

# **BISCARRUÉS RESERVOIR LAND RESTORATION PLAN**

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## **1 INTRODUCTION**

Located on the river Gállego (Spain) with a 192 hm<sup>3</sup> capacity, the Biscarrués reservoir design calls for strategies directed towards reducing its considerable impacts and endeavouring to achieve a land pact which will contribute to laying the foundations for collaboration and negotiation between the population affected and institutions. It is therefore necessary to undertake both actions and land development in reservoir affected areas and strengthen the positive aspects regulation provides for the region.

The target proposed is a dual one; on the one hand, to achieve effective collaboration between the population affected and institutions and, on the other, to undertake economic and social development actions in the surroundings of Biscarrués reservoir which will contribute towards achieving a positive effect and drive economic and social life forward, as well as to address environmental regeneration actions. Part of the actions involved have therefore been extended to the whole of the Gállego catchment area and the surroundings of the district where the reservoir is located, La Galliguera, with the purpose of improving the regional structure and conditions of its inhabitants' standard and quality of living.

Nevertheless, undertaking the Plan itself should generate further actions deriving from the interaction between the population affected and representatives of the various institutions.

## **2 BACKGROUND**

The "Land Restoration Plan" for the Biscarrués dam is provided for in the following documents:

1. A resolution passed by the Plenary Meeting of the Aragón Parliament in its 30 June, 1992 session, on the occasion of the debate held on the Communication from the General Aragón Provincial Council relating to criteria on the Aragón Autonomous Community's hydraulic policy: the Water Pact.

Amongst other matters, it lays down that countervailing plans for the areas affected by reservoir construction shall accompany every regulation carried out and shall be addressed through the collaboration of both Administrations.

"A prior impact plan must also be drawn up for each of the projects, to be negotiated with the institutional representatives of those affected who will also be heard. The plan will contain at least the following aspects:

- Environmental impact assessment.
- Fair compensation for those affected.
- If such be the case, restoration of land for those affected. Socio-economic support actions for the area.
- Should such be the case, construction of new housing
- Participation of those affected in hydroelectric developments.

- Retirement schemes for those affected, by setting up a pension fund, if such be the case.
2. The Ebro Catchment Area Hydrological Plan Bill passed by the Catchment Area's Water Council on 12 February, 1997, lays down that the "Land Restoration Plan" for new reservoirs to be built shall be included amongst necessary or priority actions. The Ebro Hydrological Plan regulations' article 145, referring to "basic actions", specifically lays down that "a prior land restoration Plan in parallel with regulation works must be drawn up, as well as a compensation Plan for those affected".
  3. Point 7 of the Biscarrués reservoir Project's Environmental Impact declaration establishes that:
 

“The Directorate General for Hydraulic Works and Water Quality will ensure that the countervailing measures included in the documentary proposal as a Regional Restoration Plan are performed”.
  4. Article 130.4 of the revised text of the Water Act.

### **3 ENVIRONMENTAL IMPACT DECLARATION**

The resolution whereby an environmental impact declaration was formulated with respect to the Biscarrués reservoir project and road variants was published in the B.O.E. (Official State Gazette) of 16th November 1999. This declaration is environmentally feasible if what is established in the environmental impact study and in its additional information document.

These conditions involved measures relating to the protection and conservation of soil and vegetation, of the hydrological system, of fauna and against the impact on water. They also included, defence measures against erosion, measures for environmental recovery and landscape blending of the work, for cultural heritage protection, and monitoring and surveillance conditions, as well as the need to provide documentation and contractual definition of corrective measures, and a series of countervailing measures as detailed in condition 7.

### **4 APPLYING THE ENVIRONMENTAL IMPACT DECLARATION**

Four estimate items had to be addressed in the Technical Specifications for the Design and Construction Tender Documents with the purpose of putting the dam design out to tender whilst respecting the conditions as described in the previous point. Such items involved the estimate for the reservoir's design and road variants, supplementary environmental correction and integration actions, where it should be pointed out that the corrective measures were brought together in a total of 15 actions incorporated into the main design. They included actions as regards the water cycle, historical-artistic heritage, leisure, etc. apart from the design of some of the Land Restoration Plan's actions and the Estimate for drafting the Restoration Plan itself.

As it was not possible to form the Restoration Council, those LRP actions which were deemed not to require prior social consensus had to be selected. These actions, which are described in more detail when expounding each of the Plan's programmes involved: placing the compensation hectares under irrigation and making paths for rambling, cycling and horse riding in the surroundings of the reservoir and restoring the cemetery and moving the tower of Erés Church.

## 5 LAND RESTORATION PLAN

The most relevant aspects with respect to land planning as expounded by those affected in the area and in Hoya de Huesca were:

1. After the Ebro Catchment Area Hydrological Plan was approved, the district of Hoya de Huesca was included in the Upper Aragón Irrigation system, under the name of Upper Aragón irrigation in the district of Hoya de Huesca. Regulating Biscarrués reservoir's water had therefore to avoid uncertainty and clearly define the main conduit infrastructures within Hoya de Huesca which can receive Biscarrués reservoir's resources.

Two areas may be distinguished: the first, originated as compensation for filling Biscarrués reservoir which should be accurately defined and designed, and the other, whose purpose would be to irrigate an area within Hoya de Huesca until the demand for 90 hm<sup>3</sup> reserved by the Hydrological Plan were covered.

Implementing irrigation within Hoya de Huesca calls for the participation of future irrigators in the area, bearing in mind that it must fit in with the overall Hoya de Huesca irrigation system and that significant pumping costs may be a drawback unless there is a certain amount of user compensation or participation in the hydroelectric developments generated by building the reservoir.

2. The second particularly relevant aspect is to change the sterile confrontation attitudes into collaboration involving most of the possible population, both in the villages directly affected by Biscarrués reservoir and in some population centres in the rest of Hoya de Huesca. It was thus deemed fundamental to structure the necessary sociological studies to conclude in forming an executive Land Restoration Council able to head the development actions which may be generated around the reservoir and as far as possible neutralise the negative effects flooding will involve for the area.
3. The third package of actions to be considered in Biscarrués reservoir area's land restoration section comprises the strengthening of incipient tourism development, largely aided by the European Union's LEADER 11 programmes.

Improving communications and access both to population centres and land surrounding the reservoir was also considered fundamental and, by virtue thereof, a perimeter path was designed which also formed a rambling, cycling and horse-riding trail integrated into the surroundings which will enable the whole reservoir perimeter to be toured.

A further aspect considered in developing the reservoir affected area comprises environmental conservation and regeneration linked measures such as setting river restoration flows.

Maintaining the area's historic-artistic and archaeological heritage is linked to these environmental actions which is why, irrespective of the actions addressed in the reservoir's design, it was deemed advisable within the Restoration Plan, to address actions such as moving certain monuments from whose preservation an additional attraction in the area could derive.

The following sections briefly describe the programmes currently forming the Land Restoration Plan, regardless of the future possibility of the Land Restoration Council, once set up, proposing modifications or extensions to the projects described.

## **6 INSTITUTIONAL COORDINATION PROGRAMME**

One of the first steps to take in this phase of the Biscarrués reservoir Land Restoration Plan will consist in providing background and legal grounds for forming the Land Restoration Council, defining its operating conditions, members and other details facilitating the enforceability of decisions.

The Council will be most probably formed by the municipalities of Biscarrués, Santa Eulalia de Gállego, Murillo de Gállego, Ayerbe, and Concilio (Las Peñas de Riglos), representatives of the Ebro Hydrographic Confederation and the Government of Aragón, whilst other institutions may also participate.

Plans are also in place to analyse the applicable local, regional and state regulation framework, determining the structure of the Land Restoration Plan and binding it to the said regulation framework. The analysis will also comprise the whole of strategic urban and land development planning, as well as directives or recommendations emanating from the European Union. Finally, a document shall be drawn up showing all aspects analysed and giving a proposal for the Plan's wording with the purpose of its submittal to the consideration of the Land Restoration Council.

## **7 SOCIAL PARTICIPATION PROGRAMME**

Any action intended to be performed in the Land Restoration Plan's' framework without those affected and their institutional representatives participating will have no assurance as to its effectiveness. Though a social study of the most efficient means and procedures for facilitating permanent interaction between the different parties involved in the Plan drafting process and its implementation is called for.

It is therefore intended to analyse, schedule and apply public participation systems which will prevent disinformation and conflicts and will favour mutual understanding. This is particularly important in a project such as this which involves moving the population of Eres.

A microsociology study will thus be undertaken amongst the inhabitants directly affected by the reservoir, collecting together the life histories of families and proposals put forth by them to improve their socio-economic situation. A survey will likewise be carried out amongst the Hoya de Huesca population to find the degree of acceptance and commitment deriving from the new hydraulic investments as well as the proposals to be made for expediting the generation of added value in these investments.

The purpose is to collect, systematise and analyse the opinions of all sectors involved with the study serving to identify shortcomings in the action Plan and to change criteria to the benefit of the area's land and social cohesion and development.

Finally, a training programme for the population affected and benefitted by the Biscarrués and Hoya de Huesca hydraulic works will be undertaken in collaboration with business organizations in order to adapt them to the new job sources generated in the area.

## **8 PROGRAMME FOR IRRIGATION IMPLEMENTATION IN LA HOYA DE HUESCA**

A certain amount of work was carried out following a request from Almodévar Town Council and others in January, 1981, for commissioning studies on implementing irrigation in the Hoya de Huesca Canal area. This work has been making progress in defining the irrigable area.

A study was performed in 1986 on the “Hoya de Huesca canal and its techno-economic feasibility”, where the possibilities of placing an extensive area under irrigation (89,552 hectares in all) were analysed, and 13 irrigation sectors bringing together 26,981 irrigable hectares were defined, of which 21,435 hectares would be new irrigation areas and the rest would involve improving existing ones.

After defining a general hydraulic scheme, the flows necessary for completing the transformation of the area into irrigated land would proceed from the rivers Flumen, Isuela and particularly the Gállego. This would force full performance of the scheme to be subject to the completion of the Gállego – Cinca system’s regulation works, of which Biscarrués dam forms a fundamental part.

Revisions were subsequently made affecting the definition of the irrigable area and its hydraulic scheme, whilst, on its part, the Ebro Catchment Area’s Hydrological Plan (1995), addresses a total of 14,000 hectares for the Hoya de Huesca irrigated land with an allocation of 90 hm<sup>3</sup>, far below what was originally provided for in the 1986 feasibility study (169 hm<sup>3</sup>).

An economic, social and environmental study of Hoya de Huesca was therefore proposed. Its purpose is to analyse alternatives for placing the Hoya de Huesca District under irrigation, and it must bear in mind the flow allocations for the area as contained in the Ebro Hydrological Plan (90 hm<sup>3</sup>), the different hydraulic schemes possible and the different delimitations of areas to be irrigated. The most suitable areas will be selected as a function of their economic, social and environmental impacts.

The scope of this study will be the irrigable area defined in the 1986 study belonging to the municipalities of Ayerbe, Biscarrués, Las Peñas de Riglos, Murillo de Gállego, Los Corrales, Lupiñén- Ortilla, La Sotonera, Albero Alto, Albero Bajo, Alerre, Banastás, Chimillas, Huesca, Igríes, Loporzano, Monflorite-Las Casas, Nueno, Piracés, Quicena, Tierz, Almodévar, Sangarrén, Tardienta, Alcalá de Gurrea and Gurrea de Gállego.

Moreover, within the sphere of the design and construction tender, the drafting of projects were commenced for turning about 1,300 hectares into irrigated land, set as a guide, which must be agreed to with the municipalities of Biscarrués, Santa Eulalia de Gállego, Murillo de Gállego, Ardisa and Las Peñas de Riglosas as a compensatory measure for expropriations and land flooded by the Biscarrués reservoir.

The last point in this programme involves drafting the construction design of the main hydraulic infrastructures for the Hoya de Huesca irrigated land. That is those necessary between water intake and head reservoirs for distribution.

## **9 ENVIRONMENTAL STUDY PROGRAMME**

This miscellaneous programme firstly includes an erosion action plan in the reservoir surroundings that will involve an exhaustive hydraulic study of each of the ravines discharging directly into Biscarrués reservoir, supplemented by a general hydrological study of the catchment area. Loss of soil will also be determined in order to carry out a prior study for

improving the area's forest stands. The projects to be undertaken will be decided on once the potentialities for reducing erosion have been proposed.

It is wished to inventory discharges into the reservoir and analyse the river Gállego water's quality in different seasons of the year, in collaboration with the appropriate institutions and the Ebro Hydrographic Confederation's public hydraulic domain protection service to thus determine the reservoir's possible degree of eutrophy and to take corrective measures.

It is also intended to draw up an environmental flow proposal in collaboration with the Ebro Hydrographic Confederation's operations area and its Planning Office. This study will incorporate biological, concession and economic analyses of the effect of the environmental flows to be incorporated.

A multidisciplinary study will also be undertaken on the possibilities for protecting and managing the surroundings, in which it is wished to have teams from Spanish universities.

Another of the environmental study programme's items consists in designing a corridor along the Mid Gállego. This green corridor will be integrated into the network of rambling paths and the promotional actions necessary will be defined.

It is also intended to carry out a plan for the rehabilitation and alternative cultural use of the villages and buildings. It will be carried out by holding meetings with experts to analyse the circumstances affecting the cultural heritage and integrating it into the characteristics of the surroundings and other such villages in order to strengthening rural tourism in the area and its use for a second home.

La Peña and Ardisa reservoirs, together with the construction of Biscarrués means that an approximately 30 km barrier will be created for the movement of fish along the river Gállego, and this is the reason for wanting to examine various solutions to facilitate the movement of fish species.

Finally, existing electric lines will be adapted, and other will be restored, in order to guarantee a minimum of environmental disturbance, and those systems necessary to protect the wealth of bird life in an area bordering on a Special Birdlife Protection Area (ZEPA) will be designed.

## **10 ACTION PROGRAMME IN INFRASTRUCTURES AND DEVELOPMENTS**

The first item in this programme consists in a specific study framed within the tourist service sector's revitalising and in the district's land reallocation. This study will be based on a diagnosis of the current situation and its prospects, by means of which available resources, problems, reasons for them, demand, supply, profitability, etc, will be identified.

The land's potentiality and fragility will be analysed according to the future characteristics of the reservoir and its banks, and the acceptance capacity of the different areas will be defined.

Allocation of uses and their regulation will be proposed, always in agreement with the suggestions, recommendations and comments of the Land Restoration Council and fitting in with limitations deriving from applying current regulations in force as regards water and planning, including an analysis of the financing of the works necessary (investments) and return foreseen.

The design of the footpaths providing access to the reservoir surroundings was based on the path variants giving access to inhabited areas and to properties, and gives access to estates whose ones will be flooded in the future. Moreover, reforestation operations that it may be

necessary to address, especially on the reservoir's right bank, call for a number of accesses which will facilitate such work. These paths follow the shoreline around the reservoir so that the proximity of the water nappe will allow them to be used in reservoir leisure or tourist developments in the future.

The Programme's fourth action in infrastructures will consist in designing the access to Santa Eulalia de Gállego taking advantage of the Gállego river to facilitate that town population's access to Zaragoza through Ardisa. In any case, the importance of the Restoration Council's intervention in this action justifies its being postponed until the Council has been formed, since it must count on the population's will and support.

Another of the actions planned will consist in developing measures for fostering bird life in the reservoir surroundings, in agreement with the Directorate General for the Nature Environment of the Aragón General Provincial Council, including building bird watching vantage points, lammergeier (or bearded vulture) conservation measures, etc.

The foreseeable development of Biscarrués reservoir's surroundings with the creation of various tourist infrastructures may involve promoting the reservoir's banks as a residential and second home area for the inhabitants of various towns. It has been planned to carry out the studies necessary to define the residential area, with the obvious collaboration of town halls.

In actions to be approached within the Design and Construction Tender in the sphere of infrastructures, those relating to the restoration of the cemetery and moving the tower of Eres church were chosen. They will both be integrated into a single one since the church tower was incorporated into the new cemetery adjacent to the current Biscarrués one.

## **11 FINANCING AND MANAGEMENT PROGRAMME**

Five activities are planned within the financing and management programme, the first of which consists in drawing up a full, detailed estimate for the respective projects.

Secondly, possible public and private enterprise action financing alternatives deriving from the Land Restoration Plan will be analysed. The final decision on the financing system will be the Land Restoration Council's responsibility.

Chapter V of what is called the Water Pact in Aragón states that the actual works involved in the Land Restoration Plan will be taken on by the Central and Autonomous Administrations as a function of their respective competences, which is why such competences shall be analysed and actions allocated accordingly.

Thirdly, information and criteria will be obtained on the basis of which various tourist, leisure and cultural activity management promotion systems will be analysed and if suitable and advisable, statutes will be drawn up for setting up a mixed Administration-Users company with cultural and recreational ends.

Fourthly, a management and control model will be proposed for performing each and every one of the actions, indicating the resources necessary, progress chart and other aspects so that the actual materialisation of the actions proposed will be possible.

Finally, should it prove suitable and advisable, it is planned to propose the setting up of a mixed Administration-Private Individuals or similar companies for undertaking certain actions, to study the applicable juridical persons and to draft the pertinent rules.

## **12 SUMMARY**

Land restoration plans as provided for in article 130 of the Revised Text of the Water Act (R.D.L. 1/2001 of 20 July) are today not only a legal requirement for promoting a dam but also a reflection of elemental justice whereby actions are taken in districts affected by the creation of a reservoir in an endeavour to give drive to its economic and social development.

The issue is to force a turning point in the development of the district affected with two basic aims, which are to hold the population (or even increase it) and foster development, with new job creation opportunities.

Instruments to be used are, in the first case, the development or improvement of existing infrastructures, taking advantage of their nature as a driving force for another type of initiative and, in the second, the creation of occupational alternatives in at least the two obvious activities in these areas such as tourism and farming.

From the environmental standpoint, all studies and work necessary for repairing the environment's degradation and strengthening the new aspects arising from creating a reservoir must also commence.

Point 7 of the Biscarrués Environmental Impact declaration states that "The Directorate General for Hydraulic Works and Water Quality" will ensure that the countervailing measures included in the documentary proposal as a Land Restoration Plan are performed.

The paper describes the background in greater detail and expounds and analyses each of the six action programmes comprising Biscarrués Reservoir's Land Restoration Plan.