

Small systems, big challenges

How WaterQ solution can
improve management of
small drinking water supplies



Zagreb
October 2022

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water supply

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1

Small drinking
water supply

PROBLEM

Small drinking water supplies (SDWS) are a dominant type of water supply in rural and remote areas



EU definition:

Small drinking water supplies are defined as supplies serving up to 5,000 persons or supplying up to 1,000 m³ water per day²

Other terms used: small-scale water supply (WHO)

Two main management types:

Community-managed supplies: systems administered and managed in self-responsibility by the community members

Public supplies: systems administered and managed by a distinct public entity (e.g. company, municipality, water board association)



207M or 23% of population¹ served by SDWSs in the WHO European Region

On average 10-30% of population¹ served by SDWSs (depending on the % of rural population and country-specific)

65M or 14.5% of EU population² served by SDWSs

¹ [Status of small-scale water supplies in the WHO European region.](#)

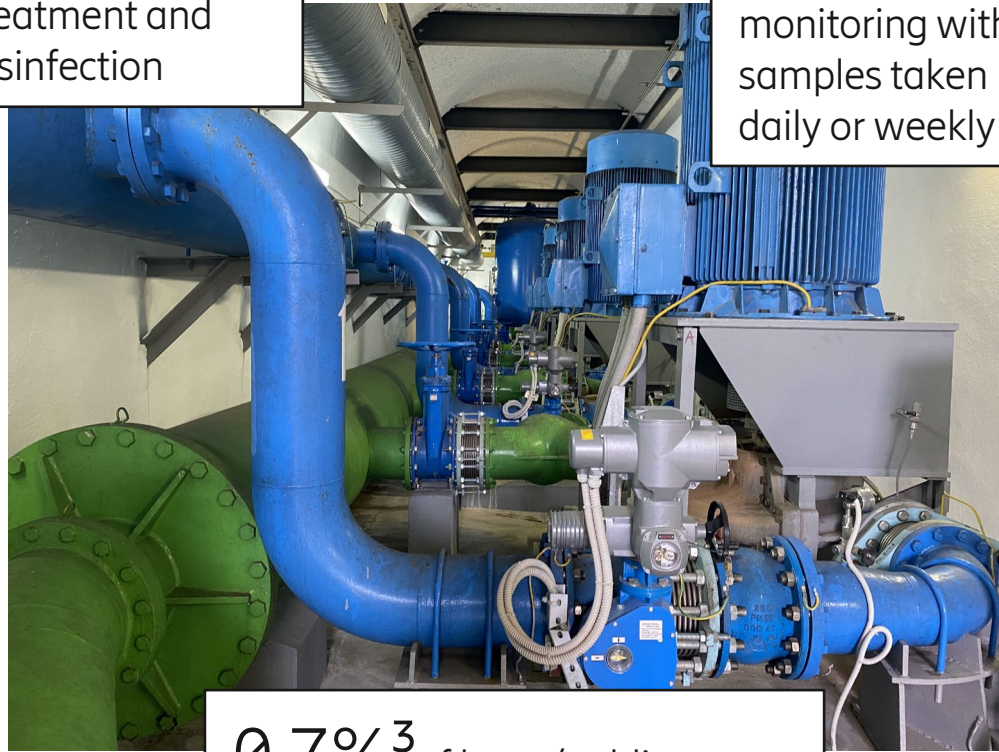
WHO European region covers 53 countries in the area from Portugal to Kazakhstan

² [Framework for Action for the management of small drinking water supplies](#)

Difference in compliance – water quality between large (public) and small water supplies puts citizens in rural and remote areas in a disadvantageous position



Advanced water treatment and disinfection



Regular quality monitoring with samples taken daily or weekly

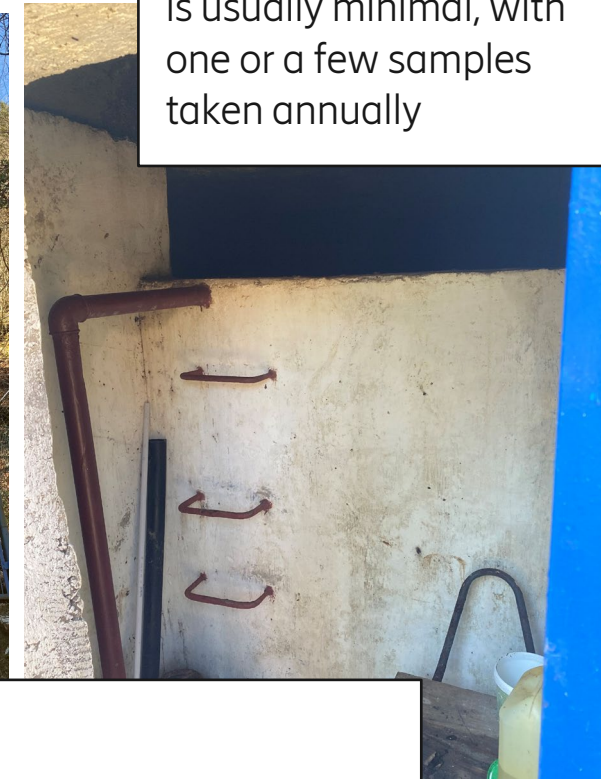
0.7%³ of large/public water supply samples indicate microbiological contamination

Water treatment and disinfection is often limited or non-existent



37.1%³ of community-managed small drinking water supply samples indicate microbiological contamination

Water quality surveillance is usually minimal, with one or a few samples taken annually



³ Examples from [Croatian report on drinking water in 2021](#)

SDWS specifics and risks call for a comprehensive approach to improving management and water quality



Regulation and organisation

- Not sufficiently addressed by water regulations
- Ownership is often unclear
- Financial resources are limited
- Non-professional staff



Pollution risks

- Ageing infrastructure
- Inadequate sanitation protection and practices
- Poor management of waste
- Vulnerability to heavy rainfall



Monitoring

- Lack of baseline data about SWDSs (location, ownership, management)
- Minimal monitoring data (usually one or a few samples taken annually)
- Missing routine data collection mechanisms
- Challenge of coordinating data collection at the national level so that data can be used for planning, regulation and corrective action



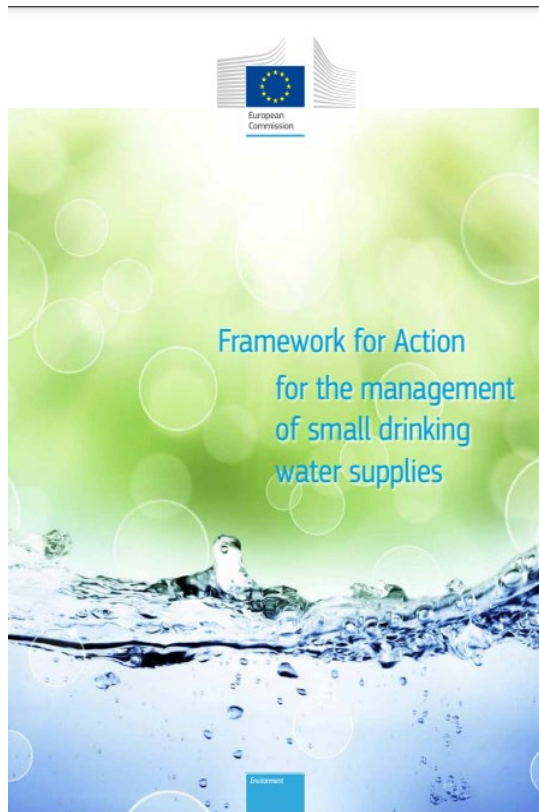


2

Small drinking
water supply

SOLUTION AT
NATIONAL LEVEL

EU-recommended solution for improving management of SDWSs at national level: introduction of a four-component risk-based approach



Register of water supplies

Build and maintain a register of water supplies: location, type and ownership of every water supply

Collecting information

Record specific information about each supply: size, population, source, treatment, sample analysis results

Risk assessment

Risk-assess each supply based on its characteristics and parameters which are higher/lower risk

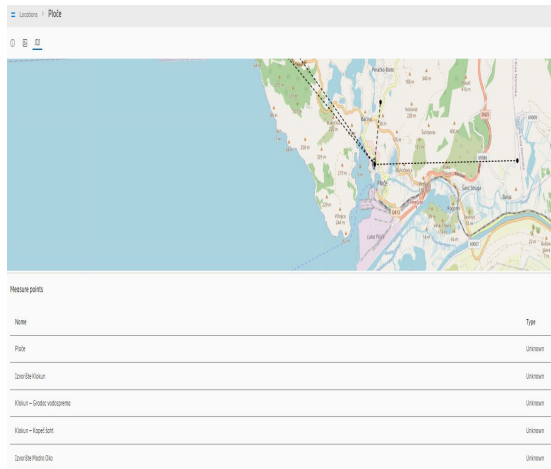
Reporting

Implement national and transparent reporting on both small and large water supplies

WHO recommends establishing national registers of small-scale water supplies and routine data collection mechanisms as a solution to improve the evidence base and identify priority actions.

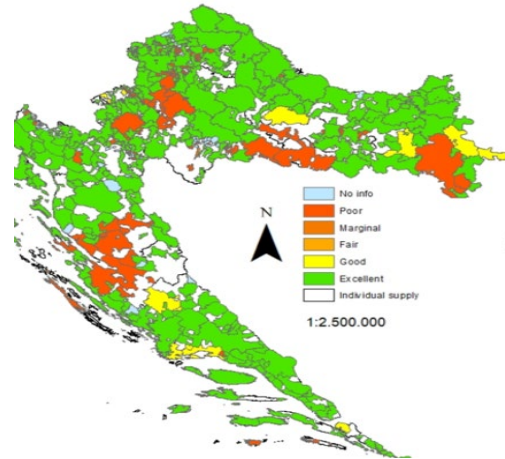
At national level, WaterQ provides a solution for all four key components needed to introduce risk-based management of the safety of SDWSs

Register of water supplies



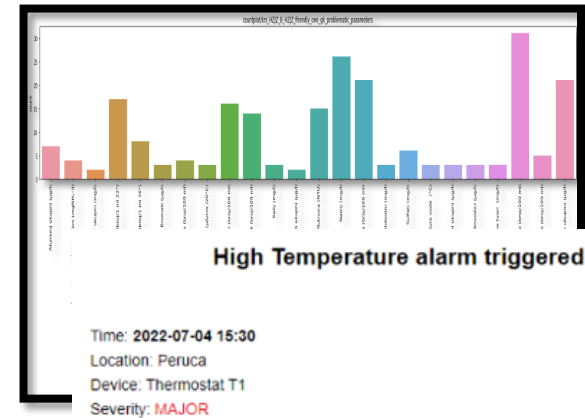
Digital platform with GIS and data component for establishing a national register

Collecting information



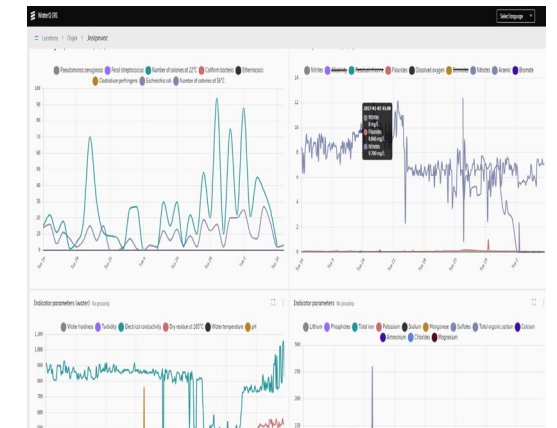
Data components (laboratory analyses, open data) and IoT sensors for routine (real-time) data collection

Risk assessment



Analytics component for monitoring optimization (focus on high-risk parameters) and early warning tools

Reporting



Visualization component for advance reporting and mobile application for easily accessible and user-friendly communication



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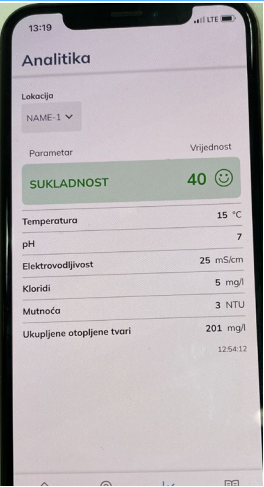
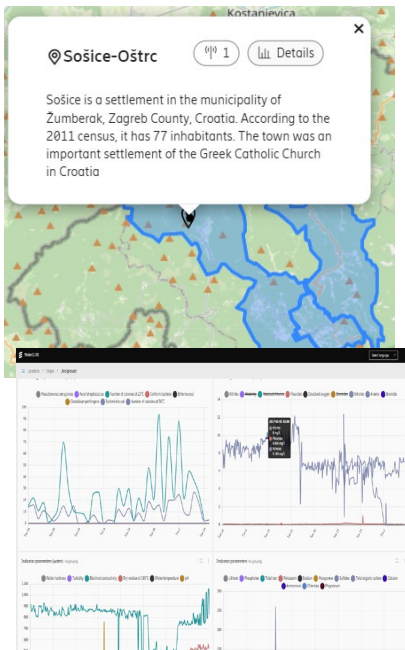
Small drinking
water supply

SOLUTION AT
SUPPLY LEVEL

At the level of each SDWS, WaterQ solution improves informed management and decision-making



Data collection (laboratory analyses, IoT measurements, weather open data) and visualization using a digital platform.



High Temperature alarm triggered



Risk management with an early warning system for threshold alert notifications towards SDWS managers and consumers via mobile application.

Using IoT sensors for real-time monitoring of risk parameters (pH, turbidity, temperature, residual chlorine) at different locations within the system (source, reservoirs, pipes), i.e. from the source to the final consumer.

WaterQ solution enables easy collection of an incomparably greater amount of key information at the SDWS



The screenshot displays the WaterQ dashboard interface. On the left, under 'Latest measurements', there is a status indicator 'Unknown' with a smiley face icon. Below this, four key metrics are shown: Water temperature at 10.90°C, Turbidity at 0.49 NTU, Conductivity at 647.60, and Chlorine at 0.26. Each metric includes a timestamp of '23/02/2023, 09:24'. The top navigation bar has tabs for 'SENSOR' (selected), 'INDICATOR', and 'WATER INDICATOR'. On the right, a map titled 'Kalinje' shows the location of the sensor, with a red pin and a blue house icon labeled 'Lovački dom'. The map also shows nearby areas like 'Draginje' and '31028'. A blue gear icon for settings is visible in the bottom left of the map area. The copyright notice '© OpenStreetMap contributors.' is at the bottom right of the map.

Metric	Value	Timestamp
Water temperature	10.90°C	23/02/2023, 09:24
Turbidity	0.49 _{NTU}	23/02/2023, 09:24
Conductivity	647.60	23/02/2023, 09:24
Chlorine	0.26	23/02/2023, 09:24

Before

- Up to eight analyses per year
- In practice, there are usually two analyses

WaterQ IoT sensor

- hourly measurements
- 8760 measurements per year

The SDWS included in the WaterQ project became the SDWS with the most analyses and measurements in the Republic of Croatia.

Through a digital platform and mobile application, all measurements are available to SDWS managers and the public health system in real time.

WaterQ solution provides assistance in managing critical processes such as disinfection



Latest measurements

Unknown

Water temperature

10.90°C

23/02/2023, 09:24

Turbidity

0.49_{NTU}

23/02/2023, 09:24

Conductivity

647.60

23/02/2023, 09:24

Chlorine

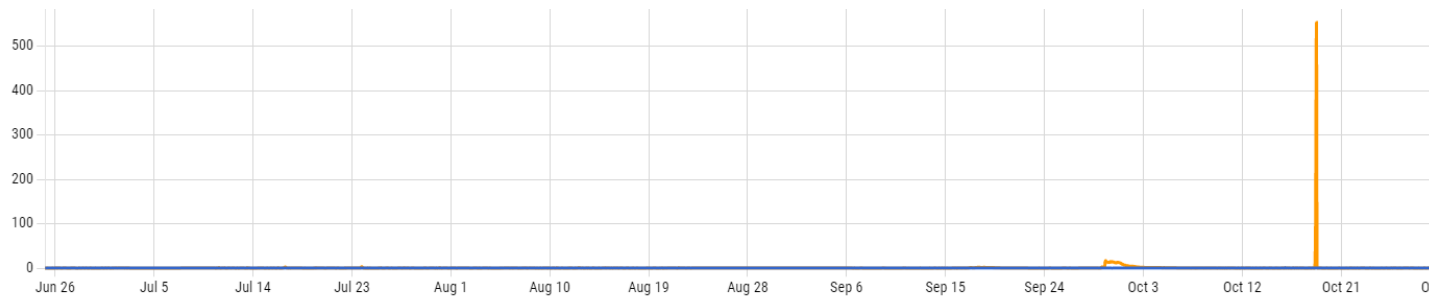
0.26

23/02/2023, 09:24

- The local community does not have advanced technical and professional knowledge.
- Help needed for critical activities such as water disinfection.
- Hourly chlorine measurements support the disinfection process where SDWS managers can adjust their sanitation practices for best results based on chlorine measurements.



WaterQ solution helps identify risks and sends an alarm in real time



- Incidents in water supply systems are sudden and are often identified only when waterborne diseases appear.
- The early warning system sends an alarm when limit values are exceeded.
- The WaterQ mobile app sends alerts and advice.
- Focus on easily accessible and understandable visuals and information in accordance with the recommendations of the EU Drinking Water Directive.

The screenshot displays the WaterQ mobile app interface. The top section shows an "Alarm details" window for a "High Temperature" alarm triggered on 25/10/2022 at 20:49. The alarm severity is "Major" (Major) and the location is "Kalinje". The device is identified as "TEST Thermostat". Below the alarm details, there is a "Message" section stating "Alarm was triggered, measured temperature was 47.000500751000000".

The main app screen shows a dashboard with various water quality parameters and their current values:

- SUKLADNOST** (Compliance): 102 (prilagodiva za piće)
- TEMPERATURA** (Temperature): 14 °C
- TDS** (Total Dissolved Solids): 702 mg/l
- ELEKTROVODIVOST** (Electrical Conductivity): 25 mS/cm
- KLC** (Chlorine): 1 mg/l

The dashboard also includes line graphs for "Temperatura vode" (Water Temperature), "pH vrijednost" (pH value), and "Elektrovodljivost" (Electrical Conductivity) over a weekly period. A "Vremenski raspon" (Time range) selector is set to "20.09.-25.10.2021.". A summary table on the right shows:

Parametar	Vrijednost
SUKLADNOST	40 😊
Temperatura	15 °C
pH	7
Elektrovodljivost	25 mS/cm
Kloridi	5 mg/l
Mutnoća	3 NTU
Ukupijene otopljene tvari	201 mg/l

The bottom navigation bar includes icons for "Naslovnica" (Home), "Karta" (Map), "Analitika" (Analytics), and "Savjeti" (Advice).

