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Memoria, proyecto y construcción del paisaje
Memory, design and landscape construction

José Ignacio Linazasoro | Joan Nogué | Jorge Torres...



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DEPARTAMENTO DE ARQUITECTURA
María de Luna, 3
Edificio Torres-Quevedo. Campus del Río Ebro
50018 Zaragoza
+34 876 555 095
uparq@unizar.es

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Memoria, proyecto y construcción del paisaje

Carlos Labarta Aizpún
Ascensión Hernández Martínez
Alegría Colón Mur
Universidad de Zaragoza

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El paisaje, en cualquiera de sus categorías o formulaciones, y en especial en lo que hoy denominamos paisaje cultural, es un patrimonio común que precisa, para su existencia y culminación, de la mirada e intervención del individuo sobre la naturaleza o sobre una herencia construida en el tiempo. Así comprendido el hombre contemporáneo lo recibe como testimonio de un legado sobre el que, progresiva y cíclicamente, retorna su mirada. Y, aún más, lo precisa como estímulo necesario para construir su identidad en un mundo en vertiginosa evolución. Por ello es necesario reconstruir el marco teórico y conceptual de una realidad en continua transformación y considerar, esencialmente, las bases antropológicas del habitar en las que la memoria y la identidad son elementos constitutivos asociados a la creciente idea de retorno a situaciones primigenias.

El análisis de la idea de retorno a estos patrimonios olvidados y al mundo rural se narra desde una mirada poliédrica y transversal, arquitectónica, paisajística, literaria, visual, musical, que incluye la actualización de las bases y razones demográficas, sociológicas y económicas para un abandono, al mismo tiempo que propone las claves y las estrategias para su transformación como motor de cambio de patrimonios en declive. A esta llamada acuden, lógicamente, equipos multidisciplinares en los que tienen cabida arquitectos, urbanistas, paisajistas, geógrafos, historiadores, sociólogos, antropólogos y economistas.

En este contexto adquieren singular interés aquellos ejemplos en los que el patrimonio juega un papel determinante en su desarrollo. En especial en zonas donde se ha producido un fuerte desequilibrio demográfico y la gestión de dicho patrimonio se convierte en una eficaz herramienta contra la despoblación. Paisajes agrícolas, ganaderos forestales, industriales, históricos o defensivos, o paisajes simbólicos, se convierten en realidades que atraen la mirada de académicos, investigadores y profesionales en la búsqueda de nuevos usos y oportunidades. Preservar su memoria e identidad es tanto como garantizar que el futuro inmediato se construye de manera más cierta sobre el principio de continuidad.

La construcción de esta memoria, en algunos casos en riesgo de desaparición, requiere de nuevas herramientas de cartografía y digitalización. En continuidad con los postulados de James Corner, expuestos en su referido "The Agency of Mapping Speculation, Critique and Invention", la mirada sobre un territorio o un paisaje no solo representa la realidad sino, sobre todo, tiene la capacidad de reformular lo que ya existe desvelando potenciales ocultos. Sumamente atractiva resulta también la constatación y recuperación de la memoria del suelo sobre el que acontece todo acto fundacional de la acción del hombre. De su análisis crítico pueden derivarse las nuevas estrategias de ocupación.

La pervivencia de la memoria visual es igualmente crucial. La documentación fotográfica, tanto histórica como actual, juega un papel esencial en tanto en cuanto nos sitúa en el escenario donde nacen las nuevas actuaciones. No solamente es cuestión de preservar la memoria sino de establecer los códigos y las bases para su reinterpretación. De ahí la necesidad de una mirada fotográfica moderna sobre paisajes y patrimonios olvidados que alerte su presencia y promueva su activación.

Memory, design and landscape construction

Carlos Labarta Aizpún
Ascensión Hernández Martínez
Alegría Colón Mur
Universidad de Zaragoza

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The landscape, in any of its categories or formulations, and especially in what today we call the cultural landscape, is a common heritage that requires, for its existence and culmination, the gaze and intervention of the individual on nature or on a built heritage in time. Thus understood, contemporary man receives the landscape as a testimony of a legacy on which, progressively and cyclically, his gaze returns. Moreover, it needs it as a necessary stimulus to build its identity in a world in dizzying evolution. Thus, the theoretical and conceptual framework of a reality needs to be reconstructed in continuous transformation, and the anthropological bases of living in which memory and identity are constitutive elements associated with the growing idea of a return to original situations needs to be considered.

The analysis of the idea of return to these forgotten heritages and to the rural world is narrated from a polyhedral and transversal perspective, architectural, landscape, literary, visual, musical, which includes the updating of the bases and demographic, sociological and economic reasons for abandonment and proposes the keys and strategies for its transformation as engines of change in declining assets. Logically, multidisciplinary teams, including architects, urban planners, landscapers, geographers, historians, sociologists, anthropologists and economists, have answered this call.

In this context, those examples in which heritage plays a decisive role in their development are particularly interesting. This is especially the case in areas where there has been a strong demographic imbalance and where the management of this heritage becomes an effective tool against depopulation. Agricultural, forestry, industrial, historical or defensive landscapes, or symbolic landscapes, have become realities that attract the gaze of academics, researchers and professionals in search of new uses and opportunities. Preserving their memory and identity is as much as guaranteeing that the immediate future is built more reliably on the basis of the principle of continuity.

The construction of this memory, which in some cases is at risk of disappearance, requires new mapping and digitization tools. In line with the postulates of James Corner in his "The Agency of Mapping Speculation, Critique and Invention", the look on a territory or a landscape not only represents reality but, above all, has the capacity to reformulate what it already has unveiled hidden potential. The verification and recovery of the memory of the soil on which every foundational act of man's action takes place is also extremely attractive. New occupation strategies can be derived from critical analysis.

The survival of visual memory is equally crucial. Photographic documentation, both historical and current, plays an essential role since it places us on the stage where new performances are born. This is not only a question of preserving memory but also of establishing the codes and bases for reinterpretation. Hence, there is a need for a modern photographic view of forgotten landscapes and heritages that alerts their presence and promotes their activation.

A careful look at the landscape and the intention to contribute to its construction in time lead to a timeless and universal architecture. Memory, in this way, refers not only to monumental heritage but also,

La mirada atenta sobre el paisaje y la intención de contribuir a su construcción en el tiempo conduce a una arquitectura atemporal y universal. La memoria, de este modo, no solo se refiere al patrimonio monumental sino, fundamentalmente, a las estructuras domésticas adaptadas a lo largo de los siglos en la construcción del paisaje. De ahí el interés por estudiar las prácticas de reconstrucción de estructuras tanto arquitectónicas como paisajísticas en el medio rural entendidas como oportunidades de desarrollo. Estas intervenciones se asocian en muchos casos a nuevas prácticas artísticas y a la potenciación de parques culturales que ponen en valor el patrimonio y contribuyen a un turismo sostenible.

En términos estrictamente arquitectónicos recordamos que la evolución de la modernidad también se nutrió de la tensión entre lo próximo y lo universal, entre la tradición y la revolución, entre las formulaciones plásticas de los nuevos tiempos y las realidades ancestrales. Es sabido, por ejemplo, que Le Corbusier, en el cambio de década entre los años veinte y treinta del siglo pasado, simultáneamente, construía Villa Saboya y dibujaba, en los croquis de la Casa Errázuriz, Zapallar, Chile, las huellas de lo vernáculo. En esta tensión entre aparentes opuestos germina la evolución de las artes. Basta recordar igualmente las trayectorias de tantos arquitectos modernos, como Luis Barragán o Dimitris Pikionis, quienes, en el encuentro con el paisaje transformaron radicalmente su obra. En los ejemplos de mayor intensidad se observa una deliberada voluntad del arquitecto de desaparecer en favor de lo anónimo, lo pequeño, incluso si se pudiera, de lo inocente.

En consonancia con la escala del paisaje es pertinente recordar, desde la perspectiva estrictamente arquitectónica, que la voluntad de retorno al origen impulsó a un buen número de arquitectos y artistas a dispensarse para sí mismos unos espacios en el medio rural que les ayudasen a comprender la domesticidad y el encuentro con las condiciones esenciales del habitar. La idea de refugio impulsó, entre otros, a Wright, Le Corbusier, Aalto, Asplund, Erskine, Murcuttt, a construirse un pequeño hogar en el que sus novedosos planteamientos arquitectónicos no solo no se desdibujasen, sino que, contrariamente a las apariencias, encontrasen su verdadero sentido en continuidad con los orígenes. Otros maestros, geográficamente más cercanos, sintieron la misma necesidad de construirse su cabaña. Basta recordar los refugios de Sáenz de Oíza, Coderch, Vázquez Molezún o Fisac. También Donald Judd encontró en el desierto de Marfa, Texas, el paisaje para su obra y su morada.

Estas evoluciones contaron, ineludiblemente con el reconocimiento y el concurso de la materia. Así el material puede entenderse como depositario de la memoria de los lugares sobre los que se construye el paisaje. Son múltiples los ejemplos en los que la esencial construcción del mismo refiere a la memoria y a la información acumulada en los materiales. No solo en la arquitectura heredada de la modernidad sino en prácticas contemporáneas encontramos un punto de inflexión a partir de una modificación en la percepción y utilización de los materiales y de los valores significantes de ellos emanados.

Esta convocatoria de la revista pretende reunir a aquellas investigaciones y prácticas profesionales que indagan en el concurso de la memoria y en sus cartografías, con la amplitud de campos y escalas anteriormente apuntadas, como razón para la construcción de paisajes culturales en espera de ser redefinidos. Son igualmente bienvenidos los estudios y trabajos sobre patrimonios, tanto monumentales como domésticos, y sobre espacios frágiles y abandonados que aguardan la mirada del hombre contemporáneo para ser identificados, puestos en valor, cualificados y, de esta manera, contribuir a construir su identidad. Entre ellas, y desde la escala de la arquitectura a la del territorio, pueden incorporarse las investigaciones, tanto actuales como aquellas que muestren ejemplos pretéritos, en entornos rurales que incidan en nuevas estrategias de intervención

Carlos Labarta Aizpún, Ascensión Hernández Martínez y Alegría Colón Mur

fundamentally, to the domestic structures adapted over the centuries in the construction of the landscape. Hence, interest in studying the practices of reconstruction of both architectural and landscape structures in rural areas is understood as development opportunities. These interventions are often associated with new artistic practices and the promotion of cultural parks that enhance heritage and contribute to sustainable tourism.

In strictly architectural terms, we recall that the evolution of modernity was also nurtured by the tension between the near and the universal, between tradition and revolution, and between the plastic formulations of the new times and ancestral realities. For example, Le Corbusier, at the turn of the decade between the twenties and thirties of the last century, simultaneously built Villa Saboya and drew, in the sketches of the Errázuriz House, Zapallar, Chile, traces of the vernacular. In this tension between apparent opposites, the evolution of the arts germinates. It is enough to recall the trajectories of many modern architects, such as Luis Barragán or Dimitris Pikionis, who, in the encounter with the landscape, radically transformed their work. In the most intense examples, there is a deliberate will of the architect to disappear in favour of the anonymous, the small, even if possible, the innocent.

In keeping with the scale of the landscape, it is pertinent to remember, from a strictly architectural perspective, that the desire to return to the origin prompted a good number of architects and artists to dispense for themselves some spaces in the rural environment that would help them understand domesticity and encounter the essential conditions of living. The idea of refuge prompted, among others, Wright, Le Corbusier, Aalto, Asplund, Erskine, and Murcuttt to build a small home in which their innovative architectural approaches not only did not blur but, contrary to appearances, found their true meaning in continuity with the origins. Other teachers, who were geographically closer, felt the same need to build their cabins. It is enough to remember the refugia of Sáenz de Oíza, Coderch, Vázquez Molezún or Fisac. Donald Judd also found the landscape for his work and his home in the desert of Marfa, Texas.

These evolutions had, inescapably, the recognition and support of the subject. Thus, material can be understood as a depository of the memory of the places on which the landscape is built. There are many examples in which the essential construction of the same refers to the memory and the information accumulated in the materials. Not only in the architecture inherited from modernity but also in contemporary practices, we find a turning point from a modification in the perception and use of materials and the significant values emanating from them.

This call for the journal aims to bring together the studies and professional practices that investigate the memory contest and its cartographies, with the breadth of fields and scales previously mentioned, as a reason for the construction of cultural landscapes waiting to be redefined. Studies and works on heritages, both monumental and domestic, and fragile and abandoned spaces that await the gaze of contemporary man are equally welcome to be identified, valued, and qualified and, in this way, contribute to building their identity. Among them, and from the scale of architecture to that of the territory, research can be incorporated, both current and those that show past examples, in rural settings that influence new intervention strategies.

Carlos Labarta Aizpún, Ascensión Hernández Martínez and Alegría Colón Mur

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Editores de este número ZARCH #26/2026
Editors of this issue ZARCH#26/2026
CARLOS LABARTA AIZPÚN [ORCID: 000-0002-2754-4636]
ASCENSIÓN HERNÁNDEZ MARTÍNEZ [ORCID: 0000-0003-3630-2476]
ALEGRÍA COLÓN MUR [ORCID: 0000-0002-6358-0597]

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Arquitectura y paisaje en el patrimonio hidrosocial de los poblados de pantanos en la Península Ibérica

Architecture and Landscape in the Hydrosocial Heritage of Iberian Dam Settlements

CATARINA RUIVO PEREIRA
SHEILA PALOMARES ALARCÓN
IVONNE HERRERA-PINEDA

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Resumen

A mediados del siglo XX, la construcción de presas pasó a ocupar un lugar central en las estrategias del desarrollo nacional de España y Portugal. Estas infraestructuras suelen representarse como monumentos de innovación técnica, fruto de una prolongada experimentación con técnicas arquitectónicas y de ingeniería adaptadas a las condiciones territoriales. Al mismo tiempo, encarnaban complejos procesos de implementación de políticas públicas. Este artículo examina la construcción de tres presas en zonas remotas –Los Bermejales, Miranda do Douro y Picote– que requirieron el desarrollo de nuevos asentamientos. Se toma la arquitectura, el paisaje y el patrimonio como lentes analíticas para producir una lectura diacrónica del desarrollo y la transformación de estos espacios a lo largo de los últimos 70 años. El estudio se basa en fuentes históricas primarias –como proyectos arquitectónicos, registros oficiales y textos en primera persona–, fuentes secundarias y el uso analítico de fotografías y vistas aéreas para trazar una historia de los nuevos asentamientos desde la década de 1950 hasta la actualidad. De este modo, se pretende examinar el papel de estas presas en la profunda transformación de los paisajes existentes y en los procesos de modernización y cambio social en las regiones periféricas de la Península Ibérica.

Palabras clave: infraestructura hidroeléctrica, patrimonio cultural, paisaje, arquitectura modernista, Península Ibérica.

Abstract

In the mid-20th century, the construction of dams became central to national development strategies in Spain and Portugal, which often presented them as symbols of modernity, industrial progress and self-sufficiency. These infrastructures are often represented as monuments of technical innovation, arising from prolonged experimentation with architectural and engineering techniques adapted to territorial conditions. At the same time, they embodied complex processes of public policy implementation. This article examines the construction of three dams in remote areas – Los Bermejales, Miranda do Douro and Picote – which required the development of new settlements. It uses architecture, landscape and heritage as analytical lenses through which to produce a diachronic reading of the development and transformation of these spaces throughout the last 70 years. The study draws from primary historical sources – such as architectural projects, official records, and first-person texts -, secondary sources, and the analytical use of photographs and aerial imagery to trace a history of the new settlements from the 1950s to today. In this way, it seeks to examine the role of these dams in the profound transformation of existing landscapes and in the processes of modernisation and social change in peripheral regions of the Iberian Peninsula.

Keywords: hydroelectric infrastructure, cultural heritage, landscape, modernist architecture, Iberian Peninsula.

Catarina Ruivo Pereira. ISCTE-Instituto Universitário de Lisboa. Avenida das Forças Armadas, Lisboa. +351217650499. Catarina.pereira@iscte-iul.pt.. Catarina Ruivo Pereira (Porto, 1989) has a masters degree in architecture from the University of Porto (2014) and a PhD from the University of Lisbon (2021), with a visiting period at the Barttlet School of Architecture, in London. She is an integrated PhD researcher at ISCTE - University Institute of Lisbon, working in the research project ReArq.IB (ERC Starting Grant GA949686). She previously worked as a pre-doctoral researcher at the Escola Superior Artística do Porto (NORTE-01-0246-FEDER-000013, 2016-2018). She works at the intersection of qualitative and quantitative methods applied to architectural history and has published in ZARCH Journal of Interdisciplinary Studies in Architecture and Urbanism, Urban Science, Espaços Vividos e Espaços Construídos, and edited two volumes with Springer. ORCID 0000-0002-9245-4194

Sheila Palomares Alarcón. Department of Architectural and Engineering Graphic Expression – Architectural Projects Area. University of Granada. sheila@ugr.es. Sheila Palomares Alarcón (La Carolina, 1981). Architect from the School of Architecture at the University of Granada (2007), International Doctorate from the University of Jaén (2016, Alfredo Cazabán Award 2018) and Doctorate in History (Cultural Heritage) from the University of Évora (Portugal) (2020, FCT Fellowship). She is currently an Assistant Professor at the School of Architecture of the University of Granada (2025), where she teaches in the area of Architectural Projects (Department of Architectural and Engineering Graphic Expression), and is an external researcher at CIDEHUS-University of Évora. She was previously a postdoctoral researcher (Margarita Salas program) at the University of Jaén (2023–2024), a postdoctoral researcher at ISCTE – Lisbon University Institute (2022) (ERC – Starting Grant research Project), and a visiting professor at the University of Évora (2021–2022). Her main lines of research are architecture and cultural heritage, especially industrial heritage, in southern Europe. https://orcid.org/0000-0001-5451-8225

Ivonne Herrera-Pineda. ISCTE-Instituto Universitário de Lisboa. Avenida das Forças Armadas, Lisboa. +351217650499. Ivonne.Pineda@iscte-iul.pt.. Ivonne Herrera-Pineda (Ecuador, 1988) holds a PhD in Human Sciences: Geography, Anthropology, and African and Asian Studies (2021), a master's degree in Public Anthropology and a bachelor's degree in Philosophy from the Autonomous University of Madrid. During the PhD, she did a research stay at the Centre for Social Studies of the University of Coimbra, where she further developed her line of research in urban studies. She is an integrated postdoctoral researcher at the University Institute of Lisbon in the research project ReARQ.IB (ERC Starting Grant GA949686). Her research is focused on urban and rural communities and on the relationship between everyday and the built environment. She has conducted research on sociability, grassroot organizations, citizen participation and collective memory. ORCID 0000-0002-1871-3960

Introduction

This article presents a comparative analysis of three mid-20th-century dams - the Bermejales dam in Spain and the Picote and Miranda do Douro dams in Portugal - interpreting them as social and cultural landscapes where heritage value emerges from the interaction of territorial transformation, architectural form, and collective memory. First, drawing on political ecology, dams are analysed as technical projects that produce uneven social and spatial outcomes that extend well beyond construction phases[1]. Second, landscape and architectural research is used to read dam settlements as spatial records, where patterns of use, decay, and partial preservation register changing meanings over time[2]. Third, a critical heritage perspective draws on oral history to foreground memory and everyday experience, revealing how lived narratives shape place attachment[3]. By combining these approaches, the study shows how these dams have left layered architectural and cultural legacies that continue to inform debates on heritage and identity.

Methodologically, the study combines architectural and ethnographic perspectives through three complementary sets of sources. Archival materials - project drawings, briefs and minutes from hydroelectric company meetings in the 1950s and 1960s - are analysed alongside visual and spatial documentation, including cartography, aerial imagery, contemporary photographs and data from site visits conducted since 2023, which trace territorial and physical transformations. To incorporate lived experience, these sources are read in dialogue with first-person testimonies and photographs compiled by a local priest, as well as secondary literature and audiovisual materials on citizen initiatives. This combined reading links official records with collective memory to interpret dam landscapes as the outcome of both infrastructural planning and residents' experience.

Dam Construction in Spain

Spain's pioneering role in dam construction[4] began to take shape with the Ley de Aguas of 13 June 1879 and other laws, regulations and studies. The "Draft of a General Plan for Dams and Irrigation Channels"[5], which proposed the construction of a series of dams, was an important precedent for the Hydraulic works plan approved in 1902, which included, among its objectives, the construction of canals and dams to improve and extend existing irrigation systems and promote new ones.

This plan included 205 dams to be built throughout Spain, but no plans were published on how or when to build them[6]. This lack of definition may have contributed to the belated execution of work on numerous dams, which sometimes took decades to materialise. Nevertheless, some large-scale projects began to be constructed in the following decade, supported by the enactment of numerous provisions, such as the Ley of 7 July 1911 on hydraulic constructions for irrigation, which provided subsidies for their construction. Furthermore, the approval of the pioneering provision that created the Hydrographic Trade Union Confederations in 1926[7], as well as the National Hydraulic Works Plan of 1933, was undoubtedly a key trigger for the construction of the larger dams and hydroelectric power stations.

While some authors consider the period between 1917 and 1936 to be the "heroic age of hydroelectricity in Spain"[8], the image of Franco inaugurating dams is still associated with the regime today[9]. After the Spanish Civil War, a period during which numerous projects that had already begun were halted, work resumed on numerous dams and new ones were built with state funding under numerous plans, such as the 1940 General Public Works Plan, and others of a local nature, such as the 1953 Jaén Plan[10]. Between 1940 and 1967, some three hundred dams were built in Spain for both agricultural and industrial use.

1 Susana Batel and Sophia Küpers, "Politicizing Hydroelectric Power Plants in Portugal: Spatio-Temporal Injustices and Psychosocial Impacts of Renewable Energy Colonialism in the Global North," *Globalizations* 20, no. 6 (2023).

2 Juan García-Esparza, "Are World Heritage concepts of integrity and authenticity lacking in dynamism? A critical approach to Mediterranean autotopic landscapes", *Landscape Research* 43, no. 6 (2018).

3 Tülin Selvi Ünlü, "Urban memory and planning: Investigating the use of oral history", *European Planning Studies* 27, no. 4 (2019).

4 Jenny Pérez Marrero, *Catálogo de presas españolas anteriores a 1926 asociadas a procesos industriales*, Tomo I (Madrid: Instituto de Patrimonio Cultural de España (IPCE), 2017), 5.

5 Cuerpo de Ingenieros de Caminos, Canales y Puertos. *Avance de un plan general de pantanos y canales de riego.* (Madrid: Imprenta y Fundición Tipográfica de los Hijos de J. A. García, 1899).

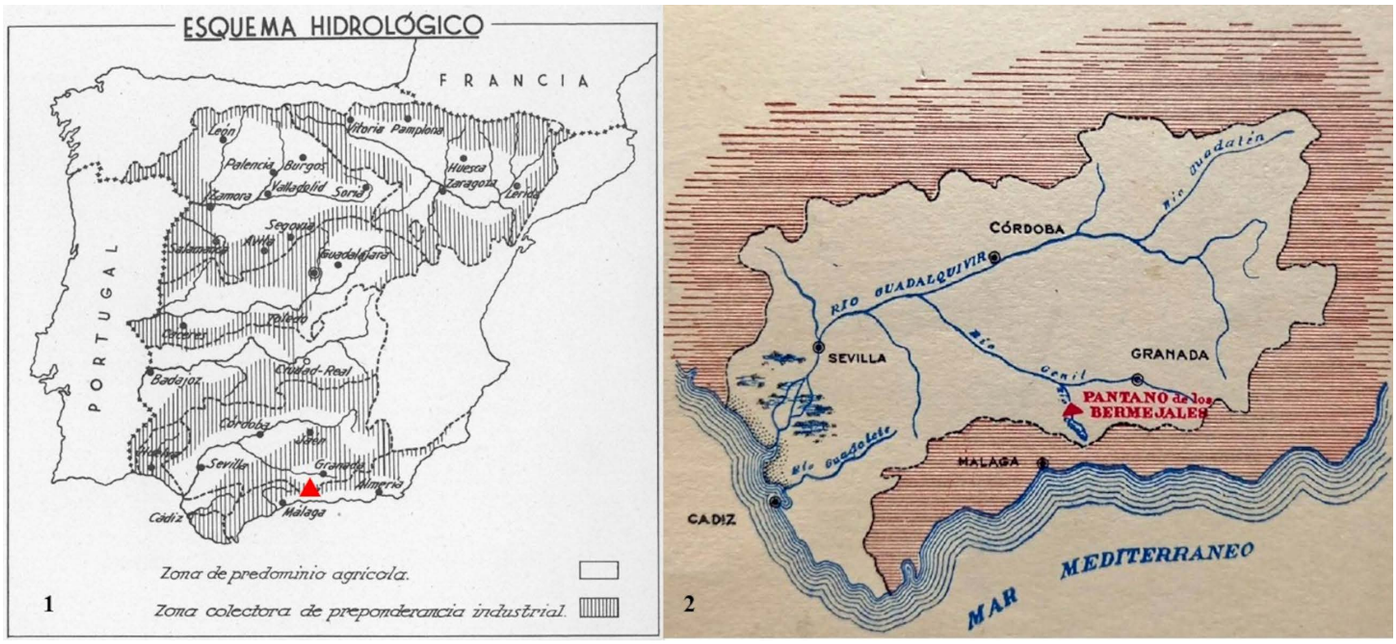
6 España. Ministerio de Agricultura, Industria, Comercio y Obras Públicas, "Pantanos y Canales de Riego," *Revista de Obras Públicas* 1286, tomo I (1900): V.

7 Antonio Gil Olcina. "Del Plan General de 1902 a la planificación hidrológica." *Investigaciones geográficas. Anales de la Universidad de Alicante* (2001), 5.

8 María Soledad Martín-Cleto Sánchez. "Evolución histórica y futuro de los aprovechamientos hidroeléctricos, su ingeniería y su función". (PhD diss., Universidad de Burgos, 2015), 242.

9 Lino Camprubí. *Los ingenieros de Franco. Ciencia, catolicismo y Guerra Fría en el estado franquista.* (Barcelona: Editorial Crítica, 2017), 111.

10 Ley de 17 de Julio de 1953.



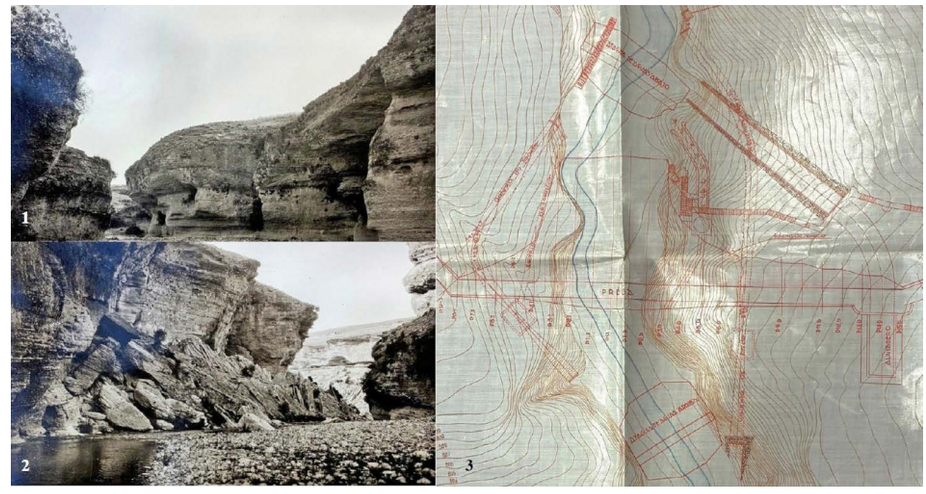


Figure 1. 1) 1940 General Public Works Plan. 2) Confederación Hidrográfica del Guadalquivir, Sección Granada. 1956.

Figure 2. 1) Cacín river. Entrada del cañón. 2) Cacín river, vicinity of the dam. 3) 1940 General Public Works Plan. 3) Los Bermejales reservoir project. 1931. Site plan for the works, 1931. Source: AGA. 25.07802.

Analysis - Los Bermejales

Studies on the use of water from the River Cacín, where the Bermejales reservoir is located (figure 1), began in 1879, although the idea of building a reservoir had already been proposed in 1900 and included in the 1902 hydraulic works plan. Several studies and projects were carried out (figure 2) before construction began in the 1930s and was completed in 1963[11]. The initial objective of this reservoir was to improve irrigation for 5,000 hectares (an extension of the Granada floodplain). However, by the time the works began, electrical energy and the creation of hydroelectric power stations associated with dams were widespread. In this context, the third revised project for the reservoir (1954)[12] included plans for an auxiliary power station at the foot of the dam, which was completed before 1956.

The reservoir submerged two farmhouses, two flour mills and a hydroelectric power station. However, irrigation was improved on 5,000 to 12,000 hectares[13] and the income from irrigable areas and the existing uses of river water for irrigation, mixed or industrial purposes were not affected. Furthermore, its construction reduced the risk of major flooding in the Cacín and Genil river plains. A curved gravity dam was constructed, 55.65 metres above the riverbed and 62 metres above the foundations, with a crest length of 400 metres[14].

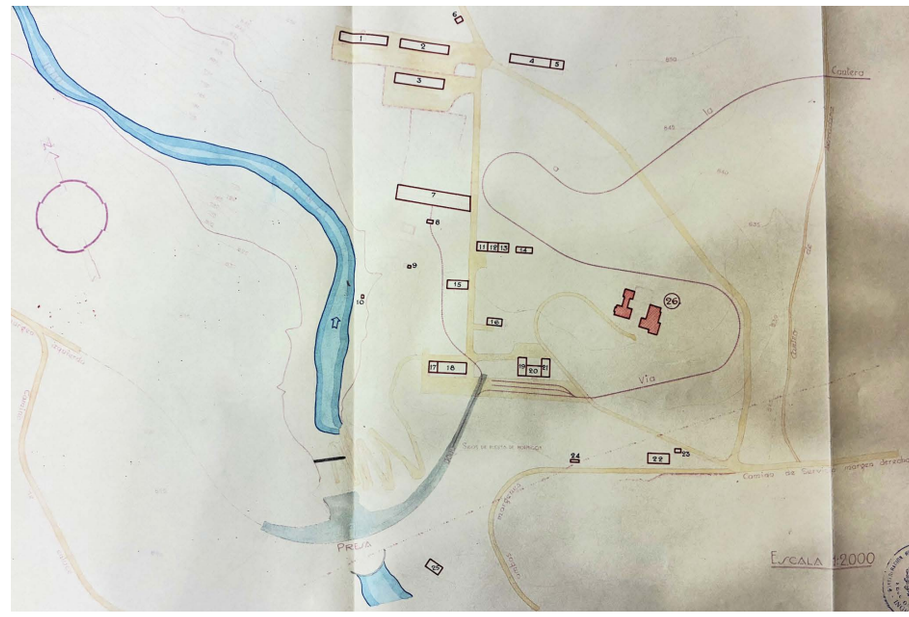
To support the execution of the works, a series of buildings were constructed in several phases, (1931, 1942, 1944), and by 1949 it had the configuration shown in

11 Ministerio de Transportes y Movilidad Sostenible (ACMITMS). "Acta de recepción definitiva de las obras del cuerpo de presas y aliviadero del embalse de los Bermejales". *Obras hidráulicas*. 037261-1. Tomo V.

12 Engineer José María Sánchez del Corral. *3º Proyecto Reformado. Obras del cuerpo de presa y aliviadero*(1954). AGA. 44.007736.

13 Rtve Nodo, "NOT N 840 A."

14 Confederación Hidrográfica del Guadalquivir, Sección Granada, *Pantano de los Bermejales* (Granada: Ministerio de Obras Públicas, Dirección General de Obras Hidráulicas, 1956).



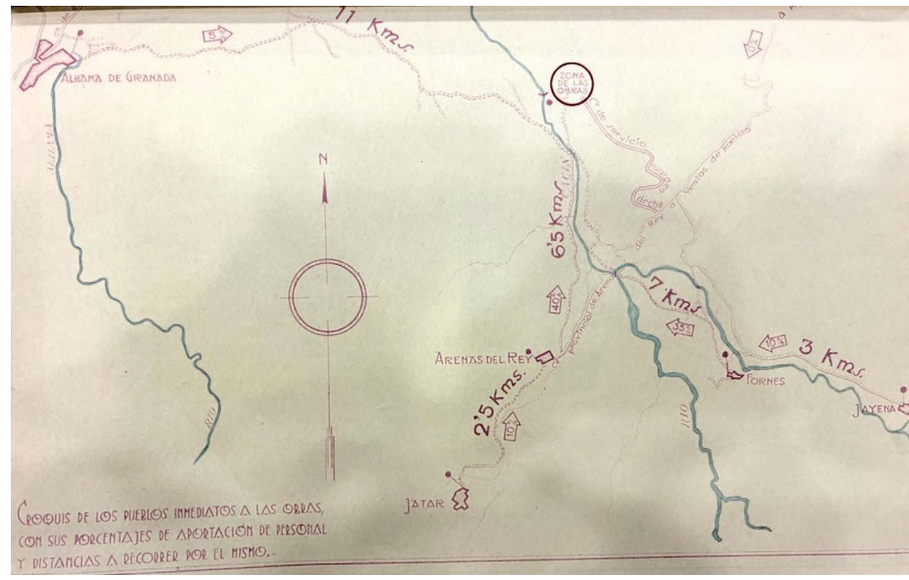


Figure 3. Site plan. Building project for engineer's residence, assistant's residence, caretaker's residence, laboratory, and offices, 1949. Source: AGA. 25.17125.

Figure 4. Sketch of the towns closest to the works, with their percentages of personnel contribution and distances to be travelled by them. Building project for engineer's residence, assistant's residence, caretaker's residence, laboratory, and offices, 1949.

figure 3. However, buildings were reused according to needs over time. Namely, the barracks designed in 1931 were never used as worker accommodation and were eventually converted into a warehouse, workshops, and a commissary store. The settlement included a hospital with accommodation for the practitioner, a house for administrative staff, offices and a laboratory, a school with accommodation for the teacher, a cement warehouse, and two buildings with 15 independent dwellings for employees and visitors. Over time, the settlement grew to include a canteen, a chapel and other dwellings, including ones for the engineer and the guard.

This settlement, called Pantano de los Bermejales, was planned near the access to the dam and the hydroelectric power station, in a slightly sloping area. The buildings were inserted into the terrain, adapting to the topography and the layout of the roads in the area, without any earthworks or excavations, following a simple design based on the standards and materials of vernacular architecture. Although no demographic data were found for the new settlement, its population appears to have exceeded initial expectations, prompting successive expansions throughout the 1940s. This population was isolated from other urban centres, where other workers also lived (figure 4). Construction work on Los Bermejales dam was finalised in 1964; however, the settlement continued to thrive: according to M. Fernandez[15], between the 1960s and 1980s, the village had between 400 and 500 inhabitants and up to 80 students. This may be related to the continued construction or a re-regulation dam on the opposite side of the reservoir until the 1970s.

15 "Presentación del libro 'Bermejales. Historia de un Pueblo Orillado' de M. Fernandez," En Clase Educación y Cultura. archived on July 2025, https://www.youtube.com/watch?v=LUXDKSULv5g&t=136s

Architecture

There was a very specific hierarchy in the designs of Los Bermejales, by engineer José Bruganolas (1931) and chief engineer José María Sánchez del Corral (1949), which included houses, laboratories and offices designed to accommodate the workers who spent more than a decade building the dam[16].

Initially, only the school, hospital, administration building and workers' housing were constructed. These were isolated buildings, built with inexpensive materials and following the standards of much of the architecture of the time, which was dominated by symmetrical spaces, both in plan and elevation, gabled tile roofs, and neo-historicism in the aesthetic treatment of the construction (figure 5). Over the years and as the work progressed, the rest of the buildings and the urbanisation of the village were constructed.

The 1931 project included distinct accommodation types intended for different categories of workers. The U-shaped building for employees and their families was the closest to the construction site. It was a two stories-high building that contained two and three-bedroom apartments with kitchen, dining room and toilet, with a gabled sloping tiled roof, pinnacles, and regionalist features. Along the settlement's main road stood another workers' residence: a single-storey, rectangular and symmetrical building with two staircases - one on each longitudinal façade - and a somewhat monumental appearance. It accommodated 66 beds, with a guard stationed at the centre, and communal kitchens and bathrooms at each end.

These barracks were never used as intended. As it didn't comply with usual notions of privacy, workers chose to sleep in separate huts rather than all together in this new facility. Over time, other essential uses were found for these barracks. The 1949 project included new single-family row houses for workers, located on the upper part of the settlement. This new design continued to reflect spatial hierarchies, including a large garden-set house for the chief engineer and his family, along with fully equipped residences - with three or four bedrooms, kitchen and dining room - for the assistant and caretaker, as well as offices and a laboratory.

Landscape

The architectural project of Los Bermejales is characterised by its understated presence in the landscape with minimal earthworks and buildings constructed from local materials. This contrasts, however, with the impact of the dam itself, which, according to Julio Moreno's 1900 plan, would submerge existing buildings and agricultural land[17] and, consequently, thoroughly transform both the physical

16 José Corral, *Pantano de los Bermejales. Confederación Hidrográfica del Guadalquivir, sección de Granada*; (AGA). Archivo General de la Administración, leg. 14888, top. 46/26; pa. 42, 46/3. Instituto Estadística y Cartografía de Andalucía.

17 Antonio Arribas Palau and José E. Ferrer Palma, *La necrópolis megalítica del Pantano de los Bermejales* (Granada: Monográfica Arte y Arqueología, 1997).



Figure 5. 1. Hydroelectric power station. Los Bermejales dam. 2. Housing. Los Bermejales settlement.

and social landscapes. The brutality of this transformation is reflected in the title of the local publication “Los Bermejales: Historia de un pueblo orillado”[18], (Los Bermejales: History of a marginalized town), which contains testimonies of residents and descendants of families dislocated from the valley. It emphasises Los Bermejales’ identity at the margins: of the reservoir, around which the settlement constructs its identity; of the existing urban centres, of which it is too far away to benefit from existing employment opportunities that might help retain its decreasing population, but close enough to attract visitors.

The settlement’s close relationship with its surrounding landscape has regularly attracted tourists. As Romero described during the book presentation, weekend visits once resembled going to the beach[19]. Today, an important proportion of residents are foreigners, from the United Kingdom, the Netherlands and other countries, drawn by the area’s beauty and tranquillity, a presence that local inhabitants hope may contribute to the settlement’s revitalisation.

Heritage

M. Fernández, who was born and raised in town, is a founding member of the *Pantano Avanza* group (‘The Marsh Advances’), which raises awareness to the town’s state of abandonment. The author claims that the village was a “well-kept garden” in the 1960s to 1980s, but that it has since fallen into a period of neglect and decline. The situation worsened in the 2010s due to a decrease in employment opportunities, resulting in emigration and population decrease. For *Pantano Avanza*, securing Los Bermejales’ future depends on preserving its built heritage, as reflected in clean-up initiatives and protests against the recent demolition of unoccupied workers’ residences by the Confederación Hidrográfica del Guadalquivir, the public entity that still owns much of the town’s original buildings. The group members argue that renovating existing facilities is essential for new families to settle in town. However, while worker housing has been demolished, the imponent accommodations of the dam’s chief engineer - recently transferred to the municipality of Arenas del Rey by the family - has been studied for the installation of an hotel, which, according to the municipality, should contribute to “recover a space that has excellent tourism potential due to its unique location near the reservoir and surrounded by nature”[20].

Dam Construction in Portugal

The process of electrification in Portugal was belated and more uneven than in other southern European countries; While Italy and Spain adopted hydroelectricity as an alternative to coal during the interwar period, which promoted industrial growth, Portugal’s electrification remained limited and focused mainly on Lisbon and Porto[21]. Despite having abundant water resources, the lack of investment and a prolonged legislative vacuum (1926-1944) slowed the development of the hydroelectric industry, postponing it until the 1950s, when the rise in coal prices during the Second World War finally reignited interest in hydroelectricity[22]. The National Electrification Law of 1944 promoted the centralisation of energy production, the preference for hydraulic power, and electrification as a vector of industrialisation. Portugal’s 1948 entry into the OEEC provided access to Marshall Plan aid, which was crucial for launching large-scale projects and for the allocation of significant resources to hydraulic infrastructure in the country’s economic plans (Plano de Fomento, 1953–1974).

Analysis - Miranda do Douro-Picote

By the mid-20th century, the section of the Douro River that forms the border between Portugal and Spain had been identified as the country’s most promising

18 Manuel Fernández Guzmán, *Los Bermejales: Historia de un pueblo orillado* (Editorial Acentuarse, 2025).

19 “Bermejales, un pueblo orillado,” Rtv.alhama, archived on July 2025, https://www.youtube.com/watch?v=hl-P6vNRuyQ

20 “Arenas del Rey convertirá la casa del ingeniero (Los Bermejales) en un hotel de cuatro estrellas”. Alhama comunicación. Diario Digital Comarca de Alhama, December 10 2010, at https://www.alhama.com/digital/comarca/bermejales/4712-arenas-del-rey-convertira-la-casa-del-ingeniero-los-bermejales-en-un-hotel-de-cuatro-estrellas#gsc.tab=0

21 Isabel B. Rodríguez, “Tan solo algunos distritos iluminados. El espejismo de la electrificación portuguesahasta 1944,” Ayer. Revista de Historia Contemporánea 122, no. 2 (2021)

22 Ana Cardoso de Matos, “As Paisagens da Hidroelectricidade em Portugal: Um Exemplo das Paisagens de Inovação Técnica” (paper presented at IHC-FCSH-UNL, Évora, 2017).

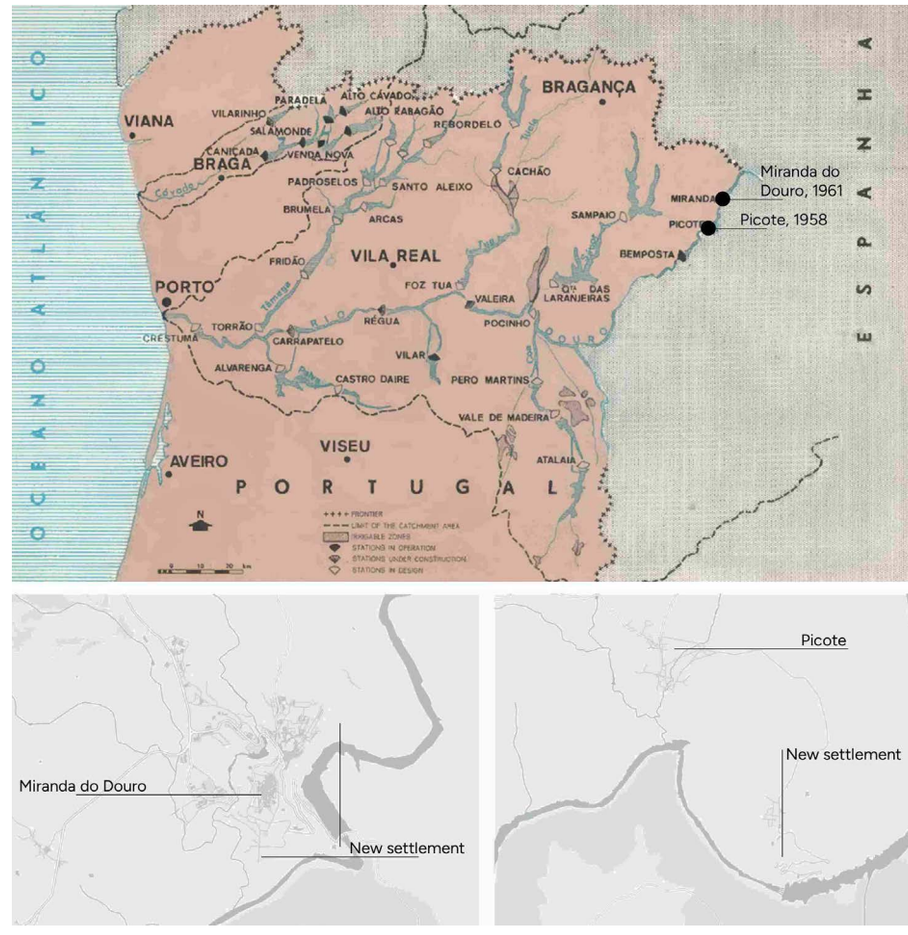


Figure 6. Hydroelectric infrastructure in the north of Portugal and location of existing and new settlements.

source of hydroelectric energy[23]. As such, despite the expected difficulties related to its remote location and steep topography, the dams of Picote and Miranda do Douro began construction in the 1950s (figure 6). They were promoted by the company Hidro-Eléctrica do Douro (HED), which was funded by state and industry entities. Located between steep slopes, these dams represented a feat of national engineering, grounded on technical knowledge and skills developed over decades within a government research institution[24].

Though, unlike Bermejales, the reservoir resulting from dam construction didn't submerge villages or a substantial amount of fertile land, it still represented a brutal transformation of the existing physical and social landscapes. To support the project, new settlements were built near the construction sites (figure 6) in sparsely populated areas. In Picote, the new settlement accommodated 6,500 people in an uninhabited area that had not yet been transformed by human hand[25]. In Miranda do Douro, more than 4,000 workers settled around an existing town until then inhabited by fewer than 1,000 people[26]. In both settlements, new, modern buildings were placed with minimal earthworks, adapting to the site's topography. However, while the architecture team paid attention to the integration of their design into the physical landscape, using local materials and vegetation, they sought little connection to the local social environment. New settlements, incorporating housing, services and cultural and sports facilities, were self-sufficient and independent, creating a clear separation between their residents and the local populations[27].

Social relations were similarly mediated within the new settlements, where workers were attributed different types of accommodation according to their role in the company. Social class was spatialised, with the design of these spaces defining distinct relationships with architecture, landscape and heritage.

23 Portugal, Lei n.º 2058, December 29, 1952.

24 Portugal, Portaria 623/2011, June 29, 2011.

25 J. Figueira, "O Estado na electrificação portuguesa" (PhD diss., Coimbra University, 2012).

26 Hidro-Eléctrica do Douro, *Aproveitamento hidroeléctrico do Douro Internacional - Escalão de Miranda*, (1958).

27 Batel and Küpers, "Politicizing Hydroelectric Power Plants in Portugal".

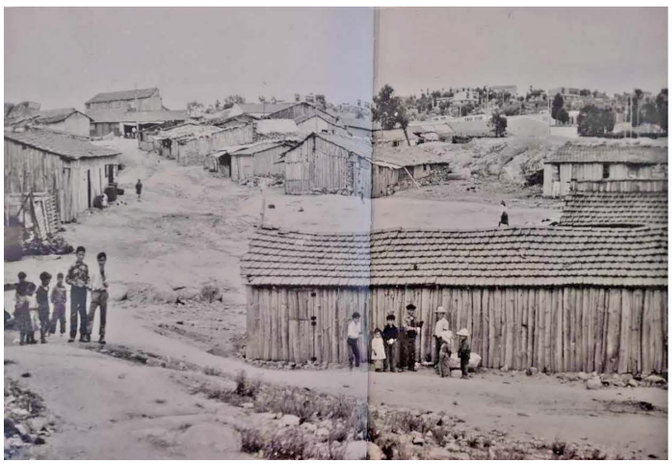


Figure 7. Spatial organisation of the new settlements: 1) Aerial view of Picote's settlement; 2) Aerial view and photograph of Miranda's settlement.

Architecture

The hierarchies of the construction site were the foundation of the planned settlements.

In Picote, five large four to five-bedroom detached houses with maid accommodations were built in concrete and masonry up in the higher areas of the settlement, destined for the company's qualified professionals, such as licensed engineers and medical doctors (figure 7). These houses were arranged in an arborised, gardened area, which included large wooden detached houses, to be demolished once the dam was concluded, as well as the inn for visiting senior management, swimming pool and tennis courts. Separated from these by a forested area was the core of



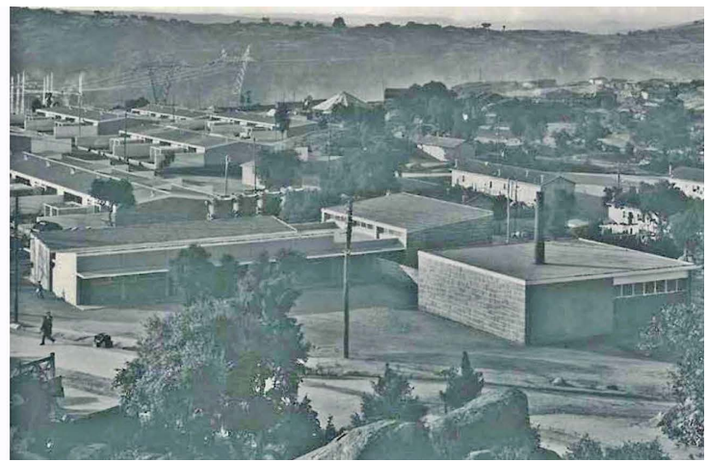


Figure 8. Picote: side by side comparison of houses for unskilled workers and the formal settlement's commercial building and houses for skilled labour.

the settlement: service buildings and shops located near row houses for technical specialists (figure 8-right), which were followed, further down, by smaller wooden row housing for skilled and then unskilled labour.

Miranda do Douro's settlement followed a similar logic. The detached houses of qualified professionals were located at a distance from the rest of the settlement, of which they were separated by the houses of technical specialists, services and collective equipment. Row houses for skilled and unskilled labour were located closest to the construction site.

In both cases, down the slopes leading to construction sites, unskilled workers built their own houses (figure 8-left). These often worked for independent contractors involved in the construction of the dam, or ran parallel services as, for example, bakers or tavern keepers. In Miranda do Douro, which benefited from the experience of Picote, many of these self-built houses were replaced by prefabricated accommodation provided by the HED. However, these were not integrated into the new settlement, but placed on the other side of the mountain, distant from both the old and new urban centres. This spatial distance has shaped collective memory, with new spaces being seen as a separate area that reinforced social distinction and fosters among its inhabitants a strong sense of belonging linked more to the dam than to the city itself[28].

While company workers benefited from exclusive commercial, social, cultural and recreational facilities informal workers slowly created their own spaces, parallel to those envisioned by the architects. The HED administration minutes are full of instances of requests for donations, to which the company usually agreed: special donations around Christmas, financial assistance for religious ceremonies such as the Holy Communion, for summer camps, for local festivals, or for craft schools for the workers' children, for which houses and other spaces were adapted[29].

Landscape

Design and regulation also mediated each social group's relationship with the surrounding landscape. One's relationship with the landscape became more regulated as one's position was higher in the company's hierarchy. While qualified professionals observed their environment from above, in houses that lifted from the ground and stood over carefully designed gardened spaces, sub-contracted workers lived in the rocky slopes, in masonry houses built from locally collected stone, wood, or the leftover materials found in the construction site. HED's buildings were well-built and isolated from the extreme temperatures of the Portuguese northeast, while precarious housing remained vulnerable to cold and snowy winters. Simultaneously, sub-contracted workers were better integrated into the local social landscape. Despite the distance at which their houses

28 Lurdes Pequito, "Barragistas na rede: construção de memória e identidade nas redes sociais," *Trabalhos De Antropologia E Etnologia*, 57 (2020).

29 "Actas da Direcção", Livros nº 1-10 (1953-1966). Fundação EDP. HED/AG/OS-S001-S003.





Figure 9. Miranda: side by side view of skilled workers' children exercising by the swimming pool and of local children playing in the river.

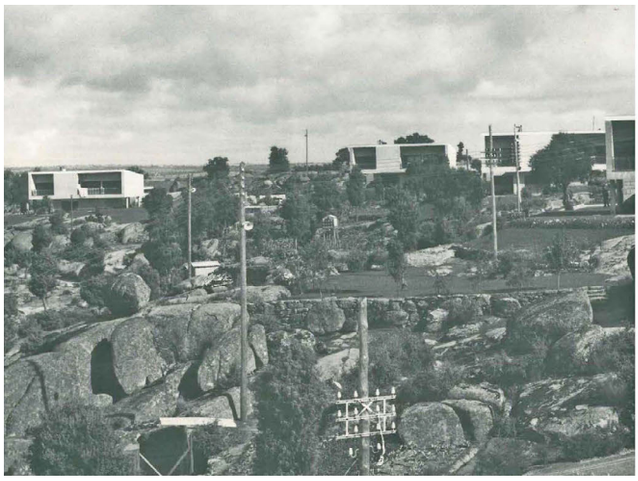




Figure 10. Picote: side by side view of the photograph of detached houses for qualified professionals and self-built unskilled labour accommodation.

were built from Miranda's old town, and restricted from the new collective facilities, these families relied on existing services and place-based social practices. They frequented local shops, the weekly market and learned to swim and play with original residents down in the river, which contrasted with users of the HED swimming pool (figure 9).

Heritage

The architectural quality of the dams and their accompanying structures has been widely acclaimed in recent decades, for the architects' success in articulating the language, materials and spatial organisation of Modernism with a respect for the local context and officially recognised in its classification in 2011[30]. What is known as "hidden modernism", following the exhibition and book with the same title, has become a symbol of progress in an otherwise socially and economically depleted region[31]. Historically, these spaces have played an important role in the local social conformation and, today, they are part of its physical and cultural landscape, along with the steep mountains, centenary villages and towns, the dams and the reservoirs.

If the period of dam construction has become part of the shared cultural heritage of the local population, only a few buildings remain standing: the same whose access was the most restricted. In Picote, the permanent houses built for professionals are currently being renovated for tourism (figure 10-left) and the inn – with its swimming pool and tennis court – is reserved for EDP's senior management. Conversely, the precarious dwellings of the unskilled and informal workers (figure 10-right) have largely disappeared from the physical landscape. As such, the surviving architecture perpetuates what was once HED's hierarchy.

Discussion

Architecture and Landscape as Frameworks of Cultural Heritage

Both Miranda-Picote and Bermejales illustrate how large hydraulic infrastructures produced profound ruptures in rural landscapes, though distinct purposes and architectural expressions. In Bermejales, the dam flooded a fertile valley structured around agriculture and milling as part of an irrigation project intended to transform an arid region into productive farmland. The associated structures adapt to the local vernacular, with simple, functional buildings constructed from local materials. In Miranda-Picote, surrounding villages and agrarian practices were disrupted and gradually abandoned as labour was redirected towards dam construction. The Picote dam in Portugal was a pillar of the country's hy-

30 Portugal, Portaria 623/2011, June 29, 2011.

31 Michele Cannatà and Fátima Fernandes, *Moderno Escondido. Arquitectura das Centrais Hidroeléctricas do Douro 1953-1964 - Picote, Miranda, Bemposta*, (Edições FAUP, 1997).

dropower strategy, implemented in a remote area where electrification arrived late. Here, the dam's architecture represents a strong modernist statement, later celebrated for its technical ambition and formal engagement with the landscape.

These two cases reveal distinct relationships with the natural environment. Although the three settlements lie within protected natural areas, Miranda developed at a distance from the dam and canyon, fostering a relatively detached and contemplative engagement mediated by viewpoints and a service-based economy. Bermejales, by contrast, was built beside the dam as the valley was submerged. The forced relocation from living "below" in the valley to living "above" at the edge of the reservoir is encapsulated in the notion of *orillado*[32] conveying both spatial displacement and a sense of being left aside after the construction of the dam. Collective memory highlights how dam projects prioritised economic reshaping while overlooking long-term social effects. Today, in both contexts, the landscape is reframed as a resource for nature-based tourism.

These spatial and economic arrangements reflect political and symbolic frameworks. Under both dictatorships in the 1950s and 1960s, dams were promoted as emblems of progress and technical mastery. In Spain, reservoirs played a central role in Francoist narratives of nation-building, amplified through inaugurations and media spectacle, whereas in Portugal under the Estado Novo they occupied a less central symbolic position. Yet in both contexts, official narratives obscured lived experiences marked by forced expropriations and dangerous labour, as reflected in two books that are key to their social history[33]. A fascination with modern infrastructure is present in both cases, combining fear and uncertainty with pride and belonging. In Bermejales, the original buildings are under threat of demolition, despite opposition from the local population[34]. In contrast, the recognition of Picote as a heritage site has led to the renovation of several buildings. However, these remain reserved for the occasional visits and holidays of the company's senior management, and do not benefit the local population.

Beyond written records, another form of heritage has developed around these dams: the collective memory embedded in local experience. In both cases, resident-produced oral histories have been essential to reconstruct it. In Miranda and Picote, they show how dam construction intensified migration from nearby villages while connecting the Trás-os-Montes region to wider migratory flows; once construction ended, many workers left, and neighbourhoods built for both skilled and informal labour declined. Former construction workers retain a strong sense of belonging through shared memory and informal networks[35] while *Terra de Miranda* movement has reframed the dams as a collective achievement and seeks recognition of their social and economic legacy. In Los Bermejales, testimonies recall the settlement's commercial and social vitality in the 1960s-70s, sustained by shops and shared facilities created after the valley's flooding; the later closure of services - including the school in 2017 - accelerated depopulation, prompting a local association to promote heritage tourism and the reuse of existing buildings as a strategy for revitalisation.

As research on hydrosocial territories notes, water infrastructures generate forms of "hydrosocial heritage", shaped by historically produced relations between communities, practices and environments[36]. In this sense, Bermejales and Miranda-Picote can be understood as hydrosocial landscapes in transition: although the temporary employment created by dam construction was followed by sustained out-migration, partial occupation and the reuse of buildings still sustain collective memory and the social significance of these places.

32 Ibid.

33 Ferraz, *O Lodo*; Fernández, *Los Bermejales*.

34 "Manifestación contra derribo de los pabellones," *Alhama comunicación. Diario Digital Comarca de Alhama*, November 5, 2023, https://www.alhama.com/digital/medios/videos/video/48:manifestacion-contra-derribo-de-los-pabellones.

35 Pequito, "Barragistas na rede".

36 R. Boelens, J. Hoogesteger, E. Swyngedouw, J. Vos, P. Wester . "Hydrosocial territories: a political ecology perspective," *Water International* 41, no. 1 (2016): 1–14.

37 Batel and Küpers, "Politicizing Hydroelectric Power Plants in Portugal".

38 E. Swyngedouw, *Liquid Power: Contested Hydro-Modernisties in Twentieth-Century Spain* (The MIT Press 2023)

Conclusion

This article contributes to the understanding of how architecture functions not as a passive infrastructure but as a material repository of collective memory, retaining traces of labour, displacement, and resistance[37]. The interest of comparing Miranda-Picote and Los Bermejales lies in how it reveals the relevance of hydrosocial heritage in the Iberian Peninsula, by illustrating the social and political aspects of the built environment[38]. In both cases, dams act not only as infrastructures but as catalysts through which communities construct and negotiate contested legacies, amid contemporary rural depopulation and ageing in Portugal and Spain. In the ongoing transformation of these "hydrosocial territories"[39], architecture and landscape emerged as key pieces in the construction of the "hydrosocial heritage"[40] that shapes collective memory and identity[41]. In both Miranda-Picote and Los Bermejales, the built environment played a major role in shaping social hierarchies among residents and between residents and outsiders, and today it still reflects inequalities in what is preserved and what is demolished. Read in this way, landscape and heritage emerge as critical categories through which the uneven aftermath of development becomes visible, revealing how spatial form mediates between past experience and uncertain futures.

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Authorship contribution statement

Conceptualization (A1, A2,A3); Methodology (A1,A2, A3); Investigation (A1,A2,A3); Formal analysis (A1,A2,A3); Writing – original draft (A1,A2,A3); Writing – review & editing (A1, A2,A3); Visualization (A1,A2,A3); Supervision (A1,A2,A3).

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