enormous sacrifice they went through to maintain the buildings and the traditional life style.

Allocations were also set up to compensate for the loss of jobs, in accordance with the type of activity performed. In the farming industry, there exists a considerable number of activities that generate income, sometimes uncontrolled incomes. Namely, family truck farms, corrals for raising cattle, lumber operations, bee keeping, truffle growing, tea growing and snail raising, which can be regarded as picturesque and exotic, but have proved to be an important source of income, in kind. These activities were approved by the committee and accepted by the Public Works Board and by the State Board, which declared them eligible for compensation and were finally approved by the Council of Ministers. The impact upon dwellings affected the families and people shown on figure 1 .



Figure 4. Oliana in rear of reservoir

It should be pointed out that almost one third of the population affected by the relocations were over 65 years of age. For these people, the higher level of material comfort, as a result of the eviction, was little consolation for their traumatic uprooting.

The compensations were paid in cash, so that each family, and each individual, felt free to relocate or go back to their normal lives, at their entire free will. However, during the construction of the dam, a significant percentage of the population affected by the project opted for the reconstruction of a second house, at their own expense, in singular areas of the affected municipalities.

Where practicable, normal activities were tolerated for several years on farm plots already subject to compulsory purchase. This has meant an additional source of income for their former owners, until the reservoir was finally put in operation.

The overall figure devoted to compulsory purchases and compensations amounted to US\$ 60 million. A portion of this money has been ultimately taken out of the territory by some of the people who settled in urban areas, while the rest has been used to invest on new houses, as savings and even as consumer spending. However, the impression that this compulsory purchase policy wanted to give to the affected people was not a magnanimous one, because the ultimate goal was to give to a considerable chunk of the affected population the possibility to remain in the territory, through the upgrading of structures and by improving their adaptation to the conversion of the farm industry in the land not affected by the reservoir, thanks to the liquidity obtained from the sale, through compulsory purchase, of unproductive assets. So far, the success of this policy is apparent in the raising of cattle in stables.

To this end, the existing facilities have been upgraded and equipped with generating sets, using bio-gas, and genetic improvement techniques and computerised management have been adopted.



Figure 5 . Adventure activities in Rialb river and Basella

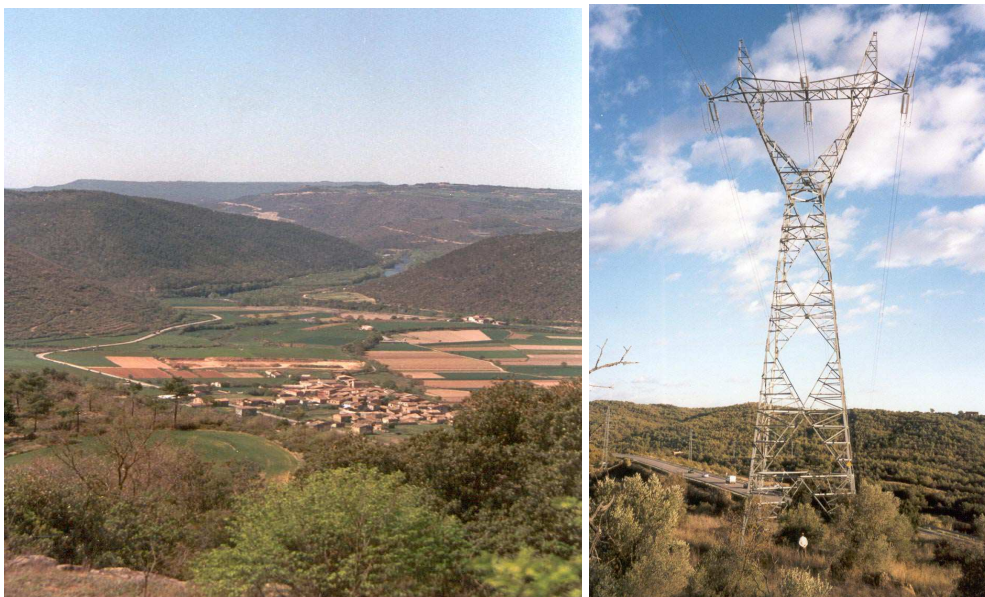


Figure 6 .Tiurana valley prior inundation and new electric grid

To promote the re-investment of the amounts paid, an additional measure was introduced in the form of a legislative initiative to improve the fiscal treatment given to the compensations for relocation.

Pursuant to Spanish tax law, the amounts paid for this kind of compulsory purchase were subject to P.A.Y.E. taxes and no special treatment or deduction was envisaged. Consequently, in some cases and given the large amounts involved, the amount paid to the beneficiary of the compensation would see a cut of over 50% of the agreed sum. Pursuant to the aforesaid initiative and for the first time in Spain, all the compensations paid in respect of relocations, due to the construction of this kind of public works, were free of tax, following the publication of the Act that accompanies the General Budget Act for 1999.



Figure 7. New water tank and irrigation ditch in Baronía and Ponts

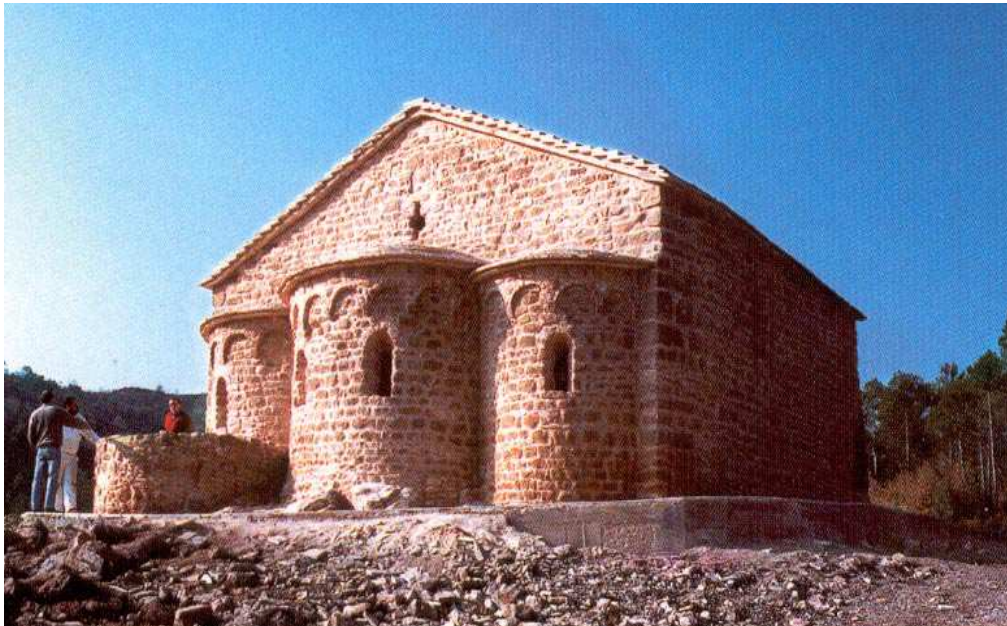


Figure 8. Old Hermitage restored. Baronia de Rialb

5 PLAN OF ACTIONS

On the basis of all the information gathered and of all the assessments made on the impact caused by the reservoir upon the population, a preliminary plan of action was drawn up. Said plan was submitted to and debated with the municipalities and, then, transformed into a Plan of Action, divided into five programs.

The first program dealt with urban planning and land zoning and was aimed at securing the cooperation between the different Governments on the planning of the actions to be undertaken and on their priorities. Ultimately, the results would find their way into the urban regulations to prevent an uncontrolled growth that would cause irreversible damage to the existing resources.

The second program focused on infrastructure creation and improvement but was also aimed at the restoration of the services affected by the project and at increasing the quality of life of the population, through the mitigation of the basic deficiencies of the territory. By upgrading the road and track network, large and in a bad condition, and by providing power, drinking water, telephone and town and water wastes treatment facilities, to a considerable number of people, either scattered or living in small population centres, one is contributing to the promotion of the general economy.

The program for the preservation of natural and cultural resources was aimed at the promotion of sporting and leisure activities, compatible with the traditional activities.

The program for economic growth draws on the previous programs in its attempt to reactivate the productive industries, particularly through the development of a moderate program of quality tourism and of an agro-forest industry concerned with the protection of the environment.

The final package includes those special programs aimed at solving specific and very localized problems, such as the closing and relocation of cemeteries and the administrative rearrangement of the flooded municipalities.

6 PROGRAM FOR URBAN PLANNING AND LAND ZONING

Under this program, attempts were made to have all the technical proposals, contained in the other programs, applied co-ordinately, particularly when different administrations coincided in an action or when the projects scope of action exceeded the existing administrative boundaries. The purpose of the program was to prepare and review urban regulations in the affected municipalities, taking into account the impact caused by the reservoir. In most municipalities, this goal was accomplished. They drew up and updated the zoning of urban land and any subsidiary regulations on municipal planning, with a view to defining the following aspects: the land suitable for development, the basic infrastructures, the layout of the streets and roads and the areas to be protected.

Although the municipalities were responsible for the preparation of these planning documents, irrespective of the construction of the reservoir, this was an excellent opportunity to press ahead with their updating, which otherwise would have been perhaps subject to considerable delays.

In addition, the ground was laid for the setting up of an association, or Commonwealth, of municipalities to participate in the management of the hydroelectric resources generated by the Rialb reservoir. However, this Association has not been able to operate properly, since it was set up a long time ago. The establishment of a common stance, vis-a-vis the Government, was prevented by, on the one hand, the existence of exclusive rights, held by different utilities, to operate the hydroelectric facility. And, on the other hand, by the worsening relationship among the different members of the association, over their disputes about who own the territory and the population that remained in the flooded population centres, thus ruining the possibility of building a stronger front in the negotiations with the Government.

7 PROGRAM FOR THE CREATION AND IMPROVEMENT OF INFRASTRUCTURES

The provision of infrastructures figures prominently in the plan of action, both with regard to their number and to the investment required. To define them, three criteria were taken into account: the restoration of the services damaged by the reservoir, the construction of new infrastructures or the improvement of existing ones, where these were of poor quality and the creation of specific facilities for tourism. The program was, in turn, subdivided into five subprograms, in accordance with the type of services involved.

Under the first infrastructure subprogram, already 60% complete, 47 Kilometres of roads were constructed. Similarly, access was provided to the tens of population centres, farms and isolated country houses, by means of a 100 kilometres long road that surrounds the reservoir. In addition, these roads provided a link with plots of land and woods, to facilitate the extraction of wood using suitable equipment, and afforded access to most of the area occupied by the reservoir, so as to allow it to be used for sporting, nautical and tourist activities. The overall budget for this program amounted to 65 million dollars.



Figure 9 New bridge over the river Salada

The second subprogram, which includes infrastructures for the supply and treatment of water, puts the emphasis on the construction of water reservoirs, wells, more than 40 kilometres of pipes and regulation reservoirs and takes advantage of the possibility to construct strategic reservoirs to fight wildfires in the woods. In addition, this subprogram envisaged the construction of water treatment plants for the main population centres, so that the performance of aquatic sports in the future is not impaired by the releases of water from the reservoir.

The third subprogram took care of power systems through the restoration of the high voltage power transmission lines affected by the project, through the supply of power to the entire territory and through the improvement of the quality of the service in isolated areas plagued by frequent cuts. A total budget of 16 million dollars was devoted to this program, which included: the restoration of three, 110, and 380 Kilovolt, power lines; the erection of 30 kilometres of medium voltage lines, for the supply of power to all the farms and isolated centres, whether inhabited or uninhabited. These infrastructures were put in place, so that any rural tourism projects were not interfered with.

The fourth subprogram took care of telecommunications through the restoration of the services of the same isolated groups as above, which added up to about 20 users. Basically, the work consisted in the provision of a telephone system via radio, which was the chosen technology, given the high cost that result from the installation of other technologies, in isolated areas. This project was financed by Compañía Telefónica de España, which included it in its preliminary planning. In some cases, the difficulties posed by the provision of electronic mail and Internet via radio had to be overcome. This was done through the provision of the required conventional lines.

The last subprogram was targeted at hydraulic infrastructures and consisted in the construction of a major project in the form of an artificial lake in the tail of the impoundment. The lake, capable of holding 2 Hm³ and covering an area of 80 hectares,



Figure 10. Canoeing-kayak school in Ponts

was constructed with the help of a dyke located inside the reservoir, which maintains the level of the water at the maximum ordinary level on a permanent basis. To prevent the rising of the water level, caused by this structure in the case of floods, the entire dyke crest, 120 m long, has been provided with flat gates, of the swing type and 28 by 3.00 m each. They are operated in a staggered fashion, as the flow of the river rises. This project is very important, from the environmental point of view, because it does away with the fluctuations of the Rialb reservoir's water level and allows it to be used as a recreation area to attract tourism. The budget for the project amounts to 20 million dollars and has attracted the attention of private investment groups, which have made plans for a recreational complex, consisting of hotels, bungalows, built inside the lake, and a marina with an aquatic fairground. The job creation potential of this item of infrastructure makes it ideally suited for the accomplishment of the basic goals of the plan of action. Nevertheless, there has been some controversy and contradicting arguments, which has not been resolved yet, between those in favour of the project and those who advocate for the preservation of a farming area in the location of the infrastructures devoted to tourism,

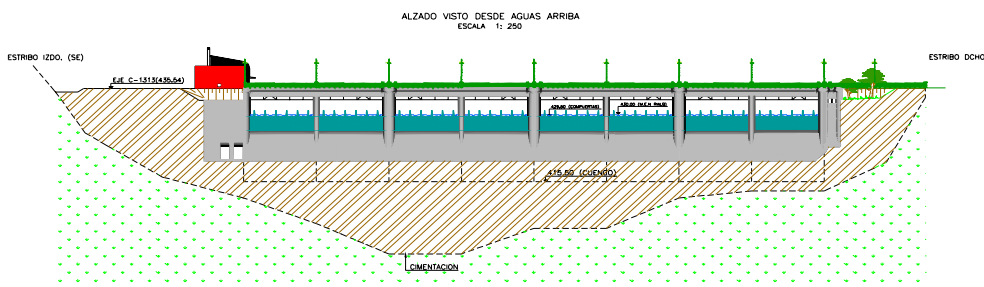


Figure 11. Rear dam in Oliana

Plans are also in place to upgrade a section of the river Segre, downstream of the dam, to practice canoeing in the rapids of the river, which has a long tradition in the area.

8 PROGRAM FOR THE PROMOTION OF NATURAL AND CULTURAL RESOURCES

This program included the development of two projects, associated with outstanding resources, which were of little use before the construction of the dam but that were susceptible of being used for an economic revival. The first project was targeted at natural resources and its only purpose was to indicate to the municipalities the plan of



Figure 12. Trout fishing in Segre river, Ponts

action to maintain the regeneration of the woods and forests and fight soil erosion and wild fires in the forests.

The second project, which dealt with cultural resources, was aimed at two different targets: to preserve the important monuments that would be covered by water and restore the architectural heritage, to facilitate the use of recreational facilities in said areas.

The first archaeological sites dug were: a cave, which had been lived in around the Neolithic, 6,000 years before Christ and three dolmens from the bronze age, which were relocated away from the flooding waters. The following items were found in one of the dolmens: human remains, silex utensils and arrow tips, dating back 2,000 years before Christ. Not so old was a Roman farm settlement or villa, with an attached cemetery, the ceramic remains of which proved that it had been lived in from around the II century B.C. to the IV century A.C. An important medieval complex from the Middle Ages (dating back to the XI century) was also dug. This included a fortified compound, a necropolis with more than 200 human skeletons and a Roman church, which was removed and relocated in a suitable area, readily accessible from the banks of the reservoir.

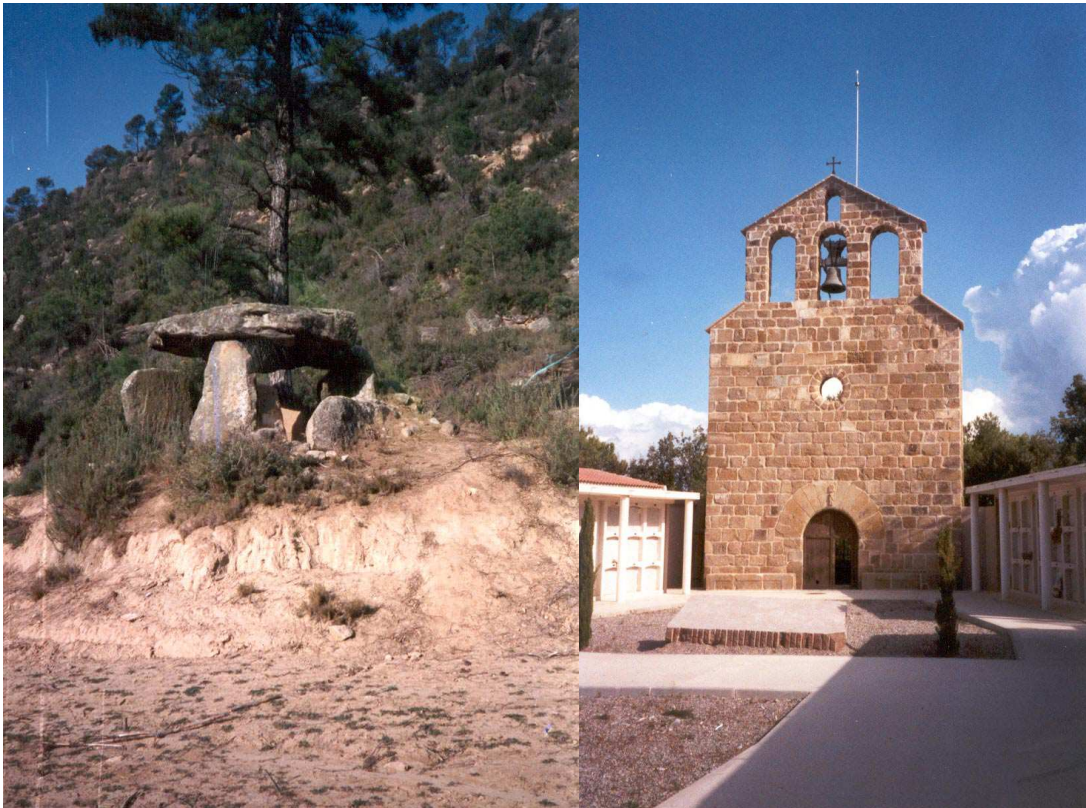


Figure 13. Neolithic dolmen and tower-bell of Tiurana saved from reservoir

From the scientific point of view, the study of the population found in said cemetery was an interesting experience, with regard to their distribution according to sex, to average age and to the most frequent pathologies suffered by said medieval population.

The restoration also included several monuments outside the reservoir that can now be accessed thanks to the new roads and tracks built under the first project. Namely, two Roman Hermitages from the XII century, in a ruinous state and about to fall down, and a medieval monastery destroyed during the Spanish Civil War. The budget for this program amounted to one million dollars.

9 PROGRAM FOR ECONOMIC GROWTH

After the review of all the information and the development of the above programs, plans were drawn up to raise the rate of income of the population, who was to remain in the territory, through the promotion of the potential for tourism on the basis of the existing natural resources. These plans were set up merely as a guide, because the participation of private groups, in the traditional productive industries, was essential, if the program was to be implemented at all.

As far as tourism is concerned, plans were put in place to define the steps to be taken to raise the number of residential dwellings, through the rehabilitation of old buildings, the setting up of camping facilities and sport complexes, the provision of more hotel rooms, the upgrading of areas for fishing activities, etc..

Two subprograms, one aimed at the promotion of industrial activities and the other at occupational training, completed the definition of the main program.

Finally, and as far as the promotion of agricultural and forest activities are concerned, forest zoning measures, site studies for preserves to hunt game and for irrigation areas, were advocated

in the program. As it happens, the irrigation proposal was accepted with the greatest enthusiasm, within the scope of the reservoir, because the affected municipalities had never had large areas susceptible of being irrigated. Given the social sensitivity about this problem, small areas, covering a few hundred hectares and scattered over the territory, had to be allocated for irrigation. This approach was considered advisable because it would contribute to the goal of making the population stay in the territory, without incurring in excess production, something, which ran counter to the common agricultural policy of the European Community. The budget for this project amounted to 4 million dollars.



Figure 14 New recreational area designed beside Segre river.Ponts

10 SPECIAL PROGRAMS

The existence of two very specific problems, posed by the construction of the reservoir, called for the preparation of a special program aimed at their resolution. One was the relocation of the three cemeteries to be flooded by the waters and the other the administrative rearrangement of the two population centres to be wiped out: Tiurana and Basella.

As far as the old cemeteries were concerned, they were closed and the existing 300 skeletons were dug out and relocated, after being identified, in two new cemeteries

built for the purpose. The closure was necessary because the cemeteries were very old and contained several hundreds more human skeletons, which could not be identified, for which reason they were sealed by means of anchored concrete walls and slabs, to prevent that any earthworks activity could bring the buried remains to the surface.

The relatives of the dead were free to choose the sites for the relocation of the human remains and the new cemeteries were provided with some items of remembrance that brought back memories of the landscape and milestones of the old villages. In this connection, the facades and towers of the two churches were brought to the cemeteries from their old sites and some singular buildings were reconstructed to allow the former inhabitants of the villages to meet in the future.

Similarly, a church, located near the Tiurana cemetery, was fully reconstructed, including the fresco paints that covered its dome. This project had a budget of 1 million dollars.



Figure 15. Rural hotel in P eramola

Although the Catalanian Parliament was responsible for the administrative rearrangement of the two municipalities, because the two population centres belonged to different regions, they were asked to join another municipality or to merge, as the most practical alternatives.

This problem has not been resolved, so far, because some inhabitants of the villages do not want them to disappear, as an independent entity. Nor do they want to be integrated into other municipalities, and because they both lay claim to the management of the important economic resources that would result from the operation of the reservoir.

11 CONCLUSIONS

The construction of the Rialb dam gave rise to a strong opposition, both from inside and from outside the area where it is located. The large impact caused by the project upon a depressed area, which was strongly dependent on traditional activities, made it absolutely essential for a plan of action, aimed at the creation and maintenance of jobs and at keeping the people in the territory, to be put in place.

Once the plan of action and the problems were defined, the Central Government provided the money for the required infrastructures. These infrastructures, in addition to complement the construction of the dam, would be compatible with the agreed goal. Although the program is still at the 60% completion stage, it has turned out to be a positive one and has lent credibility to the development of similar projects in other areas.

However, the budget cuts that are sweeping Europe may delay or influence these type of investment, which, once the dam has been constructed, may be regarded as secondary or superfluous. This possibility is forthrightly negative and its consolidation could give further arguments to those who oppose or resist new projects.

Honest planning and evaluation of the programs involved and of their implementation, hand-in-hand with the parties involved, prior to and concurrently with the construction of a dam, would go a long way towards making this type of questioned and controversial projects more palatable to the inhabitants of the affected area.