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CHRONICLE

UNDER THE ADRIATIC SEA THERE IS FRESH WATER. FROM THE ISOLA DELLE ROSE TO THE AGIP WELLS IN VENICE: WHAT WE KNOW SO FAR

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Precious reserves for humanity under the seabed around the world. The first drilling was done on Cape Cod (Massachusetts). The marine geologist: "Our society has a growing need for water, we should get used to the thought of natural disasters and create a sort of strategic reserve."

Bologna, 13 October 2025 – under the Adriatic Sea there are reserves of fresh water. The focus is mainly on the Upper Adriatic (north-eastern Italy), but the Romagna coasts could also hold surprises. The potential for use from a human and social point of view is more than positive. An incredible and precious resource if we also think about climate change.

What is known about this water? How was it found?
"The search for fresh aquifers or aquifers with low salinity is growing a lot in the field of geology studies of the ocean floor," explains Angelo Camerlenghi, geophysical researcher at the National Institute of Oceanography and Applied Geophysics in Trieste. "By doing geophysical and electromagnetic investigations, through drilling for oil and gas, it has been seen that under the ocean floor there are interstitial or underground water with low salinity. Usually water is sought for industrial, agricultural and civil purposes only on land, but the coast is not necessarily a limit, as we first thought".

Professor Camerlenghi, the Upper Adriatic is one of the parts of the world where fresh water is said to be present under the seabed. What do we know so far?
"Making a geological argument, the coast of the Upper Adriatic in the last glacial period, so up to 20 thousand years ago, was at the height of Abruzzo. There was a huge expanse of plains where all the rivers of the Apennines and Alps were conveyed. The current seabed has been exposed to rainfall for about 100,000 years and had its own system of aquifers which, with deglaciation and rising sea levels, has been trapped under a thickness of 20-30 metres of salt water. Nothing excludes that it is still present".

Do we already know what water it is?
"There is a lack of studies and drilling (such as those that are done on land) to understand what water it is, but there is an awareness: under the seabed across the world, there is a large amount of fresh water that was unknown until now, because it was mistakenly taken for granted that the entire underground system ended with the coast".

Where in the world is there underwater water?
"Research has been done almost everywhere. The best known places are New Zealand, the east coast of the United States, which has also been drilled, China, Corinth, Gulf of Lion, Malta".

How much can there be?
"A global estimate of the potential volume of fresh water or of low salinity is between 500,000 and one million cubic kilometres. The first scientific, and not exploitative, drilling that reached these waters was done this year in the summer at Cape Cod (Massachusetts), on the northeastern coast of the United States. Completed about a month ago, it was promoted by the Scientific Drilling Project of the Ocean Floor, which is one of the largest international projects that has been underway since the 50s. There is also a European Consortium (the European Consortium for Ocean Research Drilling of which Prof. Camerlenghi is also a member, ed.). After three months of drilling, the water was extracted from under the seabed and sampled. It was an expedition that was also widely followed from a media point of view, by CNN, CBS, Associated Press: it was proof that these waters are there".

Fresh water could be scarce if you think about climate change. How does knowing about the existence of these reserves change the perspective?
"The water that participates in the climate cycle is always the same, but we know that with climate change, rainfall is becoming very concentrated, causing floods and destruction. Alternating with periods of drought in which the level of the aquifers drops. Our society has a growing need for water for industry, agriculture and civil use, I believe we will have to get used to natural disasters that we know will become more and more frequent. And in fact, the United Nations has drawn up a document on unconventional water resources (the World Water Development Report is a report that is published periodically, ed.). It is known that you cannot rely only on rainwater that flows on the surface in waterways and then ends up in the sea. Much of it infiltrates the subsoil and creates the reserves used by our society. But we should identify other sources of water to cope with crises. A sort of strategic reserve".

Or?
"One of the sources of unconventional water is that of underwater environments, then if you read the document there are other ideas: the polar ice caps (melting the water of the icebergs and using it); trap mists (there are systems to put special nets that condense water, making it drip); in India in the Ladakh valleys they have created a system to freeze water in winter, creating small mountains of ice then used in summer when it melts. We have to be creative and cope with situations. There is an inevitable need to find extra water, without forgetting to improve the efficiency of the distribution system and avoid waste. Around the world, a lot of fresh water is lost from old and unmaintained pipes."

Returning to the Adriatic, even if we need to finish the search, where could the fresh water be? Is there anything beyond the Romagna coast?
"Among the examples of finds is the Island of Roses, about which a recent film was released. The artificial island had been built about 11.5 kilometres from the coast of Rimini, beyond the limit of territorial waters. They found drinking water 280 metres deep, under the seabed. Another indirect piece of proof is the old wells made by Agip in the 70s off the coast of Venice. In the first 300 metres, when looking for gas, low electrical conductivity of the subsoil formations was detected, interpreted as the presence of water with low salinity. Finally, there are scientific studies, such as those of universities and the National Research Council (CNR) of Bologna, as well as those of OGS and the University of Trieste, on the possibility of the presence of aquifers beyond the coast in the northern Adriatic.

Now the challenge would be to find the funding to make a scientific sampling well offshore and understand what waters there are. If they are old (they can be even 60,000 or 100,000 years old) or young and if they are of good quality. If these waters were fossils, they should not be touched."

They shouldn't be touched because fossil waters are too old and therefore unique?
"If the waters are fossils, that is, they have infiltrated the ground in the past, they are no longer connected to the rainfall cycle. They are therefore a non-renewable resource. A bit like oil or gas, if they are exploited then at some point they run out. I share the line of thought according to which fossil water should not be used, except in the event of a climate calamity".

When it is possible to extract this water, you will finally be able to conduct all the analyses in the laboratory. How do they work?
"Yes, once an aquifer has been intercepted with a well, chemical analyses are carried out to understand the age, flow rate tests, and the possible presence of contaminants. Generally, if the water is old (this also happens in terrestrial aquifers), it is clean and of better quality, because younger waters are often more superficial and subject to contamination. The analyses are exactly the same as those carried out in the terrestrial environment, such as those carried out by the Regional Agencies for the Protection of the Environment (ARPA)".

If you map the network of underwater reserves in the future, what will be the economic and usability impact of the waters in the northern regions bordering the Adriatic?
"There is a lack of legislation for underwater waters. At the European level, there is the Maritime Strategy Water Directive of 2008, i.e. the European directive that regulates offshore activities, which, however, does not mention water under the sea, because it was not known to exist when it was written. We must avoid the commercial race to use these waters. The same rules that apply to oil and gas, placed on the market for profit, cannot be used. In our case, national and regional governments should prepare to regulate access to this resource, for social use and emergency purposes in the event of a disaster. If that water can be taken, it will be necessary to build a withdrawal system with pipes, which will have to go from the collection point to the ground and enter a distribution system. An infrastructural impact that could generate a 'green' economy for our society".

Can it be a valuable resource for agriculture and industry?
"I believe that the agricultural system could be the first beneficiary, then the industrial one for cooling for example. There are many industries that need non-potable water. But if it turns out that the waters under the sea are of excellent quality, I would reverse the priorities".

If the water is pure, it would be used for humans.
"Exactly. Then in addition there is the whole discourse of desalination".

Tell us.
"You could also consider taking the underwater water, desalinating it, cleaning it and circulating it. A bit like what is already being done: there are already several desalinators scattered around Italy. Close to us is Malta, which is supporting research for these underwater waters. Using desalination a lot, Malta is interested in the project and among other things, there is an Italian study that has identified a very deep freshwater deposit right between Sicily and Malta. The desalination plant could also be located offshore and would have less impact on the coasts".