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WILL FRANCE RUN OUT OF DRINKABLE WATER?

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Fresh water constitutes only about 2.5% of the Earth's total water supply, but plays a pivotal role in supporting life, agriculture, and industry. In the context of the Third United Nations Oceans' Conference 2025, that is currently taking place in Nice (France), it is relevant to remind about the intricate link that exists between fresh water and sea water to fully understand the importance of preserving both. As clearly presented by Riku Yamaguchi (2024)[2] in his short communication in Journal of Aquaculture Engineering and Fisheries Research:

"The hydrological cycle is the natural process that describes the continuous movement of water on, above, and below the surface of the Earth. This cycle connects fresh water and sea water in several ways. Sea water evaporates into the atmosphere, forming clouds that eventually precipitate as fresh water in the form of rain or snow. This process replenishes rivers, lakes, and aquifers, providing essential fresh water for ecosystems and human use." (ibid., p.1)

As such, fresh water and sea water are intricately linked in ways that are crucial for both human survival and ecological balance. Estuaries and wetlands, where fresh water meets sea water, are among the most productive ecosystems on Earth, but are also the most sensitive regions for up-stream transfers of pollution from sea to fresh water, and thus to drinkable water.As emphasized by the United Nations Convention on the Law of the Sea (UNCLOS) of 1982[3], rivers and lakes that flow into the ocean can be contaminated by industrial waste and agricultural chemicals, but also by plastics and chemicals coming from the sea. When this water reaches aquifers or is used for irrigation, it can have harmful consequences on the health of populations living nearby. Waterborne diseases can spread, leading to epidemics and public health issues.

According to the 2024 report by the Intergovernmental Panel on Climate Change (IPCC)[4], approximately 4 billion people are currently facing severe fresh water shortages for at least one month each year due to both climatic and non-climatic factors. This situation is expected to worsen with the increase in global warming. Particularly vulnerable regions include South Asia, northern China, Africa, and the Middle

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2 - Yamaguchi R. The connection between fresh water and sea water: A vital relationship. J Aquacult Eng Fish Res. 2024; 10(10).
3 - https://www.un.org/depts/los/convention_agreements/texts/unclos/unclos_e.pdf (downloaded on June 10th 2025).
4 - https://www.ipcc.ch/2024/ (latest access on June 10th 2025).

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East, where high population density is often associated with low water availability, as well as issues of accessibility, quality, and governance. Climate change contributes to water insecurity through both the potential reduction in fresh drinkable water availability, and the increased risk of flooding.

The IPCC emphasizes that climate change can exacerbate existing tensions related to fresh water, particularly in areas already under water stress. For example, changes in precipitation patterns can amplify existing tensions, as observed in Syria, where prolonged drought have contributed to the destabilization of the country. In areas where fresh water resources are shared between different groups or states, the impact of climate change on these resources could increase tensions, especially in the absence of strong institutional capacities. These heightened tensions can escalate into social conflicts, even protests and riots. Moreover, studies indicate that a 25% increase in food insecurity raises the risk of conflict by 36%, while a 25% increase in the number of people without access to drinking water increases the likelihood of conflict by 18%. These results show that proper water management is not only a public health issue but also a geopolitical challenge.

Southern European countries — namely Spain, southern France, Italy, and Greece — are facing increasing risks of drinking water shortages due to climate change, overexploitation of resources, and infrastructure degradation. The Mediterranean basin is warming 20% faster than the global average, making droughts more frequent and intense. Experts are calling for an urgent reduction in greenhouse gas emissions and sustainable water resource management to limit the extent of future damage.

Since 1980, the average amount of drinkable water available in Spain has dropped by 12%, with an additional decline expected by 2050. In 2023, Spanish fresh water reservoirs were at 44% of their capacity, with some basins like the Guadiana and Guadalquivir falling to 28% and 27% respectively. Catalonia has declared a drought emergency, with reservoirs reaching only 16% of their usual level. Italy, particularly Sicily, is also experiencing extreme drought. Sicily has recorded eight months of nearly total aridity, with reservoirs falling below the alert threshold. Water losses caused by outdated infrastructure reach 52.5% in some regions.

A report indicates that Italy could lose up to 40% of its water resources in the coming decades, with peaks of up to -90% in the southern regions. Other increasingly frequent and prolonged droughts, affecting soil moisture and river flow, are also observed in Greece. Groundwater now accounts for between 28% and 75% of drinking water supply, but its use is considered unsustainable. Regions like the Aegean Islands are particularly vulnerable due to the destruction of natural wetland areas. Moreover, among the Mediterranean regions the most affected, the south of France, particularly the Pyrénées-Orientales, has been experiencing severe droughts for the past two years, with a rainfall deficit of up to 60% in some months. Groundwater levels are already below average in 68% of cases, and water restrictions have been imposed in several Departments. President Emmanuel Macron has warned that 'the time of abundance' is over, as the country faces an estimated 40% decrease in water availability in the future.

Hence, once unthinkable, the question of whether France may run out of water is now relevant in view of the increasing droughts linked to climate change. It is also a fact that the water crisis in France is becoming structural and is an eminently strategic issue.

Drinking water is one of the most controlled food products in France, with over 18 million tests conducted annually by health authorities and private operators. In 2021, 98.3% of the population was supplied with water meeting microbiological standards, and 99.3% for nitrates. However, compliance with pesticide regulatory limits fell to 82.6% in 2021, down from 94.1% in 2020. This decline is attributed to the detection of new substances, notably pesticide metabolites. Among concerning pollutants is trifluoroacetic acid (TFA), an «eternal pollutant» resulting from the degradation of flufenacet, a widely used herbicide. TFA has been detected at concentrations exceeding the safety limit of 0.1 $\mu g/L$ in several regions, potentially affecting more than half of the French population.

Nevertheless, according to ANSES (French Agency for Food, Environmental and Occupational Health & Safety) report on tap water[5], published April 6, 2025, measurement campaigns conducted between 2020 and 2022 on emerging compounds, including pesticide metabolites (pesticides applied in the

5 - https://www.sedif.com/rapportansesleaudurobinetpeutetreconsommeesansrisque (latest access on May 25th, 2025).

environment transform into new molecules called metabolites), show that tap water can be consumed safely. The report concludes that the metabolite R471811 of Chlorothalonil, a fungicide banned since 2020, is the most frequently detected molecule in waters intended for human consumption. The metabolite was found in 57% of samples, and in 34.1% of cases its concentration exceeded the quality limit of 0.1 µg/L. This value, the maximum health value (Vmax), is used by health authorities to manage cases where the 0.1 µg/L limit is exceeded. Thus, if the measured concentration in drinking water is above 0.1 µg/L but below the Vmax, the water can still be safely consumed, but actions must be taken by the water supplier to restore compliance. For the R471811 metabolite of Chlorothalonil, ANSES was unable to establish a Vmax. Pending data review, health authorities decided to use a value set by German authorities, called the transitional health value (VST), which is 3 µg/L.

Water resources in Île-de-France, like the rest of the country, are contaminated by Chlorothalonil R471811. Concentrations measured at water intake points of main drinking water production plants of SEDIF range around 0.4–0.5 µg/L in the Marne and Oise rivers, and up to 0.6 µg/L in the Seine. Conventional treatment lines, though complete and highly efficient, do not retain this molecule, with concentrations in treated water roughly equivalent to those measured in the raw water.

Another more concerning illustration of the quality issue is given by the Loiret Department, where three municipalities have been without drinking water since 2019 due to contamination by manganese and vinyl chloride monomer (VCM), a carcinogenic gas from old PVC pipes (communication made on January 23, 2025 by UFC-Que Choisir and Générations Futures regarding the presence of PFAS (eternal pollutants) in tap water). Based on official analyses conducted on behalf of the Regional Health Agencies between January 2019 and December 2020, UFC-Que Choisir and Générations Futures have constructed an interactive map, scaling quality of tap water using a 5-range Likert scale: 'very bad', 'bad', 'mediocre', 'not satisfying', and 'satisfying'). In four Loiret villages, namely Bucy-le-Roi, Huêtre, Cercottes and Gidy, tap water is contaminated by Selenium at a level yielding a 'very bad' quality score, probably due to non-standardised pipes, and the quality of the tap water of one village, Meung-sur-Loire, has been diagnosed as 'bad' due to contamination by pesticides. No direct answer has yet been provided by ANSES regarding the safety status of the fresh water for drinking usages in these municipalities.

Beyond the sole quality issue of its drinkable water, France is facing a scarcity of its fresh water resources, exacerbated by the combined effect of poor resource management, climate change, growing urbanization, changes in land use planning practices, and competing uses, which may in turn exacerbate the quality of its drinkable water. In 2022, a major drought caused over 10 million French people to consume water that did not meet quality standards, mainly due to excess pesticides and their metabolites. As stressed in the 2025 report on water demand by the French Ministry of Ecological Transition[6], the water France receives from rain and from its neighboring rivers has dropped by 14% over the past two decades. With repeated heatwaves and droughts, France is seeing its natural water capital dry up. Today, drought is no longer limited to the Mediterranean rim; all departments are potentially affected. Unlike mainland France, the water crisis in overseas territories is far more severe and sometimes dramatic. In Mayotte, running water is cut off two days out of three for more than six months. In these territories, water prices range from one to three times higher. They all face the common problem of insufficient potable water supply due to intensified drought, deforestation, poor network maintenance, and governance issues.

Hence, preserving what has become Humanity's most precious resource, blue gold, requires a complete revision of the entire approach to water management.

In March 2023, the French Government announced its national Water Plan, including 53 measures to save water[7]. The main objective of that plan is to reduce water withdrawals by 10% by 2030. Measures to reach that objective include urgently fixing leaks in the network; reusing 10% of wastewater by 2030, up from less than 1% currently; implementing progressive and responsible water pricing; and introducing an «EcoWatt for water,» modeled after electricity consumption reduction tools. Hence, through its Water Plan, the French Government targets the drinkable water's supply

6 - https://www.adaptation-changement-climatique.gouv.fr/agir/espace-documentaire/la-demande-en-eau (downloaded on May 25th , 2025).
7 - https://www.ecologie.gouv.fr/sites/default/files/documents/23017_DP_PLAN%20EAU_annexes.pdf (downloaded on May 10th , 2025).

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and demand, by aiming at increasing the quality of the supply and reducing the quantity demanded.

Concretely, the increase of quality of the water supply will consist in (1) repairing network leaks, (2) reusing water, and (3) restoring nature.

In France, on average, one liter of water out of five is lost due to leaks in drinkable water distribution networks, and in 170 municipalities, that share increases up to one liter out of two. One of the first things for local authorities to do is therefore to ensure that they urgently repair their network.

Moreover, relying on nature to store water naturally is one of the most efficient solutions to combat drought. Several nature-based adaptation solutions, tested by communities, have already demonstrated their effectiveness:

(i) Restoring wetlands, such as marshes, peat bogs, lakes, ponds, mangroves, wet meadows. In case of rain, they absorb water like sponges (one cubic meter of peatland can store up to 700 liters of water), thereby limiting runoff and thus flooding. In dry periods, they gradually release water, feeding underground aquifers and watercourses[8].

(ii) Restoring the hydro-morphology of rivers. In France, many of them have had their meanders removed since the 1950s. These artificial straightening have often disconnected them from their flood expansion areas and their aquifers. The watercourses flow more quickly to the sea, and their low water flow (minimum flow) decreases. The solution? To restore the rivers to their natural course and reconnect them to their aquifers.

(iii) Maintaining soil humus, which helps retain soil moisture and its ability to infiltrate water. In gardens, fields, forests, it is crucial to protect it through various actions: cultivating under plant cover, avoiding earthworks, trampling, or plowing, covering plants and seedlings, preserving hedges, or practicing agroforestry.

(iv) Re-naturalizing cities to better infiltrate rainwater where it falls: in cities too, we can act against drought by increasing the soil's infiltration capacity[9]. Unsealing paved surfaces; greening streets and squares; increasing soil fertility through dense vegetation, etc.; all these actions contribute to recharging groundwater aquifers and supporting river flows in summer.

(v) Local authorities have the power to act: through their urban planning, mayors can list their wetlands or natural areas in order to preserve them e.g., by prohibiting any new construction in these areas, or by purchasing these lands to enhance them.

Furthermore, the quality supply of drinkable water can also be enhanced by using 'non-conventional' water, such as rainwater or wastewater. The term 'non-conventional waters' refers to all water not collected by humans, covering a wide spectrum: treated wastewater from treatment plants, rainwater (collected from rooftops, running off roads); 'grey water' from showers, washing machines, and sinks; water from industrial processes; etc. It is possible to use that water for purposes suited to its quality, at the scale of a house, a building, a factory, a city. But note that this only allows for water savings if it replaces and does not add to the ongoing withdrawals (cf. Jevons Paradox[10]). Among unconventional water sources, the French Government aims at reusing 10% of treated wastewater (REUT) by 2030, compared to less than 1% currently. 1,000 projects will be launched over five years to recycle and reuse water. This solution is well-developed in countries like Israel or Spain. In coastal areas, where wastewater treatment plants discharge directly into the sea, it serves as a no-regrets adaptation measure as it allows for giving new life to freshwater, produced in large quantities during the summer tourist season. To support this objective, on August 29, 2023, a decree was issued to simplify the procedures for using treated wastewater (REUT), expanding its use, which was previously limited to agricultural irrigation and golf course watering (including green spaces) to road washing, hydro-cleaning of networks, and aquifer recharge (Décret n° 2023-835)[11].

8 - https://www.adaptation-changement-climatique.gouv.fr/agir/espace-documentaire/preserver-les-ecosystemes-aquatiques-pour-faire-face-la-secheresse (downloaded on May 16th, 2025).
9 - https://www.lafabriquedelacite.com/wp-content/uploads/2024/11/La-ville-permeable-BD-2.pdf (downloaded on June 10th, 2025).
10 - In economics, the Jevons paradox occurs when technological advancements make a resource more efficient to use (thereby reducing the amount needed for a single application); however, as the cost of using the resource drops, if the price is highly elastic, this results in overall demand increasing, causing total resource consumption to rise. Governments have typically expected efficiency gains to lower resource consumption, rather than anticipating possible increases due to the Jevons paradox.
11 - https://www.legifrance.gouv.fr/jorf/id/JORFARTI000048007386 (last access May 10th, 2025).

On the demand side, the French Government stresses that preserving water resources shall be the responsibility of everyone[12]. For instance, local authorities are expected to act on two fronts: ensure to limit their own water consumption, particularly by optimizing the watering of public green spaces; and encourage their residents, both professionals and individuals, to limit their usage[13]. Water savings in agriculture are also particularly encouraged as this sector is very consumptive. Between June and August, 80% of the water is consumed by agriculture. The response to climate change therefore requires a new agricultural model that is more water-efficient and protective of soils, for instance by improving irrigation equipment, changing practices, and choosing crops that consume less water. Legumes, roots, and tubers, consume for example much less water than corn, which requires a large amount of water during a period of the year when the resource is the least abundant. Limiting irrigation to 'the right dose at the right time' could also reduce consumption by 30% in some areas[14]. Beyond that, the national Water Plan also stressed that each one of us can control his or her water consumption through everyday actions, such as favoring showers, installing water-saving sanitary equipment, running washing machines at full capacity, reusing rainwater, etc.

But are French citizens willing to participate to this (inter)national effort?

According to the survey conducted by the Terram Institute in January 2025[15] among 5,000 French people, 58% of respondents consider water stress to be a current reality. This concern is particularly pronounced among those under 35 (61%). Furthermore, 65% of those surveyed express concern about water-related issues, and 72% believe that water has become a source of anxiety. The French express clear expectations regarding water management: 33% of respondents advocate for the reuse of treated wastewater for irrigation, industry, and urban cleaning; 18% of respondents support a transition to less water-intensive agricultural practices; and 14% of those surveyed consider that reducing water needs in industry shall be a national priority. Regarding water quality, 38% of respondents support the modernization of drinking water treatment plants; 33% consider a reduction of the use of chemicals in industry as a priority, while only 17% are in favor of protection of drinking water sources through organic farming.

Hence, while the survey reveals that 80% of French people are willing to reduce their household consumption, and 82% accept the idea of strict restrictions during periods of water stress; they want the efforts to be shared fairly and not solely rely on households. Measures such as the introduction of progressive tariffs or the widespread use of individual meters (EcoWatt system for water consumption) are less well received, with only 10% and 9% support, respectively.

While the 6th Sustainable Development Goal's Target 6.1 seeks to achieve access for all to safe drinking water by 2030, it seems that France is still far from guaranteeing this objective sustainably. The combination of increasing climate disruption, sometimes failing governance, degradation of infrastructure, and a historically wasteful use of resources now makes the risk of a drinking water shortage tangible, even in regions that have long been spared. However, there are levers in place. The Water Plan launched by the government represents a first structural response, but it must be accompanied by collective mobilization at all levels: from the State to local authorities, from farmers to industries, including every citizen. It is about placing water at the heart of land use, production, and consumption policies, with a guiding principle: sobriety.

Water, a vital resource long seen as inexhaustible, has become a fragile, strategic, and contested common good. Making it a pillar of ecological, economic, and social transitions is no longer an option: it is a necessity. The question is no longer whether France will run out of water, but how it will choose — or not — to act in time to avoid the worst.

12 - https://www.creseb.fr/voy_content/uploads/2024/05/France_Strategie_note_analyse_prelevements_et_consommations_d-eau_2024.pdf (downloaded on June 10th, 2025).
13 - https://www.fnau.org/wp-content/uploads/2024/12/fnau-62-eau-web.pdf (downloaded on June 10th, 2025).
14 - Ministère de l'Agriculture et de la Souveraineté Alimentaire (2024). « L'agriculture s'adapte au changement climatique : quelques éléments sur l'eau ». https://www.adaptation-changement-climatique.gouv.fr/agir/espace-documentaire/lagriculture-sadapte-au-changement-climatique
15 - https://institutterram.org/wp-content/uploads/2025/02/IT_ETUDE-00011_BRISTIELLE_FR_2025-03-18_w-pages-1.pdf (downloaded on June 10th, 2025).

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