Common Seas

MUNICIPALITY OF PAROS ISLAND

DEYAP
Paros Water Supply & Sewerage Company

Clean Blue Paros

Good news! The tap water on Paros is safe to drink!

DEYAP is the Municipal Water & Sewage Paros Company. They perform regular, rigorous checks of water quality across the island and their tests consistently show that our water is of very good quality.

You can start drinking tap water straight away, as long as:

- ✓ **You are connected to the water grid.**
- ✓ **The pipes from your home to the DEYAP meter are in good condition.**

If you have doubts about the quality of your pipes, we recommend contacting a local chemist to do an independent test.

"I'm 40 years old. I've been drinking tap water for 40 years or maybe 39 and a half! Nothing is wrong, everything is tested!"
– Kostas P., DEYAP, Paroikia.

"I used to drink tap water only in the winter. Now that I know it has been certified and tested, I also drink it in the summer. I think it tastes good."
– Stamatis Velentzas, Kosmo bar, Naoussa.

"A happy old timer tap water drinker since the 70's, still healthy and kicking."
– Phillada Lecompte, Tour leader in the Cyclades. Living in Paros since 1968.

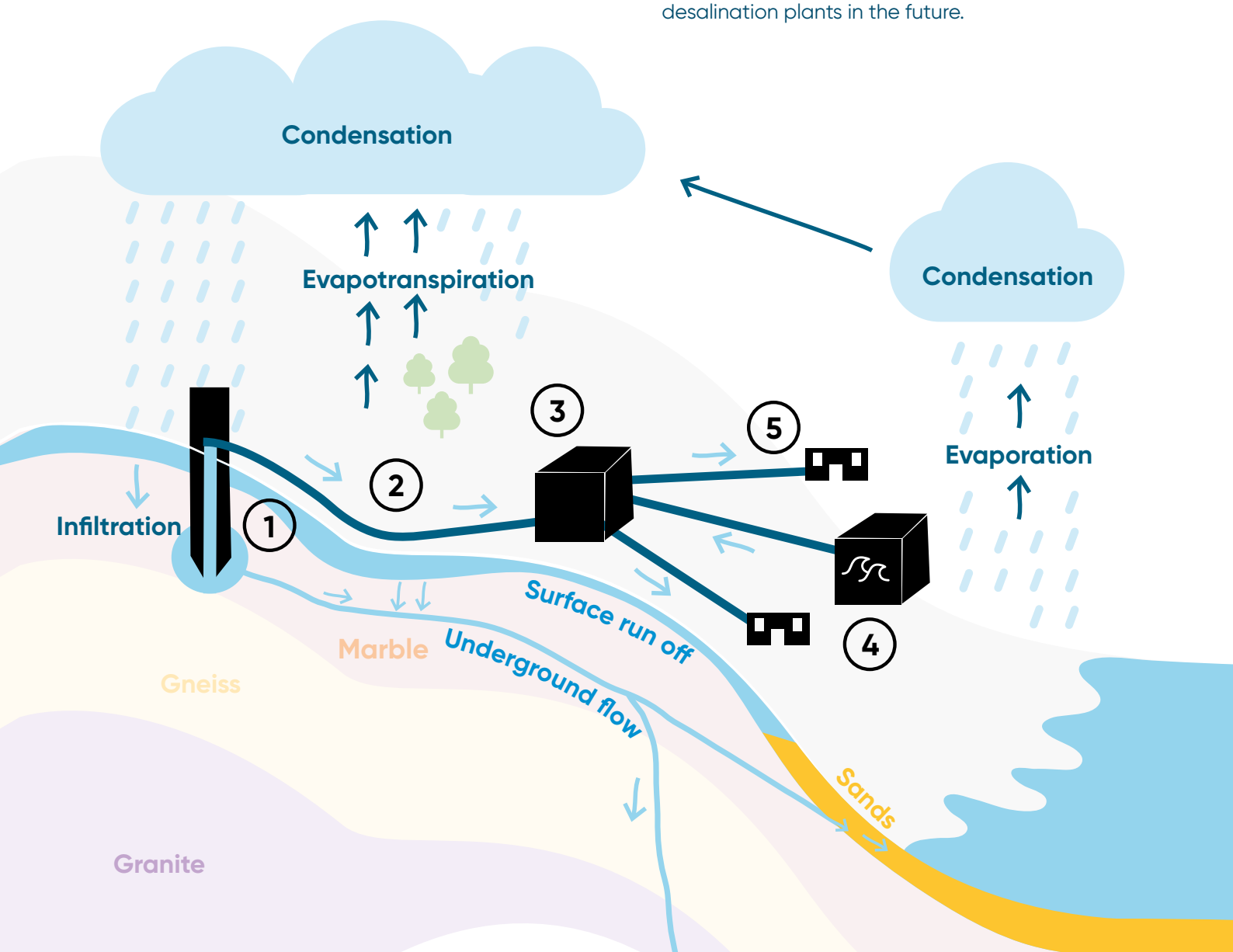
Download official tests in Greek on DEYAP's website: tinyurl.com/deyapwaterquality

See latest test results in EN and GR on EDEYA's interactive map: tinyurl.com/edeyaparos

Where does our tap water come from?

1. **Extraction:** Water is extracted by pumping it up from boreholes (a narrow well drilled for obtaining water). The quality and levels of boreholes are regularly monitored.
2. **Pumping to a central tank:** Water is then pumped to central tanks, each one serving a different area or village.
3. **Central tank:** Given the purity and quality of the water from boreholes, the only treatment applied at the central tanks is disinfection by chlorine (to prevent microbial presence). To guarantee quality, central tanks are monitored live on a 24 hour basis using specialized sensors.
4. **Desalination plant*:** Desalination is the process of reducing salt content in the water using reverse osmosis - a highly efficient filtration method. In some areas of Paros, seawater is desalinated and then pumped to the central tank, where it is mixed with the water from the boreholes, reducing water hardness and salt content.
5. **Water pumped to homes:** Finally, the water is pumped to homes through pipes. The total network of pipes exceeds 200km in length, 80% of which are PVC, 10% are PE, and the rest of which are asbestos-cement or galvanized steel (see the section about the pipes, further down).

* There are currently two operating desalination plants in Paros: one contributing to the Naoussa area and one serving areas near Paroikia. DEYAP is planning to build several new desalination plants in the future.

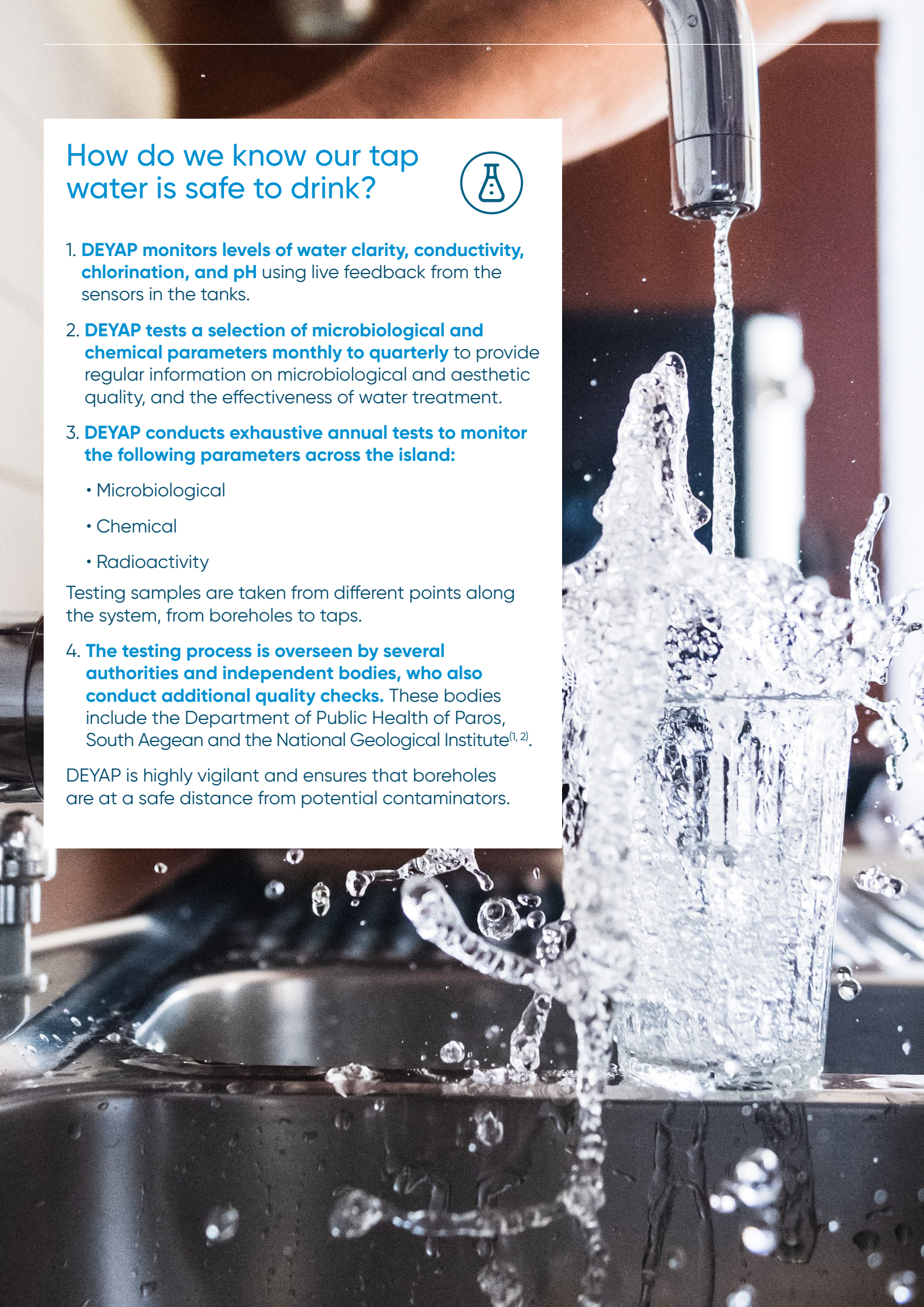


How do we know our tap water is safe to drink?

1. **DEYAP monitors levels of water clarity, conductivity, chlorination, and pH** using live feedback from the sensors in the tanks.
2. **DEYAP tests a selection of microbiological and chemical parameters monthly to quarterly** to provide regular information on microbiological and aesthetic quality, and the effectiveness of water treatment.
3. **DEYAP conducts exhaustive annual tests to monitor the following parameters across the island:**
   - Microbiological
   - Chemical
   - Radioactivity

   Testing samples are taken from different points along the system, from boreholes to taps.
4. **The testing process is overseen by several authorities and independent bodies, who also conduct additional quality checks.** These bodies include the Department of Public Health of Paros, South Aegean and the National Geological Institute[1, 2].

DEYAP is highly vigilant and ensures that boreholes are at a safe distance from potential contaminators.



What's in our water?

Comparisons with EU limits.

Water isn't just H20, it's made up of lots of different compounds - some of which occur naturally and some of which are a result of human activity. All the compounds listed below are well within the limits recommended by the EU[3, 4].

- **NITRATES:**
  Maximum: 50mg/l,
  Paros: 8.9 - 17mg/L.
  Occur naturally in most water sources. Increased concentrations can be due to fertilizer use, animal waste and agricultural runoff[5].

- **CHLORIDE SALTS:**
  Maximum: 250 mg/l,
  Paros: 100 – 190 mg/L.
  Occur naturally in water. High concentrations can indicate that seawater has entered the water source. Levels can also depend on the local geology[6]. Chloride is harmless below recommended levels, but higher concentrations can cause pipe damage[7].

- **SULFATES:**
  Maximum: 250mg/L (EU),
  Paros: 17 – 45 mg/L.
  Occur naturally in water sources. Concentrations can vary due to local geology. There are no health guidelines for sulfate levels in drinking water, but studies have shown that excessive sulfate can contribute to laxative effects[5].

- **SODIUM:**
  Maximum: 200mg/L,
  Paros: 50 – 100 mg/L.
  Occurs naturally in many water sources. High concentrations can be caused by seawater intrusion and local geology. No health recommendations available, but values above 200mg/L may result in unacceptable taste[5].

- **RESIDUAL CHLORINE:**
  Range: 0.2 - 0.5 mg/L,
  Paros average: 0.3 mg/L.
  Added to the water as a precaution to ensure the quality and safety as it is transported through pipes (killing microorganisms such as bacteria)[5]. Residual chlorine is harmless to human health, but may cause a bad taste or smell in drinking water[6].

Regular testing is also being done regarding other compounds, but only the following elements have been detected as traces: Other minerals, Aluminium and Fluoride salts, both due to geological and mineralogical factors. Calcium and Magnesium are also present, see the section about water hardness.

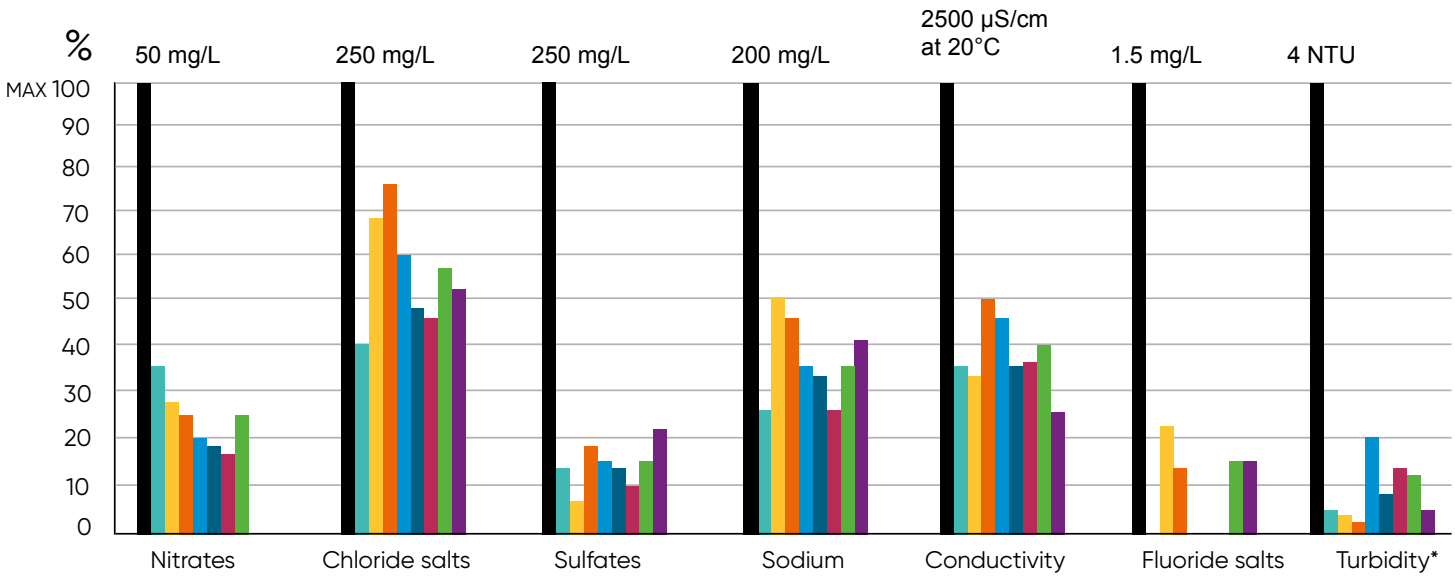
Other limits we measure:

- **CONDUCTIVITY:**
  Maximum: 2500 µS/cm at 20°C,
  Paros: 817 – 1243 µS/cm at 20°C.
  An index of salt and mineral content in water. In Paros conductivity levels are attributed to chlorides and calcium carbonate, which contribute to water hardness[8].

- **TURBIDITY:**
  Recommended Maximum: 4 NTU,
  Paros: 0.8 - 0.55 NTU
  A measure of the relative clarity of water depending on the number of particles present. A key test for water quality[9].

- **pH:**
  Range: 6.5 - 9.5,
  Paros: 7.4 - 7.7.
  Describes the acid-alkali balance of the water. It affects how water behaves in distribution systems and treatment processes[10]. A mid-range of pH, as in Paros, is ideal for good functioning of the system.

Main Detected Parameters Compared to EU Limits (latest Tests: 2019-2020)[4]



- Parameter levels are displayed as a percentage of the official EU and Greek directive limits to account for different scales and measurement types.
- The turbidity limit is only a recommendation.

Max value (EU/WHO)
Paroikia
Naoussa
Lefkes/Kostos
Archilochos
Marpissa
Aliki
Drios
Parasporos to Kampos

Which water test results correspond to your area:

Paroikia:
Livadia
Krios
Kalami
Kamares
Thapsana

Naoussa:*
Ambelas
Kolymbithres
Protoria
St. Andreas
Filizi
Santa Maria

Lefkes/ Kostos:
Isterni
Asteras
Marahti

Archilochos:
Prodromos
Marmara

Marpissa:
Xrisi Akti
Tsane
Mesada

Aliki:
Kamari
Agairia
Voutakos
Farangas

Drios:
Glyfa
Aspro Chorio
Pirgaki

Parasporos:
Kampos
Agia
Irini
Pounda

*In the past, high demand meant that Naoussa's tap water exceeded suggested salt limits in the summer. This is no longer a problem because the Naoussa network now has two new boreholes and the desalination plant contributing to the network.

IMPORTANTLY, in our local water there are:

- **NO microorganisms - Water in all areas consistently tests negative for microbial parameters.**
- **NO heavy metals - From natural or industrial sources, water treatment processes, pipe materials, bedrock or insecticides.**
- **NO micropollutants - From industrial activity and pollution, water treatment.**
- **NO pesticides - From industrial agriculture.**

OUR WATER

Our water only contains harmless minerals that get picked up from the rocks the water moves through. These give the water its particular taste. Potable groundwater on Cycladic islands is rare. We in Paros are lucky as the water in the DEYAP network is of good quality and within international guidelines for drinking water [1, 5].

For full descriptions of all water parameters in Paros and the results from different locations around the island, see EDEYA's labcheck site: tinyurl.com/edeyaparos

How hard is our water?

Hard water refers to water with a high Calcium and Magnesium (Ca+ and Mg+) mineral content[11]. This can occur when water passes through geology rich in Ca and Mg – this is the case in Paros, where Parian marble is widely found[12].

According to the tests done by DEYAP, tap water in Paros is hard, you can tell it is hard because of the calcium mineral deposits on surfaces, which can be a nuisance for appliances! Hard water can also have a mineral taste, which may take some time to get used to.

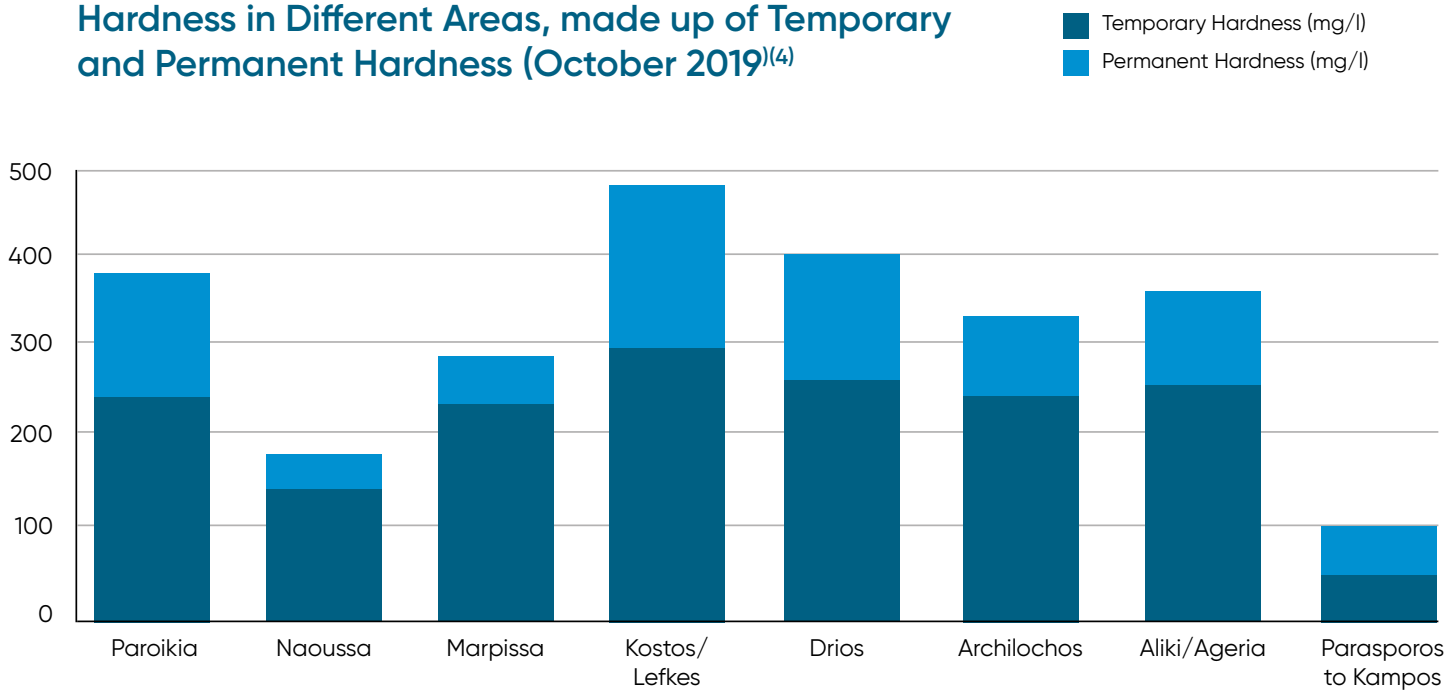
Calcium is the most abundant mineral in our bodies and supports many functions [13,14]. One litre of Paros tap water can provide around 10% (100mg/L) of our daily calcium needs [4].

Organisations, including the EU, do not set water hardness limits - it is considered safe[3]. Hard water simply creates a mineral taste, which might take some time to get used to.

Water hardness can either be:

- **Temporary:** can be removed through boiling and leaves a mineral deposit.
- **Permanent:** can not be removed through boiling.

Hardness in Different Areas, made up of Temporary and Permanent Hardness (October 2019)[4]



Our water pipes are safe

Most of the water pipes on the island that were originally installed in the 1960s have been renewed and only high-quality materials have been used*[2]. Even the very few older pipes are shown to be safe**. Regardless of the material, the water is depository and leaves a layer of calcium carbonate on the pipe surface, which keeps the water from coming in contact with the pipe material[15].

So the pipes in the DEYAP grid are safe for transporting drinking water! Additionally, a live sensor system is continuously being developed and expanded to provide instant feedback for leaks and pressure in the pipes.

! Water that sits for a long time in the pipes has a tendency to develop microbes. Normally this is not a problem, but if your house has been uninhabited for a while, make sure to run some water before drinking from the tap[4].

* All new sections are made of 3rd generation Polyethylene, a chemically non active and, resilient plastics [4].

** There are 4 asbestos-cement sections left, which are scheduled to be changed, and are safe anyway because no health effects have ever been found at the insignificant levels contributed to water (asbestos is only a significant concern when it is inhaled anyway)[16,17]. Very few galvanised steel sections are left, these are also safe as no detected heavy metals have been found in the water[4].

How to reduce chlorine taste:

Underground water gathers mineral flavours from surrounding rocks, which gives the water its unique taste. Chlorine also adds a particular taste to tap water. Here are some quick tips to make the water taste better:

- Add lemon: High in vitamin C, it reduces the amount of residual chlorine and adds a pleasant taste.
- Leave a carafe of water in the fridge overnight: 80-90% of the chlorine evaporates in 12-24 hours (use a wide-mouth container).
- Another option is to use an activated charcoal filter. We will give more details in our coming leaflet about water filters.

P.S. Water without chlorine should be stored in the refrigerator and drunk between 24 to 48 h maximum.

Taking care of our precious water

Many Cycladic islands have unsatisfactory water sources and this has made them dependent on imported drinking water. In some cases this is due to overuse or already existing seawater infiltrations. In other cases the water is not drinkable due to heavy metals present in the bedrock. **As DEYAP's regular monitoring shows, we are lucky to have tap water that is of good quality and within international guidelines for drinking water!**[3, 4, 5, 18, 19]

However, our water resources are limited, **so let's do everything we can to preserve them. Here is what you can do:**

- Save water in every way you can.
- Collect rainwater (watering your garden with water from DEYAP is not allowed except with controlled drip irrigation; use rain or filtered grey water instead).
- Use natural cleaning products.
- Avoid using herbicides and pesticides.
- Support and promote organic food.
- Plant trees and regenerate the landscape, it will enrich the water table and bring rain[20,21].
- Make sure you have a septic tank that follows the latest guidelines, or even better, put in place a proper biological system to treat your wastewater for reuse, if you are not connected to the municipal sewage network.
- Avoid building pools and enjoy our gorgeous blue seas instead.
- Stay within the authorised depths and pumping rates for private boreholes. If you don't, this can compromise the groundwater system for the entire island's needs.

And of course, avoid single-use plastic such as plastic bottles. Instead, get a reusable bottle you can always have with you. Choose glass for storing drinking water and make sure to clean the bottles regularly. Refill your bottle with Paros tap water as often as you like!

References

How do we know our tap water is safe to drink?

1. *Hellenic Survey of Geology* igme.gr/
2. *Department of Public Health of Paros, South Aegean* tinyurl.com/publichealthsouthaegean

What's in our water? Comparisons with EU limits.

3. *EU Water Directive* tinyurl.com/euwaterdirective (PDF)
4. *DEYAP Water Quality* tinyurl.com/deyapwaterquality
5. *WHO Water guidelines (2017)* tinyurl.com/whowaterguidelines
6. *Southern Water Quality Standards (2020)* tinyurl.com/swateruk
7. *WHO Chlorides in Water (2003)* tinyurl.com/whochloride (PDF)
8. *USGS.gov: Conductivity* tinyurl.com/usgsconductivity
9. *EPA Turbidity* tinyurl.com/epaturbidity
10. *WHO* pH tinyurl.com/whoph2o

How hard is our water?

11. *Kazemi (2005). Hard water. Water encyclopedia.* tinyurl.com/kazemi2005
12. *Hannappel (2005). Rhyolitic dykes of Paros island, Cyclades* tinyurl.com/hannappel2005
13. National Health Institute (2021) Calcium. https://tinyurl.com/2hnh562y
14. *WHO (2011) Hardness* tinyurl.com/whohardness

Our water pipes are safe

15. *Melidis (2007) Corrosion control by using indirect methods* https://tinyurl.com/melidis07
16. *Ratnayaka (2009) Water supply* tinyurl.com/ratnayaka09
17. *MacRae (1988) Asbestos in drinking water and cancer* https://tinyurl.com/macrae88

Taking care of our precious water

18. *Rickwood (2007) Global Drinking Water Quality.* UN Environmental Program. tinyurl.com/rickwood07 (PDF)
19. *EPA (2009) National Primary Drinking Water Regulations* tinyurl.com/epawater09
20. *Sheil (2009) How forests attract rain: an examination of a new hypothesis* https://tinyurl.com/sheil09
21. *LearningfromNature (2020)* https://tinyurl.com/droughtproofing

DEYAP:
website: www.deya-parou.gr/en
e-mail: info@deya-parou.gr

Clean Blue Paros:
website: commonseas.com/countries/clean-blue-paros
e-mail: cleanblueparos@commonseas.com
Facebook: facebook.com/cleanblueparos

September 2020

Common Seas

MUNICIPALITY OF PAROS ISLAND

DEYAP
Paros Water Supply & Sewerage Company

Clean Blue Paros