

# THE ROLE OF THE MUGA AND FLUVIÁ RIVERS IN THE DETERMINATION OF THE TER RIVER TRANSFER TO THE METROPOLITAN AREA OF BARCELONA

**David Pavón Gamero**

Departamento de Geografía. Universidad de Girona

The interbasin transfers are an axis of the infrastructural intervention in the Spanish hydraulic policy during most of the last century. These achievements can be defined as the conduction of a specific volume of water from a basin origin that is considered surplus with regard to the internal demands of water, to a receiving one which is considered in a deficit situation to serve its own demand. Thus, the construction of a reservoir for storing the appropriate volume of water, apart from the channel to allow its transport as far as the desired destination outside the boundaries of the basin, are converted in expression of the engineering that are often connected with the projects of interbasin transfers. The controversy will be an element that will accompany the many proposals suggested during the period and will be favored by the debate on the benefits and the costs associated with its implementation and exploitation.

In the complex geographical context that characterizes the Iberian peninsula and under an ideological, economical, social and technical discourse with regenerationist roots that is favorable to the large hydraulic works, the interbasin transfers will be presented like the corrective pieces of the natural imbalances of climatic and hydrographic kinds that strangle the development of the territory. This conception will be decisive to understand part of the hydraulic achievements, especially during the second half of the Franco regime, which will be stimulated by an intense growth of agricultural and industrial sectors but also to face up to the supply of expanding urban areas. It will also be key to understand the draft and the project of the National Hydrological Plan (Plan Hidrológico Nacional) that several democratic governments, with opposed political sign, will put on the table, respectively, in 1993 and 2001.

The interbasin transfer that focuses this article has its justification precisely in the challenge that represents to provide of sufficient flow to the urban expansion of Barcelona and its area of influence. Although in this case, by its scale and its location, is not applicable

the opposition between Atlantic and Mediterranean basin to understand the transfer, it will take all its intensity the debate of the water needs (and expectations) of the origin basin in connection with the needs and the expectations to the receiving one as an argument to oppose to its implementation.

The diversion of the Ter river to the metropolitan area of Barcelona constitutes a fundamental hydraulic work to explain the water supplying of a substantive portion of the Catalan capital and its surroundings during the last decades. The economic and social benefits of this realization are undoubted for the zone since 1966, moment when the flow arrives from the Ter river by means of a conduction of 85 kilometres with the aim of satisfy part of the needs and the expectations of its water consumption. The dimensions of the diversion in relation with the size of the river and with the number and the diversity of activities that are attended by its flow have turned this project in a key piece to understand the evolution and dynamism of the metropolitan area of Barcelona since its bringing into operation. Nevertheless the limitations of the river, the proportion that supposes the derivative flow and the development possibilities in the own basin have propitiated a recurrent controversy from its inception.

By means of the present investigation we have tried to analyze the scarcely well-known influence that had two minor rivers as the Muga and Fluviá in the determination of the diversion of the Ter flows to the metropolitan area of Barcelona and, a not less outstanding aspect, like the hydraulic geostrategy propitiated to provincial scale. In this way the investigation contributes with a novelty in the subject. This novelty is the territorial approach of the fluvial transfer, not from the point of view of the metropolitan area of Barcelona or of Catalonia as a whole, but the internal perspective of the rivers from Girona province. To this end, in the article are set in a context the precedents and previous justifications to the diversion of the Ter to Barcelona to proceed, later, to value the role that those two rivers played in the writing of the draft and the project that will take to the materialization of the works during the decade of 1960-69. At the investigation are included the opposite argumentations used from the grantor area and that will cause a significant political and social controversy infrequent in full transition from the first part to the second one in the Franco's dictatorship period. Before fixing the conclusions, the study will stop in the specific repercussions that had in the hydraulic projects and in their geographical derivations for each of two basins, distinguishing between the phase before to the approval of the diversion and the later one. The subject that structures the article will be framed historically since it will provide some of the keys to understand the vicissitudes of the project as well as its significance.

At present the debate about the role that the Ter has to carry out in the metropolitan supplying and if the management of its water resources has to be less dependent on this river is entirely in force. In the last years have been added elements to this debate like the environmental variables that consider to the river client of the own river, the possibilities that offer technologies as the desalination or the advanced treatment of sewage, the grade of efficiency and saving in the consumption, the incidence of the climate change or the determinations of the Water Framework Directive. They're ingredients that have contributed to the formation of a new scenario in which «the partial return» of the Ter river flows to the own basin is seen as a more tangible possibility. So much so that the Catalan water

administration has expressed the desire to gradually reduce the diverted volume in that new management measures will be star on. Thus, compared with more than 190 hm<sup>3</sup> decanted annually of average during the first decade of the 21st century, it is hoped to reduce this volume to 130 hm<sup>3</sup> in 2013 and 115 hm<sup>3</sup> in 2015 (Catalan Water Agency, 2010).

The predominant position of the Ter in the hydraulic geostrategy of a territory that includes even a part of the metropolitan area of Barcelona has let in a second position the Muga and Fluviá rivers. The Muga is the most northern and shortest of the three rivers. Its basin borders on France to the north and its flow is the lowest of the three. The Fluviá basin takes up a central position between the Muga ones to the north and the Ter ones to the south. The river has a flow larger than the Muga one but quite lower than the Ter one. These two rivers together with Ter compose the basic hydrography of the province of Girona. Thus, a 60.35% of this demarcation is included in one of these three basins. The exception is the most peripherals areas as the Pyrenean sector of the Cerdanya county (Segre basin), the southern half of the Selva county (Tordera Basin) or coastal areas belonging to the smaller rivers and littoral streams basins. The characteristics of local relief have favoured the parallel and nearby flowing of the three rivers from their middle courses to their mouths.

The attempts to execute projects of great hydraulic works in the three rivers during the last two centuries have to link with their physical features: independent watercourses as far as its mouth with a sufficiently generous rainfall especially in the headwaters and with a fractured orography in the first half of the course but with extensive alluvial plains at the end. This combination will stimulate, on the one hand, the dam projects in straits where the relief is more favourable and, on the other hand, to the agricultural conversion of the river plains in irrigated crops in order to increase the production and the profitability. The aim to promote great irrigation projects on the lower courses in the rivers of Girona province goes back at least to the second half of the 19th century. Hence, if we analyze some of the speeches and wishes expressed by its promoters we will deduce, at least on a theoretical level, that they won't be outside to the nineteenth-century aureole that enveloped the irrigation as an unavoidable piece to overcome the situation of poverty and the chronic backwardness (Mercader and Rosés, 1850, Borrell, 1857 Burgas, 1888; Llauradó, 1884; Tutau, 1888; Coderch, 1900, González-Granda, 1930). Decades later the intensity with which agricultural and economic institutions will argue the expansion of irrigation as an element of reluctance to the diversion couldn't be understood without this background and is heir to them. In the hydraulic projects other motivations will join the priority purpose of the irrigation since the last third of the XXth century such as urban and tourism water supplies. One of the results will be several episodes of conflict between competing water uses (Genis, 1987; Ribas and Saurí, 2002; Sastre, 2002, Ventura, 2004; Serra, 2009).

In the determination of the transfer of the Ter to Barcelona was decisive, although scarcely known, the existence of two minor courses mentioned above. Without them probably the Ter wouldn't have achieved the prominence that acquired since the decade of 1950-59. Therefore, the importance of the trajectory followed by two smaller rivers not only will fall on the repercussions with the impact that was to take particularly for each of their basins, but by the way that could affect the principal rivers of Girona province understood as a unique system of exploitation. The vicissitudes that water planning has crossed in the Muga and Fluviá basins is more interesting, if possible, by the influences exerted mutually

between the two rivers and by their contrasted and unforeseeable drift. On the one hand, the Fluviá was the river that concentrated for years the hopes and the efforts to promote the large hydraulic works particularly for irrigation of the plain Empordà because of its greater size and geographic centrality. However, the Muga, the course more modest and peripheral, finally will win the game on the field of accomplishments.

The use of two peripheral rivers as Muga and Fluviá apparently had to have repercussions which couldn't exceed the local level. However, both rivers were presented as a compensation for the diversion of the Ter and this factor made easier the execution of one of the most important transfers that will be materialized in Spain to supply a first order urban agglomeration. The transfer of the Ter due to the moment that was carried out and by its main objective has to be understood as a symptom that predicts the phase of strong economic growth that will be experienced during the development stage from 1960 to 1975. Also as a consequence of the consolidation of a phenomenon of intense urbanization to such an extent that draws already unequivocally the most prominent metropolitan area closely following to the Madrid one. Metropolitan areas as these will need to rely on more distant sources of supply to face up to water demands higher and more diversified. Despite it, in contrast to Madrid, in the case of Barcelona hydraulic works of similar magnitude for urban supply won't materialize until almost a century later. However in the case of Madrid won't be necessary to resort to river basin water transfers outside to the capital which could have conflicting interests and priorities.

As in many other parts of Spain, irrigation was the reason that centred the justification to draw up great hydraulic projects for the rivers of Girona province since the second half of the nineteenth century. Nevertheless, it will be necessary to wait for an urban water demand outside to the basins should be sufficiently pressing to begin the works, going over the own irrigation.

However, the pretensions to transfer water from the Ter to Barcelona and its influence area were old and we have to go back at least to the 16th century to find the first references, specifically in 1584 (Voltes, 1966). The difference lies in the fact that in the decade of 1950-59 it will be able to achieve it. The transfer of Ter, paradoxically, serves to reactivate the construction of hydraulic works in the Muga and Fluviá basins, partly as a way to repay the inequality that represented the diversion and, therefore, as a way to mitigate the feeling of rejection and to neutralize social opposition that was generated in Girona.

The ministerial order of July 22, 1957, by approving the transfer project technically gave the green light to the urgent writing of several studies of large dams and their respective areas of irrigation. This meant the theoretical irrigation of 39,000 hectares, ranging from the right bank of the Ter, on the south to the left bank of the Muga, in the north. Without the Muga and Fluviá rivers probably never would have raised the «Ter Solution» to Barcelona, not only by a cold matter of flows, but because it would not have existed any type of «joker» capable of absorbing the pressure generated against the project. The argument of the maximum hydraulic use both the Muga and Fluviá rivers allowed to offer a justification on the part of the main provincial institutions for refusing the transfer, although not very effective and convincing to neutralize it.

In contrast to the pretension of the Ter transfer to Barcelona, it will generate a broad opposition that will try to argue the need that all the river flows have to remain in Girona

province, principally for the future irrigation expansion and the industrial uses. That is, to satisfy all the created expectations and that will be exacerbated to the maximum for avoiding the transfer even from a legal point of view. The counter-proposals of the institutions of Girona in the sense that Barcelona was supplied with the Ebro river waters nor bear fruit.

The promulgation of the ministerial order of July 22, 1957, together with the social pressure created will help to understand why, soon afterwards, in 1960, both basins have the respective reservoir projects and the respective drafts of the future irrigated areas. Moreover, in the case of the Muga basin, the reservoir of Boadella, the large hydraulic work of regulation built in this river, was already under construction. Therefore, it seemed closer than ever the material carrying out of the great hydraulic infrastructures and their associated irrigation systems. From the technical and administrative perspective had never come so far and, for once, it seemed that the rate of progress in both basins advance at par. In the short term this progression would be revealed as apparent mirage.

In the area of the three rivers (Ter, Fluviá and Muga) the transfer breaks, definitely, the principle of relationship between the projected hydraulic works and the basin where the water will be addressed. This fact will drag by nearness to the two northern basins neighbouring to the Ter one with different implications. First of all the attempt of an unitary planning with the water resources in the three basins as a whole. In second place, the constructive proposals to be developed both in the Muga and the Fluviá rivers are conceived considering to realise the maximum flows from the Ter to be addressed to Barcelona with guarantees. For the previous reason, both basins acquire a strategic value that goes far beyond the local level (as had happened until then.) Finally, the theoretical orientation that will take the entire system of hydraulic infrastructures for the irrigation of the Empordà in relation to the areas beneficiaries will tilt to the south.

The void execution of the regulation and irrigation works in the Fluviá basin will ruin with the main part of the previous theoretical assumptions. The central geographical location of its basin between the Muga one, to the north, and the Ter one, to the south, will make impossible the unitary planning defended up till then. For the same reason won't have effect the idea of orienting to the south the irrigation system as a whole. However, not construction of any large hydraulic regulation infrastructure in the Fluviá has turned it in the most important internal basin of Catalonia with a flow regime naturalized.

In another vein, by the available records, the strategic scenario that is drawn between the three basins, as a result of the transfer of the Ter the late 50s, it is feasible to consider that it had advanced to the early 40s or even in the late 30s under some assumptions that could never be corroborated. These assumptions would have been:

- a) The approval of the Plan of Public Works by the autonomous government of Catalonia (Generalitat) in 1935 with the provisions of irrigation and water supplies awarded to the three rivers of Girona (including the transfer of water from the Ter to Barcelona and the Vallés area).
- b) The non-traumatic interruption that represented the Civil War from 1936 to 1939 from the political, technical and administrative procedure perspectives.
- c) The maintenance of the competences in hydraulic matters recognized to the autonomous government of Catalonia in 1936.

- d) The absence of the deep economical recession that was experienced after the Civil War and was aggravated by a situation of international isolation until the early 50s. In other words, in a hypothetical scenario of economic expansion in the late 30s and in the 40s, it's possible that the progression in increasing water demands for Barcelona and its surroundings would have been faster (associated with the industrial development, the agricultural intensification and the urban water supplies that would have attended a greater diversity of uses). It would have justified putting on the table, already then, the solution finally adopted 20 years after. In fact, the comparison that draws the engineer García Faria between Madrid and Barcelona water supplies in 1920, two cities with similar demographic dimensions, certifies that in the case of Madrid the large hydraulic works for urban supplies, such as dams and their associated piping, began to be built at least in the decade of 1850-59, that is a century earlier than in the case of Barcelona.

Conversely, it could be questioned how it would have conditioned the evolution of the events the maintenance of a democratic regime which is expected that would have managed, in different way, the opposition occurred during the Franco period. By the way, an opposition quite exceptional for the time and its circumstances, especially if we take into consideration that the corporate and political institutions were who led it.

The approval of the transfer will stimulate the writing and partial implementation of large hydraulic works projects with a clear focus on irrigation, both in the Muga and the Fluviá basins. However, if we compare the provisions in relation to the pace of what was done and especially with the progression much more agile that experienced the works of the transfer, we must conclude that the aspects carried out moved away markedly in relation with the promised ones. Anyhow we should play down the real influence that has had the part not put into effect if we want to understand, simply as a breach of the compensations that were announced. That is, it would have to value to what extent the infrastructure not implemented is attributable to the mere violation of what was promised or if is attributable to other causes; this reflection is especially concerned in terms of irrigation. In parallel should also be questioned to what extent the non-execution of proposal works have conditioned or not changes or improvements that were expected with them.