they would be compensated for flooded properties and agricultural land.

Meanwhile, local and international NGOs have launched a series of campaigns and protests against the dam projects. Eight leading environmental organizations have created the network ‘Protect the Rivers’, while another group of individuals has launched the Vjosa Front, which focuses on mobilizing locals and raising awareness through a social media campaign.

The Vjosa campaign has also garnered considerable international attention. In April 2016, the European Parliament called on the Albanian government to control the development of hydropower plants on the Vjosa and recommended it improve the quality of Environmental Impact Assessments to take EU standards into account. A month later in May 2016, the vice-president of the European Parliament, Ulrike Lunacek, joined a group of around 100 environmentalists, kayakers and journalists from across Europe to appeal to the Albanian government to cancel the dam projects on the Vjosa.

Meanwhile, a group of scientists from Albania, Austria and Germany has called for a three-year moratorium on all construction plans on the Vjosa and its tributaries, in order to allow for the implementation of an interdisciplinary research and assessment program on the Vjosa River. They suggest the Vjosa could serve as a “large-scale natural refuge and laboratory of pan-European significance” and an international reference site for climate change research.

On the ground, environmentalist Ferruni says the protests will continue until this goal is reached: “We will continue actively protesting and doing everything we can to stop the project at Poçem.” Murataj is also determined to continue campaigning: “If the dams are built, our history will be flooded and vanish together with the fields. We cannot let that happen. The Vjosa should be left free and wild, as God created it.”

Did you know?

- Hydropower provides 80% of Albania's electricity supply. The remaining 20% comes from imports.
- Albania is among the most water-rich countries in the Mediterranean region, with an annual water availability of 10,425 cubic meters per person.
- Vjosa is a popular girl’s name in Albania and Kosovo. It is associated with the river and its pristine beauty.

Source:INSTAT (2015); Aquastat (2014).

"The Vjosa River is an integrated ecosystem and this natural dynamic will be totally destroyed if large dams are built along its course."

Lavdosh Ferruni, Albanian environmentalist

Source: Roland Dorozhani, 2015.

The province of **Almeria** is the most arid region in Europe, but also the continent’s most productive agricultural area

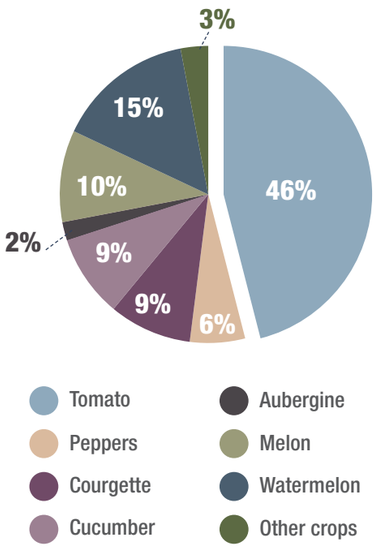
The Price of Watering Europe's Southern Plains

Arid landscape near the village of Los Albaricoques, Almerian Levant, Spain, 2013.
Source: Luis Daniel Carbia Cabeza.

Farmers in south-eastern Spain are complaining of water shortages and say they will go out of business by the end of the year if the government does not increase supply. But planners say there is plenty of water, as long as you pay for it.

Writer: Nadia Muhanna

Variety of crops cultivated in the Nijar Plain, Almeria Province, Spain
Source: The Agriculture and Fishing Department of the Regional Government of Andalusia (2016).



After months without a single drop of rain, farmers in Almeria, Europe's most productive agricultural region, say they are growing desperate. "Cultivation techniques have improved a lot and drip irrigation uses less water, but you still need *some* water," says Andrés Góngora, the provincial secretary of the farmers association COAG.

Following a particularly dry spring this year, Almeria's Federation of Farmers (FERAL) warned in July 2016 that 23,000 hectares of crops in the Almerian Levant, a region bordering the province of Murcia, were at risk of crop failure and that farmers were facing a critical situation.

"Lack of investment in infrastructure and poor planning may put the whole agri-food sector in the Almerian Levant and the Almanzora Basin out of business in the coming months," said José Antonio Fernandéz, the president of FERAL.

According to the Andalusia branch of the Small Farmers' Union (UPA), the ongoing drought is affecting 200 export companies and 18,000 business owners who provide around 64,000 jobs in the area. They say large agri-food companies are already starting to move to other, more water-secure areas.

But Joan Corominas, the former director of the Andalusia water agency and current vice-president of the New Water Culture Foundation (FNCA), is skeptical: "They've been saying this for years, that companies are going to leave, but statistics show that the number of irrigated hectares continues to expand every year."

To Corominas, it is not so much about water scarcity as about farmers' willingness to pay more for water from other sources. "There is plenty of expensive water in Almeria," he says. "What it lacks is cheap water. There is enough water available and farmers should use this to limit over-exploitation of groundwater."

Hydrologic imbalance

Combining the highest number of sunlight hours and lowest rainfall in Europe, Almeria's semi-arid climate and desert landscape do not naturally lend themselves to intensive agriculture. Traditionally, local farmers here cultivated dry-farmed crops like citrus, olives, almonds and cereals. Until the 1960s, Almeria was among the poorest provinces in Spain and people were leaving the region in search of work in other parts of the country. The situation started to change in the 1970s with the introduction of the first greenhouses, the large-scale exploitation of groundwater and the promise of new water sources from other regions.

Water management in Spain has for the past century centered on solving the "hydrologic imbalance" that exists between the country's "humid north" and the "dry south", initially through inter-basin water transfers and, more recently, through the development of large-scale seawater desalination along Spain's Mediterranean coast.

The largest of these transfers is the Tagus-Segura inter-basin water transfer system, which covers a distance of 1,000 kilometers from the headwaters of the Tagus River in the country's center to the Júcar, Segura and Mediterranean river basin districts in the south-east. Depending on water availability in the upstream basins, it transfers a maximum of 600 million cubic meters of water per year for supply to cities and agriculture in the south-east. The province of Almeria only receives a comparatively small portion of this water however – an average of 16 million cubic meters per year.

Together with water from the Negratín-Almanzora transfer, the Tagus-Segura transfer supplies an annual average of 41 million cubic meters of water to the Province of Almeria. Inter-basin transfers make up 38.5% of the water supply in the Almerian Levant, with the remainder coming mainly from groundwater, surface water stored in dams and desalination.

The increase in water availability rapidly transformed Almeria Province – and the wider region of Andalusia of which it forms a part – into Europe's largest producer of agricultural crops in terms of output (production in Andalusia was worth around $8.5 billion in 2014). Today the Dalias Plain, 30 km south-west of the town of Almeria, has the largest concentration of greenhouses in the world, covering an area of 29,000 hectares and producing tomatoes, peppers, cucumbers, courgettes, aubergines, green beans, melons and watermelons.

Further to the north, in the Almerian Levant, greenhouses are less prevalent. Farmers here mainly cultivate vegetables like lettuce, broccoli, artichokes and cauliflower as well as citrus fruit and olives. Large agri-food companies from Murcia and Valencia have established themselves in this area, with particularly strong growth in the municipalities of Nijar and Pulpi.

Corominas admits that irrigating 60,000 hectares of land to produce lettuce, tomatoes and cucumbers in the middle of the desert may seem crazy. "Almeria's advantage is that it has sun and high temperatures year round," he says. "This makes it highly suited to the cultivation of crops in winter, when there is no competition from other parts of Europe. If it weren't for this comparative advantage, it wouldn't make sense to irrigate in such an arid climate."

The province of Almeria

Source: Revolve Water after Data Spain, 2005.

Groundwater depletion

Almerian farmers pride themselves on their efficient water use. "When it comes to irrigation water use, we are one of the most efficient regions," says Roque Garcia, the UPA secretary. He lists the various technologies local farmers use to optimize water use: the latest drip irrigation systems, computer systems to measure the water requirements of different crops and pressure chambers to monitor hydrologic stress.

But despite all these water-saving techniques, the constant expansion of irrigated area has taken its toll on local water resources. Already in the early 2000s, experts warned of risks associated with the intensive agricultural model introduced in the area.

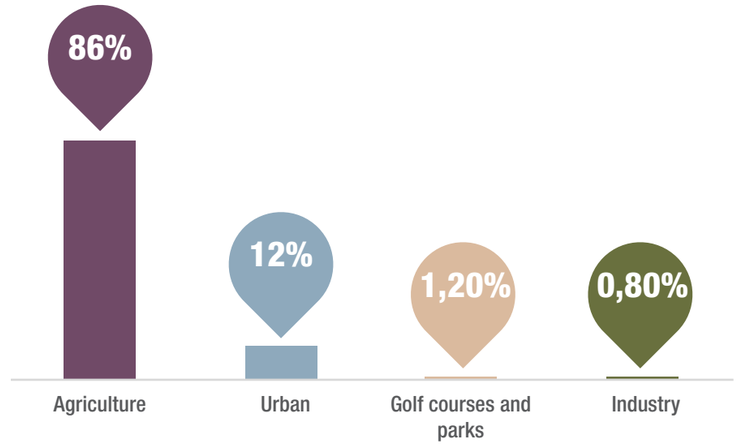
"Lettuce is a water-thirsty crop that is being cultivated in an arid basin," Ángel López Cuquejo, a researcher at the University of Almeria, noted in a critical article in 2002. "The level of the reservoir of the Almanzora Basins Dam (which used to store 150 million cubic meters of water in 1993) has dropped to less than 5 million cubic meters." Data show that the dam reservoir was filled to just 11% of its capacity in December 2015.

Today the main local aquifers, which were already over-exploited in 2002 according to Cuquejo, have also reached critical levels of depletion. Over-pumping and drought have led to a severe drop in groundwater levels, which has in turn caused seawater intrusion. Part of the water in the four main aquifers in the Almerian Levant is now too salty for human consumption or irrigation.

As a result, farmers increasingly rely on water from the two inter-basin water transfers (Tagus-Segura and Negratín-Almanzora). But FERAL says the water supplied through the inter-basin transfers will not cover demand until the end of 2016. Early signs of drought in the Segura Basin also do not bode well and FERAL expects a serious cut in the quantity of water transferred in 2017.

Water use by sector in the Almerian Levant

Source: Revolve Water based on Demarcacion Hidrográfica De Las Cuencas Mediterráneas Andaluzas, Proyecto De Plan Hidrológico 2015/2021.



According to Abel La Calle, a professor of environmental law at the University of Almeria and the current FNCA president, subsidizing groundwater contributes to its over-exploitation.

"Farmers think they are paying the full price for groundwater when they just pay the cost of pumping it out of the ground," he says. "But this does not take the cost of groundwater over-exploitation into account. This water has accumulated over thousands of years and we are consuming it within one generation. The state should reclaim the environmental cost of over-exploitation by increasing the price of groundwater."

When Spain joined the European Union in 1986, it received heavy subsidies to support the development of its economy. Most of these subsidies were revised and reduced over the years. But La Calle says that for political reasons, this was never done in the agricultural sector. "The irrigated agricultural sector is influential," he says. "Confronting [the issue of subsidies] would come at a high political price, which no politician is willing to pay."

> "People in Almeria need to take a step back and realize that the current agricultural model has reached its limits."
>
> Joan Corominas, former director of the Andalusia water agency

Desalination

The only alternative is desalination, which currently provides 11.5% of the water used in the Almerian Levant. There are currently two operational desalination plants supplying Almeria – one in Cartagena Aguilas in Murcia and one in Carboneras – with three more under construction. However, the desalinated water only reaches part of the province. Large parts of the Almerian Levant are not connected to the distribution network due to a lack of infrastructure, according to Góngora.

Furthermore, desalination is expensive: at more than $0.65 per cubic meter, desalinated water is four to six times as expensive as water from inter-basin transfers ($0.09-0.11 per cubic meter) and local groundwater ($0.13-0.15 per cubic meter). "You might be able to afford desalinated water depending on the type of crops you cultivate, but for most crops in this area it is too expensive," says Góngora.

FERAL has called on Spain's central government to lower the price of desalinated water, connect the desalination plant at Carboneras to the most water-deprived areas and reopen the desalination plant at Bajo Almanzora, which was closed a year after its inauguration in 2011 because of technical problems.

However, so far FERAL has not received a response from the government. It has not even managed to gain official recognition of the structural drought in Almeria, which would entitle local farmers to economic compensations. Góngora says the authorities reject farmers' claims of structural water deficits and point to the availability of desalinated water in the province, even though the Almerian Levant has limited access to it. "Investments are needed to expand the distribution network across the province and these have not been made," he says.

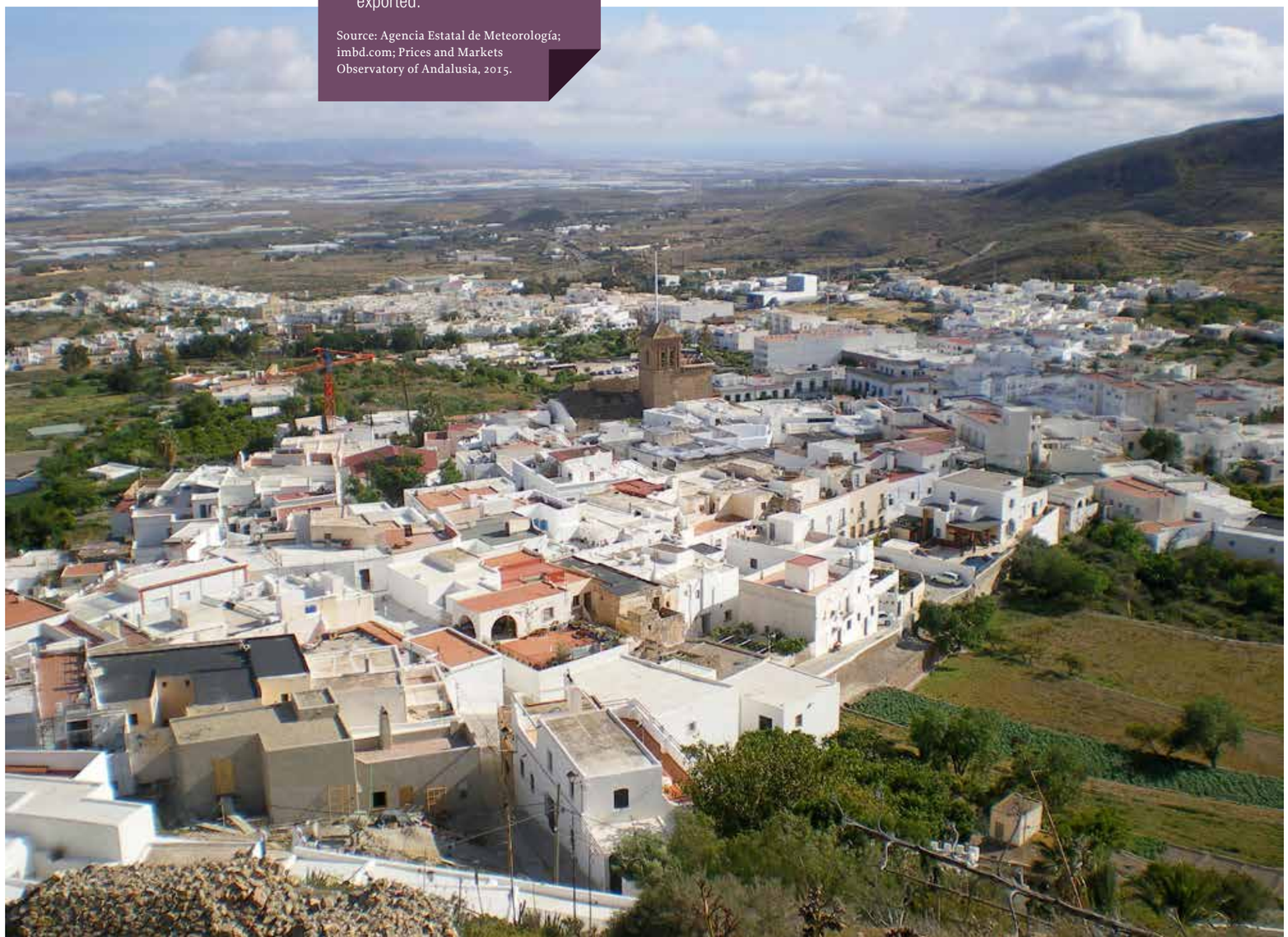
Góngora also sees great potential in the use of treated wastewater for the irrigation of gardens, public parks and golf courses, which would free up fresh water for use in irrigation. "Some municipalities already do this, but not all," he says. "Almeria Province cannot just let its treated wastewater to flow into the sea. It should be put to use."

In 2015, reused wastewater made up just 1% of the total available water resources in the Almerian Levant, suggesting there is considerable room for growth. However, very high levels of treatment are required to irrigate crops like tomatoes and lettuce, and farmers are often worried about associated health risks.

Did you know?

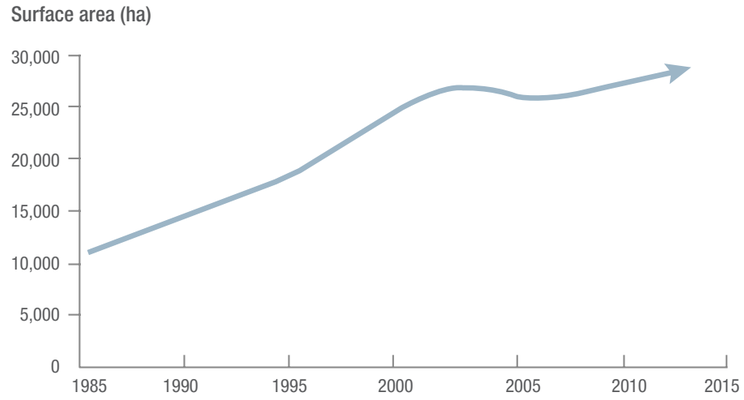
- On average, Almeria has around 320 sunny days per year. It is among the warmest regions on the European continent.
- Almeria's desert landscape made it a popular location for the filming of Spaghetti Westerns in the 1960s, including *A Fistful of Dollars, For a Few Dollars More* and *The Good, The Bad, and The Ugly.*
- In 2015, Almeria produced nearly 985 million tons of tomatoes of which 55% was exported.

Source: Agencia Estatal de Meteorología; imbd.com; Prices and Markets Observatory of Andalusia, 2015.



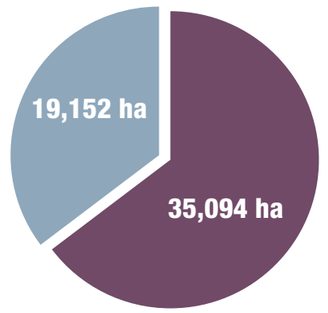
View of the town of Nijar with greenhouses in the distance, Almerian Levant, Spain, 2009.
Source: ANE.

Expansion of the surface area of greenhouses in the province of Almeria, 1985-2013
Source: Revolve Water based on Sanjuan, 2007; CAPMA, 2013.



Total agricultural area in the Almerian Levant
Source: Revolve Water based on Plan Hidrológico, Demarcación Hidrográfica De Las Cuencas Mediterráneas Andaluzas, 2015.

Total: 54,246 ha



Cost of water

FNCA Vice-President Corominas disagrees with the need for more infrastructure. He believes desalination plants can make up for any deficits as farmers are currently only using 10% of the capacity of the two operating desalination plants to save money. “Obviously, farmers always want to get the cheapest resources. They know that water is a state-managed resource, so they complain and try to get the government to subsidize desalinated water as it did this year.”

Water makes up just 2-3% of farmers’ total production costs, according to Corominas. Using desalinated water would boost that figure to 5%, but this is still very reasonable in his view. “Seeds make up 15-20% of total costs and farmers have accepted that, they don’t complain about paying for the best seeds,” he says.

According to La Calle, people are not aware of how little they are paying for water because water prices are not transparent.

“We don’t know what the state actually pays for the production of desalinated water,” he says. “We only know how much it is sold for. This information should be made public. Currently, the comparison between the respective cost of groundwater and desalinated water does not take the real cost of either type of water into account. Once the state adds the cost of groundwater over-exploitation onto the price of groundwater, desalinated water will no longer seem expensive.”

The Spanish Ministry of Agriculture, Food and Environment was not available to respond to Revolve Water’s questions for this article.

Limited resources

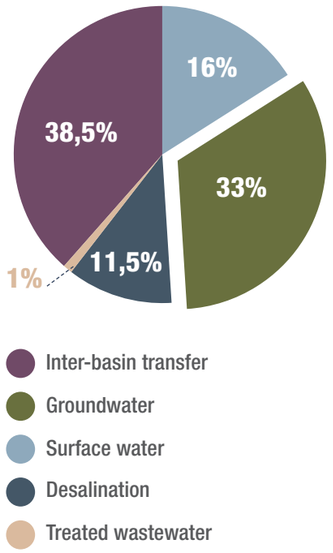
Almeria’s farmers believe that public investment in infrastructure is the only long-term solution. In a statement published in July 2016, FERAL called on the authorities to take urgent action, demanding the completion of the ‘water highway’ that is to connect the Benínar and Almanzora Basins Dam reservoirs to the provincial distribution network and guarantee the fair distribution of water, including desalinated water. These measures, they say, would allow the Almerian Levant and the Almanzora Basin to get their rightful share of water at an affordable price.

Corominas is skeptical though. Instead of investing in infrastructure, he says the authorities should start restricting further expansion of agricultural areas. As for the farmers of Almeria, Corominas says they should accept that agriculture cannot expand any further. Instead, they should work on making their current production volume sustainable by paying for desalinated water.

“This region has limited resources and water has to be brought in from outside,” he says. “Farmers cannot keep asking for more support, they should just use desalinated water. People in Almeria need to take a step back and realize that the current agricultural model has reached its limits.”

Greenhouse in Almeria, Spain, 2014.
Source: VdS Comunicacion.

Available water resources in the Almerian Levant
Source: Revolve Water based on Demarcacion Hidrográfica De Las Cuencas Mediterráneas Andaluzas, Proyecto De Plan Hidrológico 2015/2021.



Shared Waters

60%

of the surface area of the European Union lies in a shared river basin