

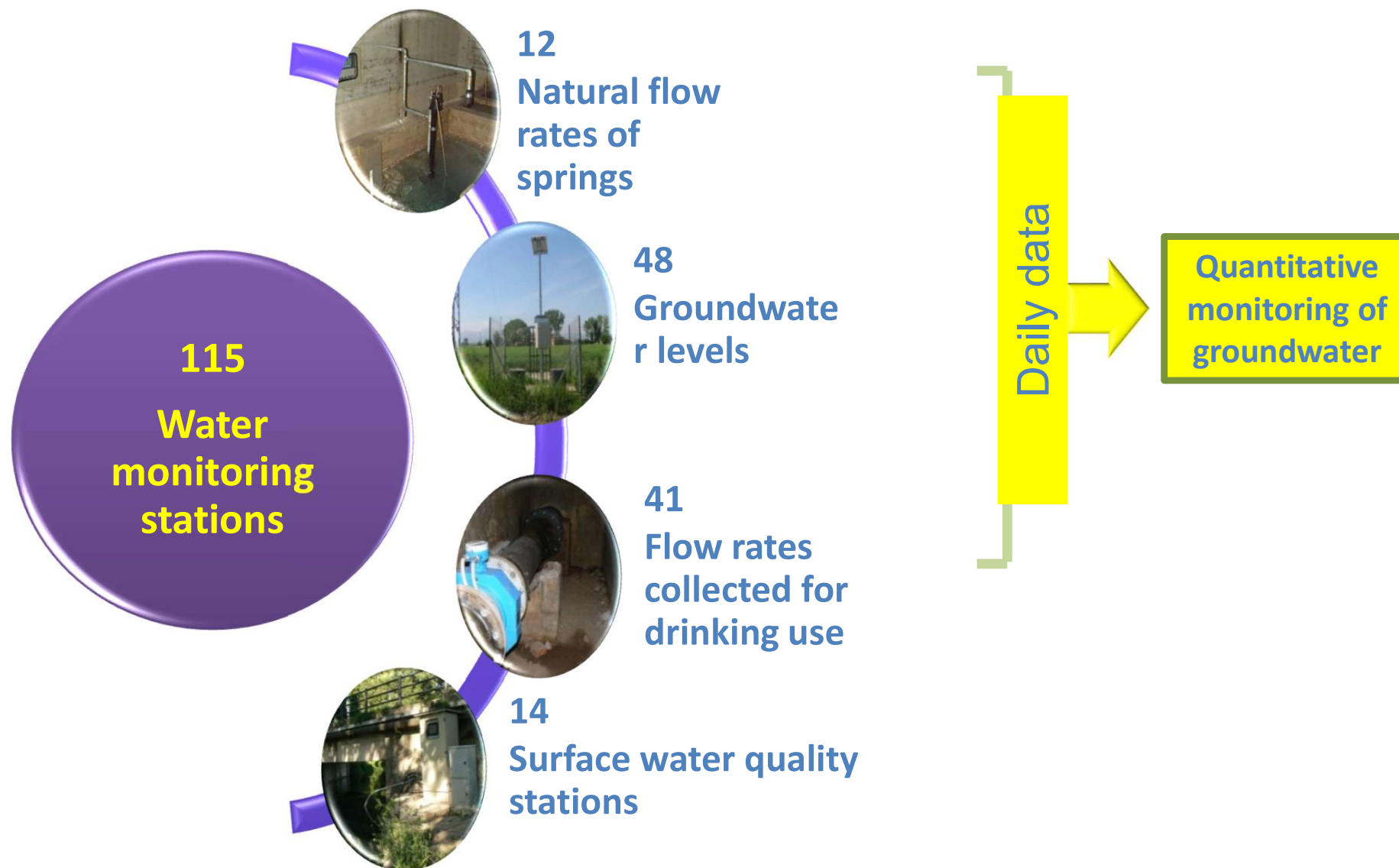


Continuous Water Monitoring

Mirko Nucci - ARPA Umbria, Servizio Rete Acqua

m.nucci@arpa.umbria.it

WATER MONITORING NETWORK



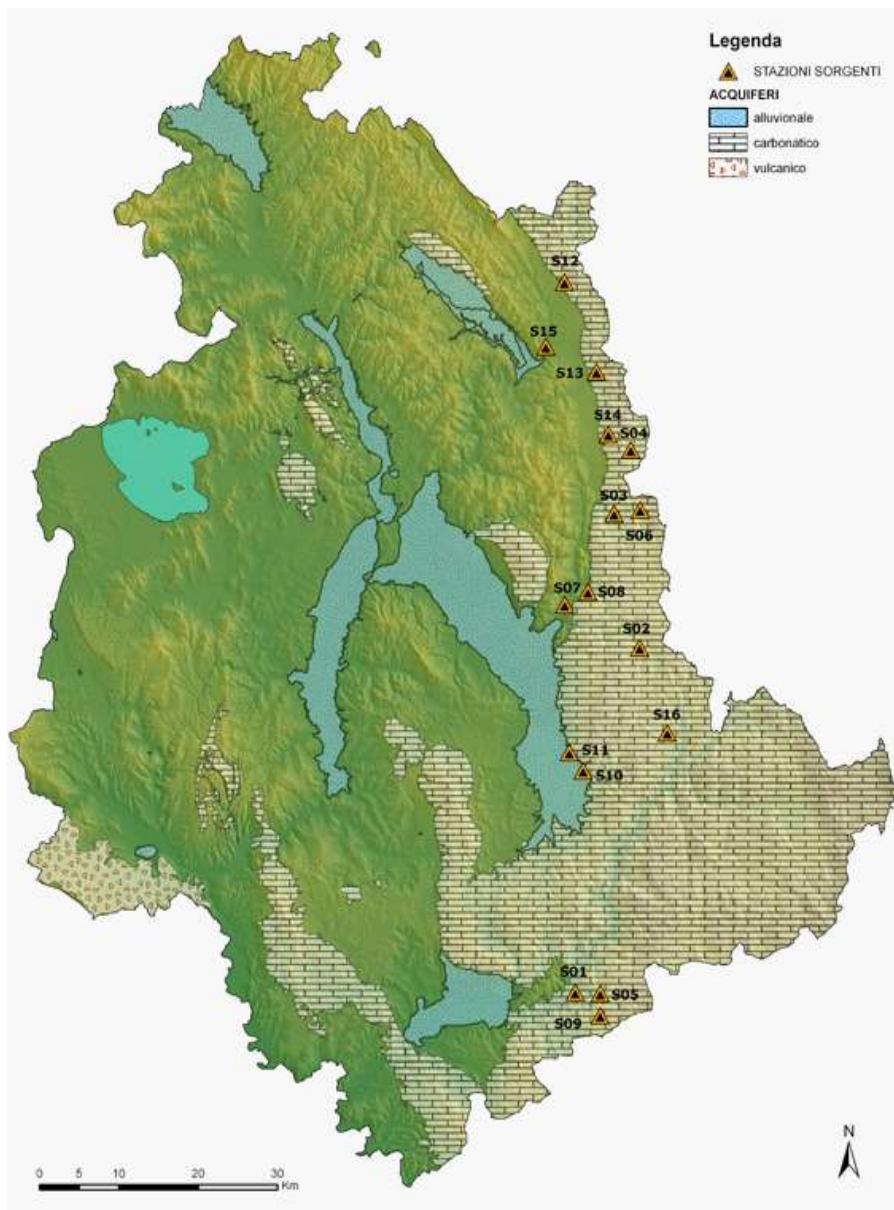
GROUNDWATER MONITORING NETWORK

SPRINGS

12 stations located in
some Apennines springs,
collected for drinking use

Acquired: 1 data / hour

Released: 1 data / day



Level meters
(ultrasound/laser)
on flow measuring
weirs

GROUNDWATER MONITORING NETWORK



GROUNDWATER LEVELS

48 stations located in
piezometers

Acquired: 1 data / hour

Released: 1 data / day



Submersible
level probes

Groundwater
level:
*Level
between
ground and
water table*

GROUNDWATER MONITORING NETWORK



FLOW RATES COLLECTED

41 meters located on
drinking water pipelines

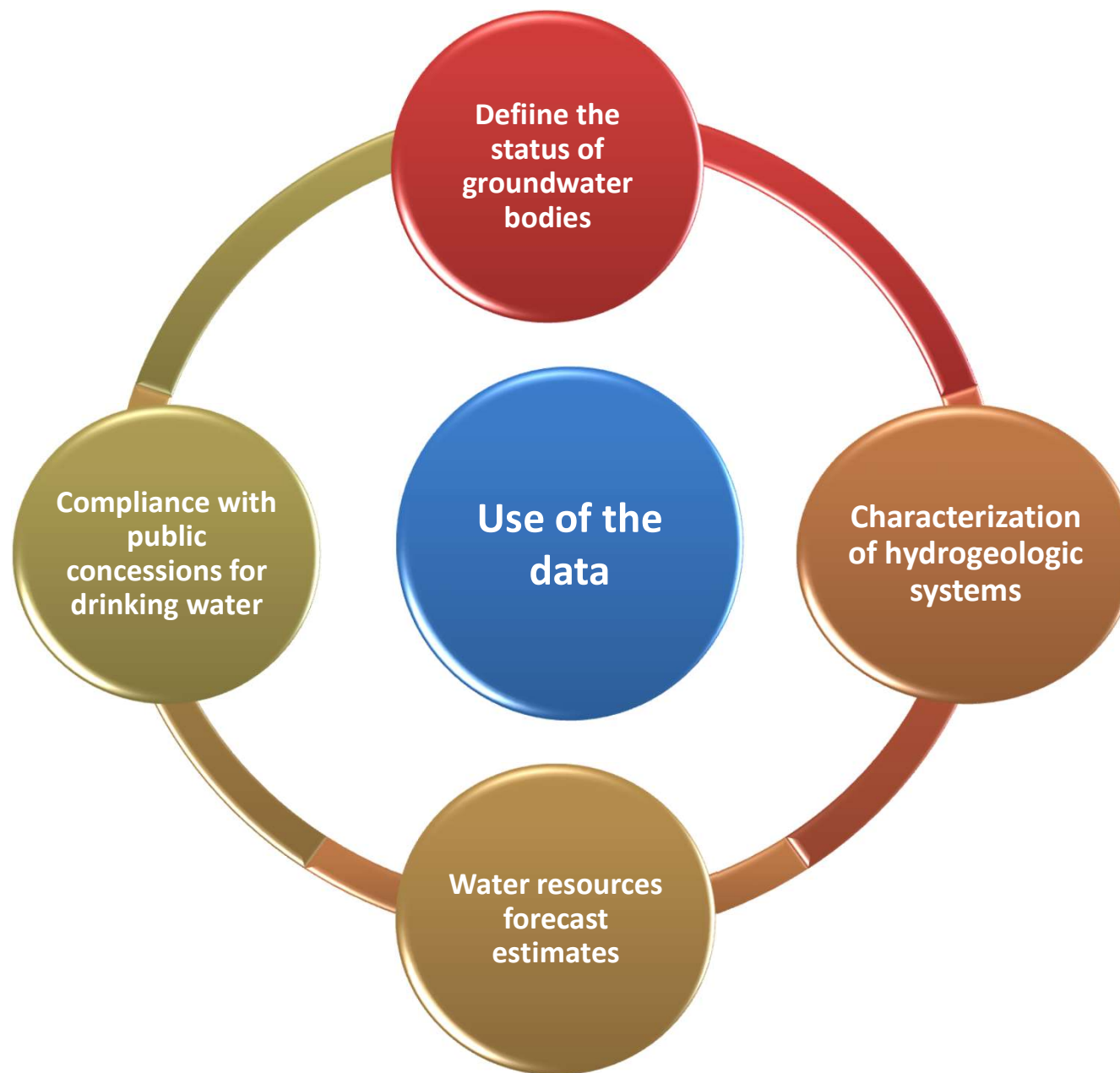
Acquired: 1 data / hour

Released: 1 data / day



Electromagn
etic meters
on drinking
water
pipelines

GROUNDWATER MONITORING NETWORK



GROUNDWATER MONITORING NETWORK

Continuous acquisition of raw data

Transport of raw data

Validation procedures



Daily transfer of raw data from local stations to ARPA server



Hourly raw data

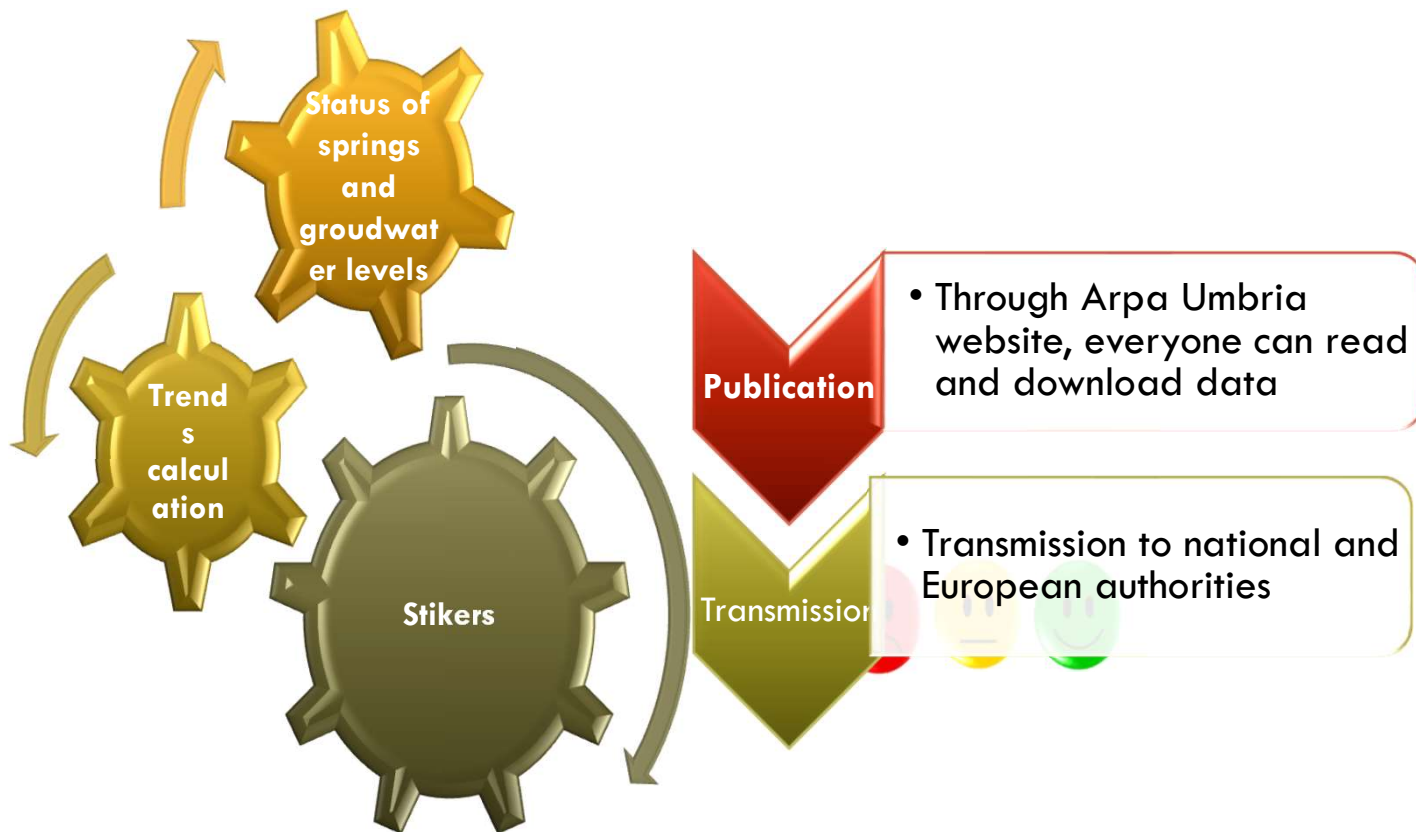
Search for anomalies and errors on raw data

Anomalous data removal

Median calculation on residual data

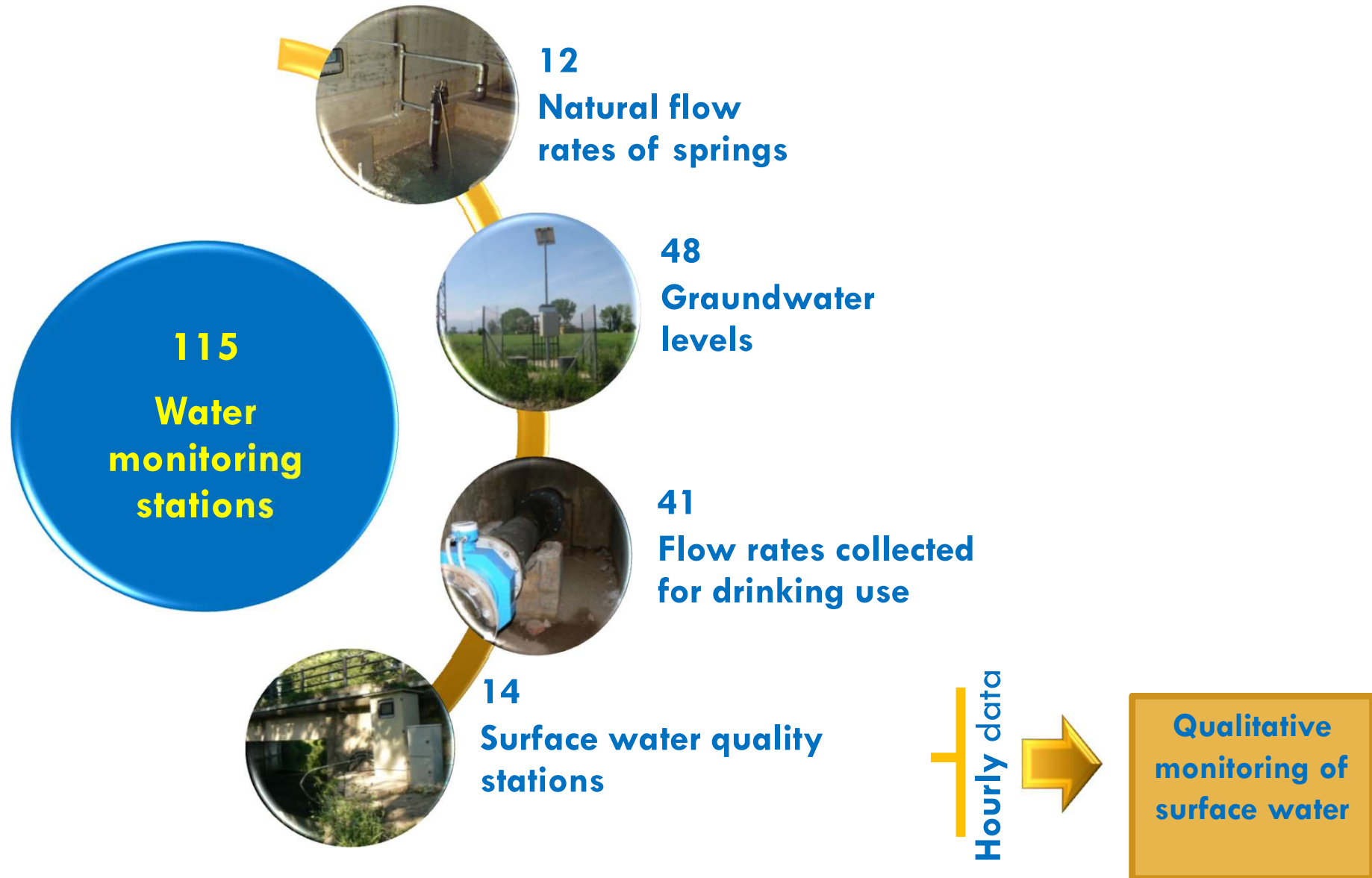
Daily data archiving

GROUNDWATER MONITORING NETWORK

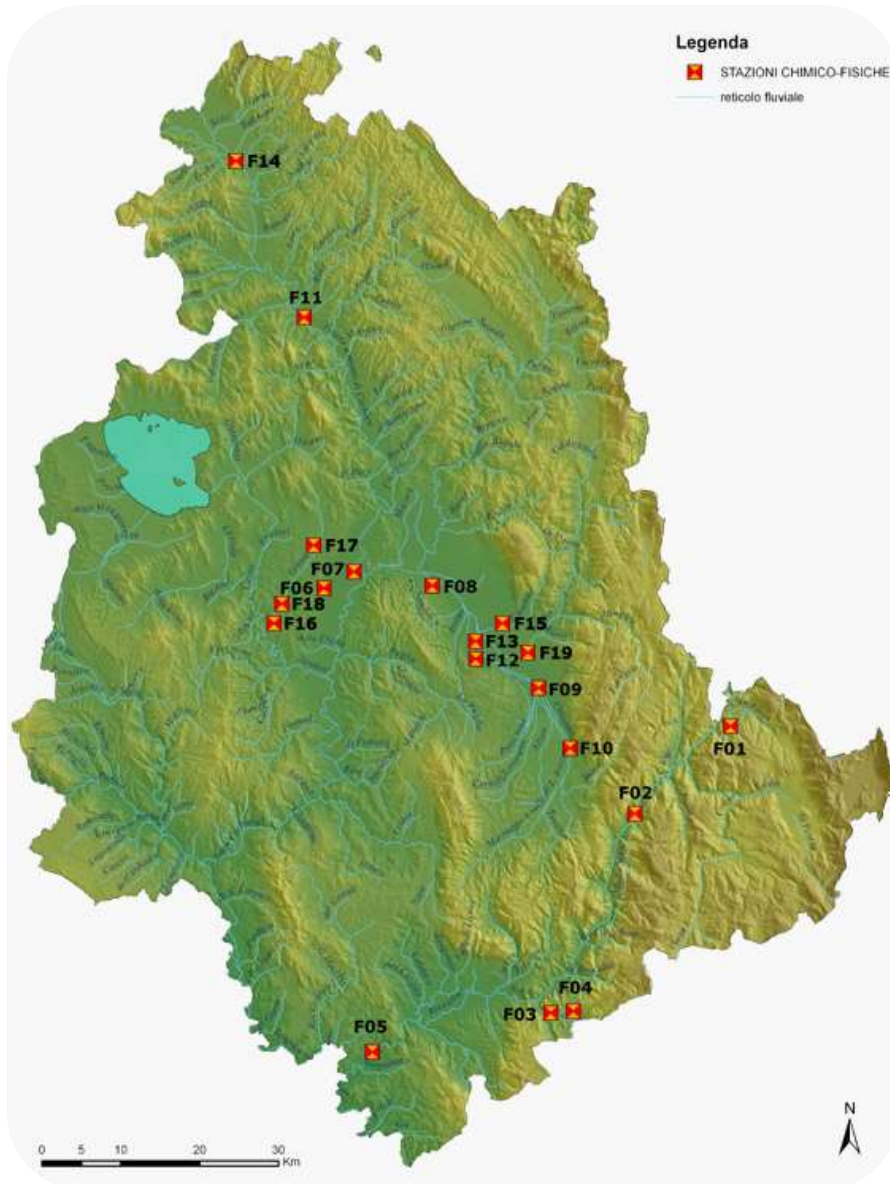


The system determines the current state of water resources by making a comparison between the current data and previous data (relating to the same day in previous years). The system calculates the current trend of flow rates and groundwater levels. The system determines colored stickers (status and trend) to assign to each monitoring point.

WATER MONITORING NETWORK



SURFACE WATER MONITORING NETWORK



COD	STAZIONE	FIUME / LAGO
F03	Piediluco	Medio Nera
F04	Piediluco	Piediluco
F06	Ponte Nuovo	Tevere
F07	Ponte Rosciano	Chiascio
F08	Bettona	Topino
F11	Umbertide	Tevere
F12	Bevagna	Clitunno
F13	Bevagna	Timia
F14	Città di Castello	Tevere
F16	Olmeto	Genna
F17	Boneggio	Genna
F18	Badiola	Genna
F19	Tenne	Alveolo

- **Main waterways (basin closure or strategic points)**
- **Minor waterways with high environmental criticalities**

SURFACE WATER MONITORING NETWORK



SURFACE WATER MONITORING NETWORK



SURFACE WATER MONITORING NETWORK

Parameters measured every hour using multiparametrical probes

Temperature

- thermal state of a body (level of molecular agitation)

Conducibility

- In a solution, charge transport occurs by ionic migration. Electrical conductivity is proportional to the content and type of substances that dissociate into ions.

pH

- Indicates the activity of H_3O^+ ions. It measures the level of acidity or basicity of a solution.

Dissolved Oxygen

- Measures the concentration of dissolved oxygen in water (expressed in mg/l).

Turbidity

- It detects the presence of substances that do not dissociate into ions, but remain suspended in the water. Expressed in FNU.

Ammoniacal nitrogen

- Direct measurement of a pollutant. Present in civil and livestock wastewater

Hourly acquisition is a compromise between the amount of data acquired and their significance

SURFACE WATER MONITORING NETWORK

OBSERVATION

Acquire data to observe the river properties

REPORTING

Acquire sensitivity to discern natural events from anomalous events (anthropic origin)

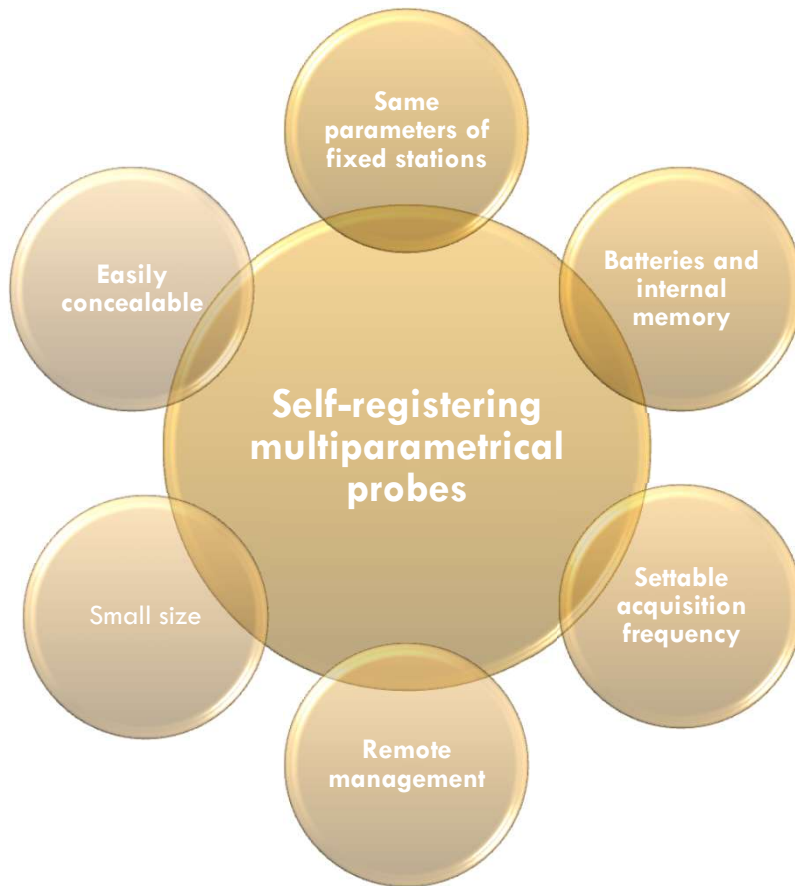
Quickly report to the competent territorial district

INTERVENTION

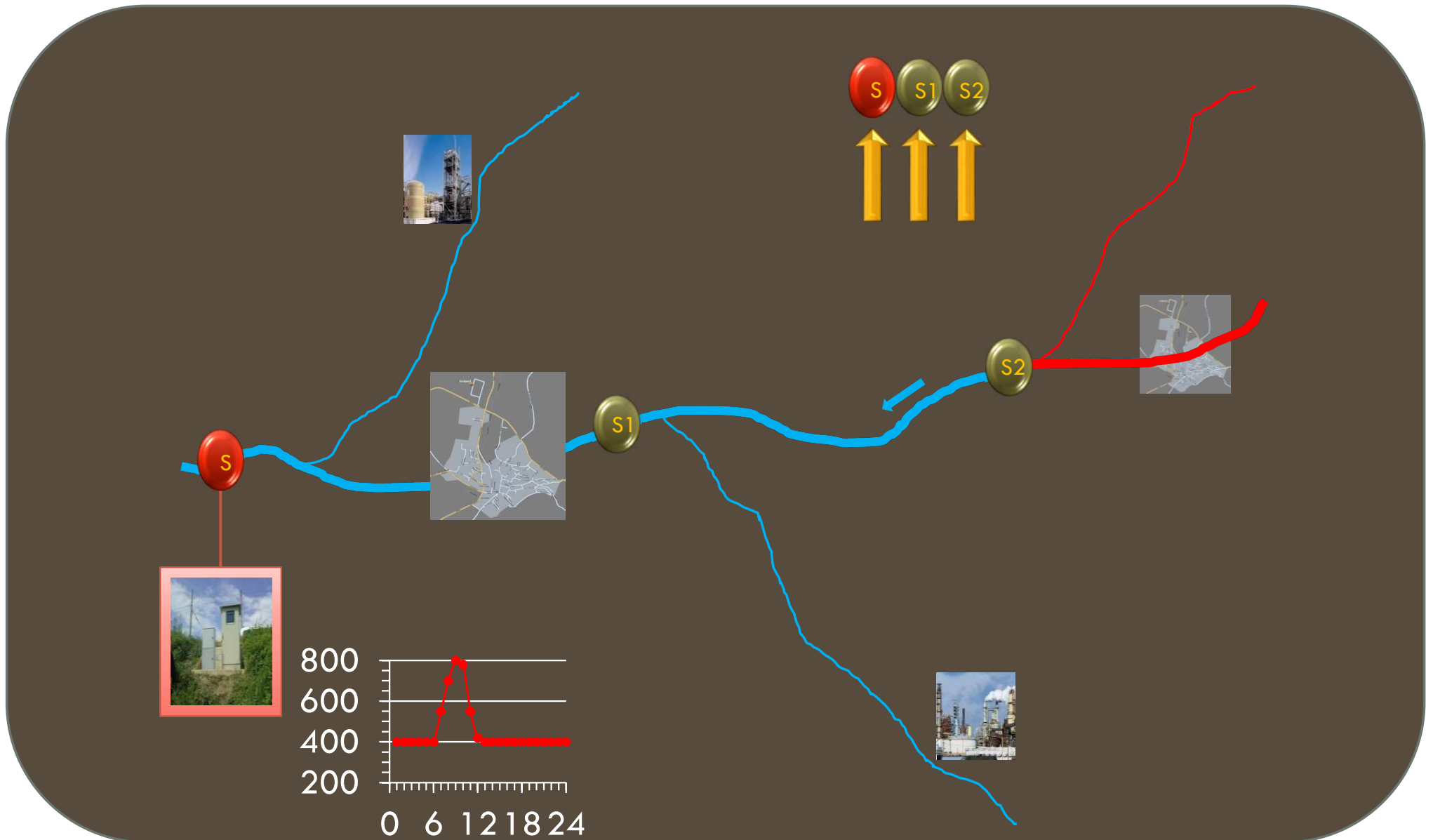
Search for potential release points of pollutants in the river basin

Identification of the release point and responsible parties

SURFACE WATER MONITORING NETWORK



SURFACE WATER MONITORING NETWORK



**Thank you for your
attention**