



The age of extinction

## Risotto crisis: the fight to save Italy's beloved dish from extinction

After drought devastated prized arborio and carnaroli harvests in the Po valley, new rice varieties offer a glimmer of hope. But none are yet suitable for use in the traditional recipe

Photographs by Marco Massa and Haakon Sand

by [Ottavia Spaggiari](#)

About this content

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**F**or most of winter and spring in 2022, Luigi Ferraris, a 58-year-old rice farmer from Mortara, a town in the Po valley, remained hopeful. Rainfall had been down 40% in the first six months of the year, and snow had accumulated thinly in the Alps, prompting an **88% drop** in the amount of water coming to the Po River from snow-melt; flow in the river and its connected canals was at a historic low.

But Ferraris believed things would soon return to normal. “I thought the lack of water would be temporary,” he says.

Historically, access to water had never been an obstacle in this lowland. It lies at the **heart of the Po valley, or Pianura Padana**, a floodplain in northern Italy where large swaths of land were originally swamps and a hotbed of malaria. For centuries, local farmers fought to push back the water, constructing drainage and levelling land to slowly transform the wetlands into crop fields and paddies.

“In this area, the problem has always been to keep the water away,” says Alberto Lasagna, director of Confagricoltura Pavia, a local branch of the General Confederation of Italian **Agriculture**. “It has never been the other way around.”



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The River Po with rice fields stretching across the valley. All Photographs: Marco Massa and Haakon Sand/the Guardian

Ferraris realised the full extent of what he was about to lose only at the end of May 2022, when his rice fields had not turned their usual luxuriant green. “They were all brown,” he says. “It all looked like dry straw.”

In his 37 years running the rice farm that he inherited from his grandfather, Ferraris had never seen anything like it. He lost more than half of his harvest and he wasn’t alone.

Italy is Europe’s **largest rice producer**, growing about 50% of the rice produced in the EU. **Most of its rice fields** are in the Po valley, which stretches across much of the north of the country. It is in these fields that the unique risotto rice varieties, such as carnaroli and arborio, are grown.



The inside of a rice plant about to flower. With global heating, farmers fear extreme weather events such as drought will become more frequent

In 2022, **the worst drought in 200 years** hit the Po, Italy's longest river. The waterway forms the lifeblood of a **complex web of canals** built **between the Middle Ages and the 1800s**, which serve as the paddy fields' main source of irrigation. That year, Italy lost **26,000 hectares (64,000 acres) of rice fields**, according to Ente Nazionale Risi, the national rice authority, and rice production dropped by **more than 30%**. Last

year, the drought persisted and the crop from another **7,500 hectares** of rice fields was lost.

Today, rice farmers struggling to recover from the impact of the drought face an uncertain future. “The higher the temperatures, the more frequent and intense these extreme events will be,” says Marta Galvagno, a biometeorologist at the Environmental Protection Agency of Aosta Valley.



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Biometeorologist Marta Galvagno at work



Every month, Marta climbs a tower 2,200 metres up on the Italian side of the Matterhorn to collect data from instruments such as the eddy covariance sensor, left, used to assess the impact of the climate crisis

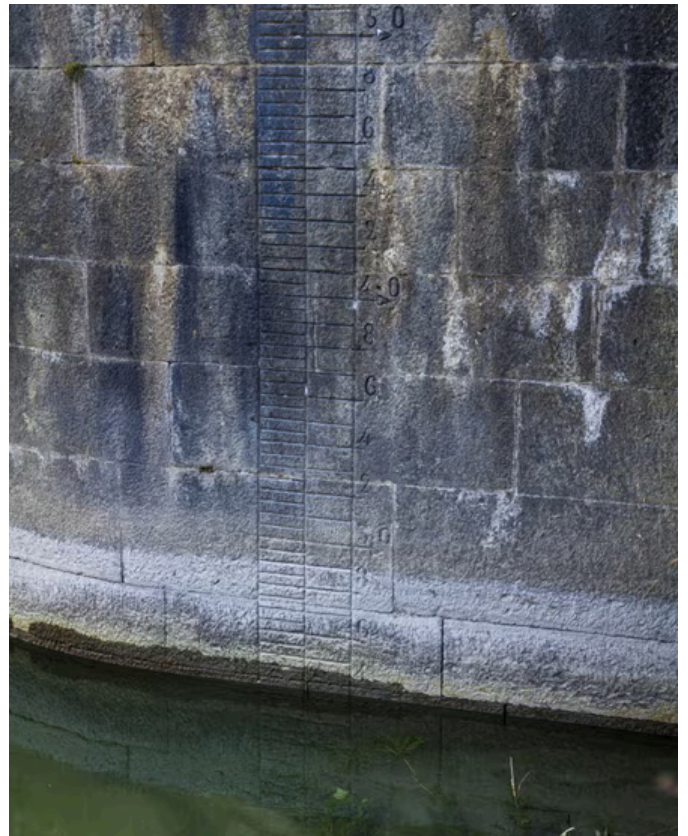
Over the past two years, Ferraris, like other farmers in the area, has tried to diversify his crops to reduce the risks brought by the climate crisis. He has reduced the acreage dedicated to paddies and started to grow crops such as maize, that require less water.

“The climate is changing and I am afraid there will be other droughts,” says Ferraris, whose farm lost about €150,000 [£129,000] in 2022. Rice remains his biggest crop, however. Recently, he has started monitoring snowfalls in the Alps and checking the water levels in Lake Maggiore every day. “It’s hard to sleep at night,” he says.

Ferraris is particularly worried about the production of carnaroli classico, a refined rice variety. Thanks to its ability to resist high cooking temperatures and absorb flavours, carnaroli is considered the “king of risotto”, but it is also extremely delicate and vulnerable to changes in the climate.



Antonio is an *acquaiolo* (water man). His job is to check and adjust the water level for the rice crops



Antonio uses a system of floodgates and the natural terrain to adjust water levels; a gauge measures levels in the Cavour canal in Chivasso, near Turin. The canal, dating from 1852, helps to regulate water feeding the Po

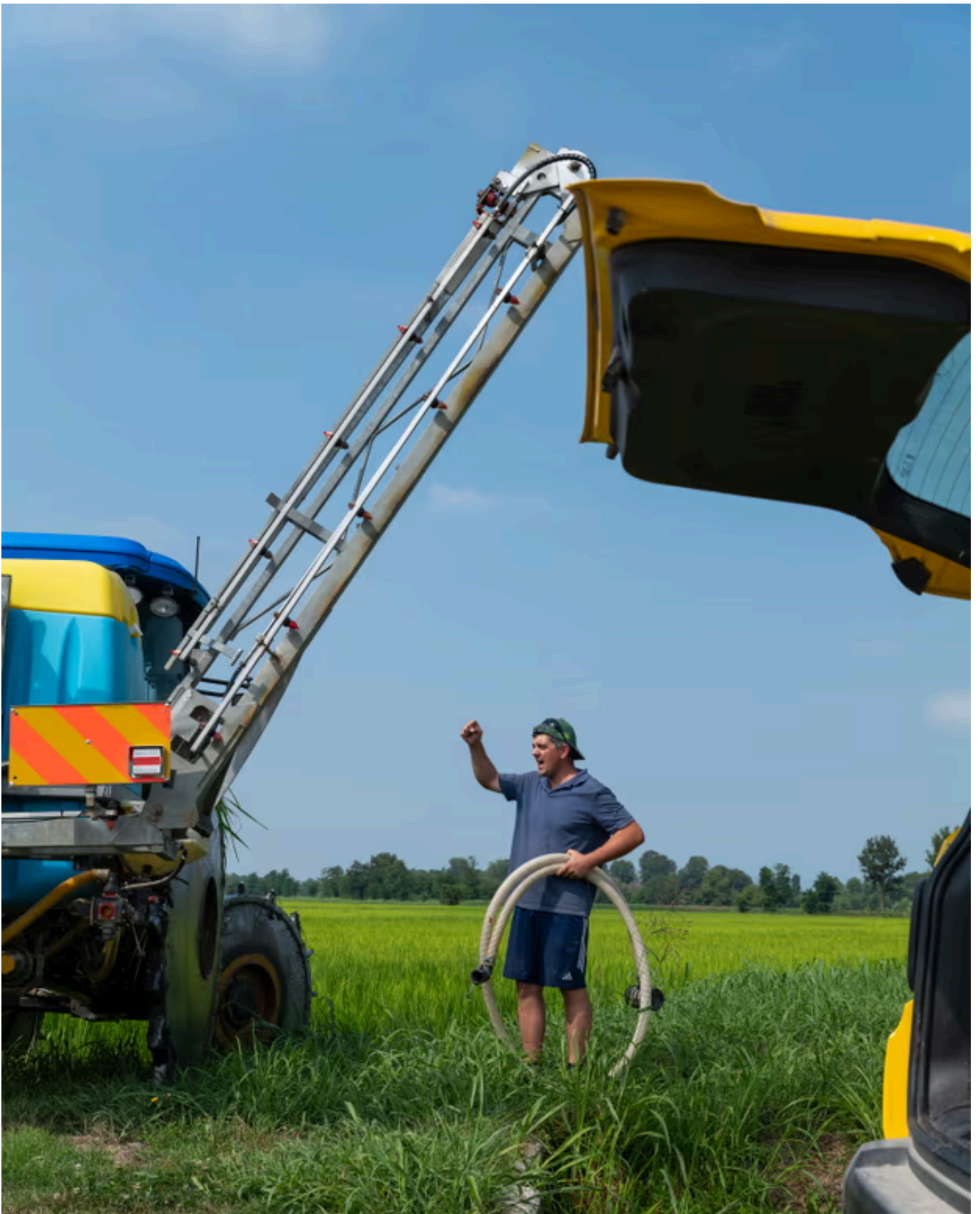
Last year, after the husking and whitening process, only 38% of Ferraris' carnaroli classico harvest was marketable. "Because of the drought, rice [grains] often split," he says.

Giovanni Pochettino, a farmer in the Unesco-recognised Collina Po natural reserve, less than a kilometre from the banks of the river, also grows carnaroli and shares Ferraris' concerns.

"We're having more and more challenges producing carnaroli rice, as it suffers from the August heat," says Pochettino. "These rice varieties were developed almost 100 years ago, when the temperatures were completely different."

Pochettino has been thinking about quitting the production of carnaroli, the quality of which he compares to a fine wine. "The margins are low," he says, adding that rice mills that buy his crop require perfect grains. "The financial return doesn't reflect all the hard work needed to grow this type of rice."





Giovanni Pochettino preparing to fertilise his carnaroli crop. He is considering quitting the crop as the returns don't reflect the farmers' efforts

Filip Haxhari, a researcher at Ente Nazionale Risi, says that, because of the prolonged drought, carnaroli production fell by 50% in 2022, threatening a unique rice variety. “Only carnaroli and other similar varieties have a varietal genetic trait that allows them to absorb seasoning, aroma and condiments and to create traditional risotto,” he says. “It’s different from all other rice varieties in the world.”

Francesco Avanzi, a hydrologist at the International Centre for Environmental Monitoring (Cima) research foundation, explains that the [2022 Po drought](#) was mainly caused by high temperatures and low snowfalls in the Alps. Almost two-thirds of all the water that flows into the Po throughout the year comes from melting Alpine snow.

“The snow usually melts down very slowly between April and June and this allows it to permeate very efficiently into the ground,” says Avanzi. Melted snow is particularly important in summer, replenishing the river when rainfall is low.

“Thanks to this slow release of snow water, rice farmers know that river flows will be consistently high between May and July,” Avanzi says.



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Hydrologist Francesco Avanzi looks over at a glacier plateau in the Aosta valley. His research involves the water cycle and mathematical models for climate forecasting

In 2022, snow water resources in the Alps dropped [by about 60% from the previous decade's median](#). “Winter 2021-2022 was the worst but 2023 was similar,” says Avanzi. According to the latest data from Cima, in February the snow water resources fell by 63%. “It doesn’t look particularly rosy,” says Avanzi.

In recent years, an increasing number of rice farmers in northern Italy have adopted [“dry sowing” of rice](#), a technique that uses less irrigation water and labour, but that, counterintuitively, also contributes to increasingly drier soil, according to some experts. “The water that was used to flood the rice fields didn’t go to waste,” says Lasagna. “It permeated the soil and went back to the river.”

Haxhari and his team are working to develop new rice varieties that require less water and are more resistant to changes in the climate. “The 2022 drought was heartbreaking, I’d never seen so many plants die in such large numbers,” says Haxhari, a researcher for more than 40 years. “But it provided a key opportunity for research.”

The events allowed scientists to test *nuovo prometeo*, a drought-resistant new rice variety that’s now on the market.



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A scientist testing the yield of a rice variety - the amount of usable product after the refinement process



From left: a researcher in the experimental rice fields at Ente Nazionale Risi; various types of rice plants: drought-resistant varieties have more vertical roots that go further into the ground to find water

Nuovo prometeo is not suitable for cooking risotto, however, and while Haxhari says his team aims to develop new varieties that will do justice to the traditional dish, Ferraris remains sceptical that small rice producers like him, who focus on a high quality product, will benefit from these new varieties. “If we want to get the clients, we need to focus on high-quality products,” he says.

Water consumption also remains a concern. In 2022, Ferraris’ rice farm suffered a 90% water reduction. “We’re talking about rice,” says Ferraris. “You still need water to grow it.”

The recent drought was probably aggravated by infrastructure failures. Research by Italy’s national statistics bureau Istat found that, due to structural leaks, in 2020 the country’s **aqueducts lost 42% of the water they carried**. Climate and agriculture experts say that new systems to store water, and steps to optimise the existing supply network, are crucial to mitigate the effects of future droughts.

“If we implement mitigation and adaptation strategies, we can still avoid a catastrophe,” says Galvagno. “As scientists, we’ve really said all there is to say. What’s missing now is economic investment and a political will to implement these strategies.”



A researcher's boots are hung out to dry after a day at work in the paddies

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