## 6.1.11Spain



**Context**

On the northern slopes of the Sierra Nevada in Granada province, the municipalities of Dolar, Caniles, Lugros and Aldeire-La Calahorra contain centuries-old irrigation systems developed from the Islamic and Andalusi periods. Gravity-fed acequias, ponds, dividers and terraces distribute snowmelt and seasonal water across a dry mountainous environment. They are not only hydraulic infrastructure: irrigation communities collectively govern water through inherited rules, work obligations and rotation systems, while seepage recharges aquifers, sustains riparian vegetation, moderates microclimates and supports distinctive cultural landscapes. The study covers more than 6,400 hectares of traditional irrigation. Current public policy promotes 'modernisation' through pressurised pipes, reservoirs, pumps, drip or sprinkler systems and automation, backed by large national and European investments. The authors use the term 'technification' because the intervention entails a social, ecological and governance transformation rather than a neutral upgrade.

**Conflict description**

The conflict opposes different understandings of efficiency, sustainability and rural development. Proponents argue that enclosed, pressurised systems reduce extraction losses, ease labour and increase agricultural productivity. Opponents counter that apparent plot-level savings do not necessarily reduce basin-level consumption. Traditional systems return a significant share of diverted water to rivers and aquifers; pressurised systems reduce those returns and may encourage expansion of irrigated land or shifts to more water-intensive crops. Evidence cited in the study shows that reduced demand can coexist with increased crop consumption. Technification also increases farmers' dependence on electricity, specialised equipment and external maintenance. Average investment costs are estimated at EUR 6,480 per hectare, with operating and maintenance costs rising by about EUR 270 per hectare. These costs can marginalise small farmers, encourage abandonment or concentration of land and favour larger operators and outside investors. Replacing open channels destroys habitats, aquifer-recharge functions and a material heritage maintained over centuries. It also weakens irrigation communities as local institutions of collective governance. Dolar illustrates the procedural dimension. Its irrigation community approved a project in meetings held in 2011 and 2014, but some members and civil-society organisations alleged inadequate notice, exclusion from meetings and breach of statutory deadlines. Qarya, Ecologists in Action, the Salvemos la Vega Platform, the Spanish Historical Heritage Observatory and Assaqya publicly challenged the agreements and sought heritage protection. Similar tensions appear where projects in Lugros and Aldeire-La Calahorra replace ditches with pipes and reservoirs. The dispute therefore unfolds both inside irrigation communities, between members with different economic positions and visions, and in public legal

and policy arenas. It concerns water rights, land viability, ecological functions, community autonomy and the future of the rural landscape.

**Resistance and pathways forward**

Resistance combines procedural challenges, heritage advocacy, scientific research and practical care for irrigation systems. Dissenting irrigators have filed complaints within community bodies and with local or regional institutions, while external associations provide legal, technical and public support. Researchers at the University of Granada's MEMOLab document *acequias* as biocultural systems, produce collaborative maps, advise communities and support volunteer campaigns to clean and restore channels. Historical irrigation communities are also organising through wider networks, and the New Water Culture Foundation challenges claims that technification automatically saves water. These alliances reduce the technical asymmetry between developers and local farmers and make ecological and cultural values legible in planning processes. The study recommends a specific regulatory framework that evaluates water use at basin rather than plot level and integrates energy, heritage, social and environmental impacts. Irrigation-community decisions should meet strict standards of notice, transparency and participation, with independent mediation where divisions are entrenched. Water concessions should be reviewed after efficiency investments so that nominal savings are returned to ecosystems rather than used automatically for expansion or intensification. Public support should prioritise 'respectful modernisation': repairing traditional channels, introducing monitoring or control technologies without destroying the open system, and tailoring solutions to each territory. Heritage designation, rural tourism, organic production and support for generational renewal can improve the viability of communities without dismantling their institutions. The pathway forward is neither freezing irrigation in the past nor replacing it wholesale. It is to combine appropriate technology with hydrological knowledge, collective governance and cultural landscape that have enabled these systems to endure under conditions of scarcity for centuries.