



Alternative water value-chain



The project **FIT4REUSE** will provide safe, sustainable and accepted ways of water supply for the Mediterranean basin by exploiting non-conventional water resources. Treated wastewater and desalinated water can contribute to compensate the gap between agricultural water demand and supply and provide consistently high quality water throughout the year.

FIT4REUSE will focus on innovative, sustainable and safe treatment technologies, and on the use of treated wastewater and desalinated water in agriculture and for aquifer recharge. Also, specific methodological and assessment tools will be created to meet the project objectives.

Particularly, **FIT4REUSE** concentrates on the development of innovative, sustainable and low-cost technologies for:

- (i) municipal wastewater treatment,
- (ii) desalination, and
- (iii) brine treatment and disposal, and focuses its activities on the use of treated municipal wastewater and desalinated water for irrigation and aquifer recharge.

It will address both direct and indirect use of non-conventional water resources providing guidelines and perform a holistic assessment of the use of non-conventional water resources to improve public and legal acceptance of treated wastewater.

Finally, it will create a specific methodological framework for impact assessment and multi-stakeholder platform that will exploit the results and improve perception of non-conventional water resources.

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Our partners:

- Alma Mater Studiorum–University of Bologna (UNIBO) - *Italy*
- Marche Polytechnic University (UNIVPM) - *Italy*
- National Institute for Environmental Protection & Research (ISPRA) - *Italy*
- BIOAZUL S.L. - *Spain*
- Ecofilae - *France*
- National Technical University of Athens (NTUA) - *Greece*
- National Water Company (MEKOROT) - *Israel*
- Higher Institute for Applied Biological Sciences of Tunis (ISSBAT) - *Tunisia*
- İTÜNOVA Teknoloji A.Ş. (ITUNOVA) - *Turkey*



FIT4REUSE

Safe and sustainable solutions for the integrated use of non-conventional water resources in the Mediterranean agricultural sector



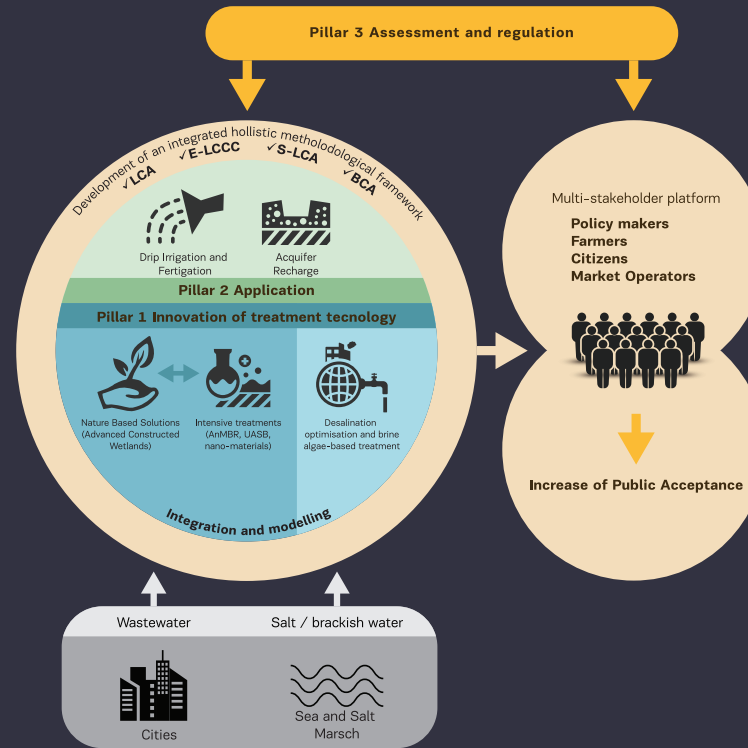
FIT4REUSE



FIT4REUSE is part of the PRIMA programme supported by the European Union. The PRIMA programme is supported under Horizon 2020, the European Union's Framework Programme for Research and Innovation.

FIT4REUSE aims to:

1. Optimize nature-based (e.g. constructed wetlands) and intensive solutions for municipal wastewater treatment by integrating techniques and advanced nano-materials.
2. Develop a customized and innovative combination of intensive and nature-based technologies that will provide adequate water quality, suitable for irrigation purposes, focusing mainly on the removal of pathogens and emerging contaminants.
3. Explore the cost reduction in the existing desalination technologies.
4. Investigate alternative drip irrigation technologies and practices for agriculture.
5. Improve the aquifer recharge process with treated wastewater and soil aquifers treatment (SAT) maintaining its water quality and ecological balance.
6. Support a wider adoption of water reuse safety planning in the Mediterranean basin by developing suitable guidelines.
7. Analyze the economic, environmental and social impacts of the proposed solution and enhance the use of treated wastewater and desalinated water through a multi-stakeholder approach.



The overall concept and rationale of **FIT4REUSE** is based on three pillars.

Pillar I concentrates on the development of innovative, sustainable and low-cost technologies for (i) municipal wastewater treatment for agricultural reuse, (ii) desalination, and (iii) brine treatment and disposal.

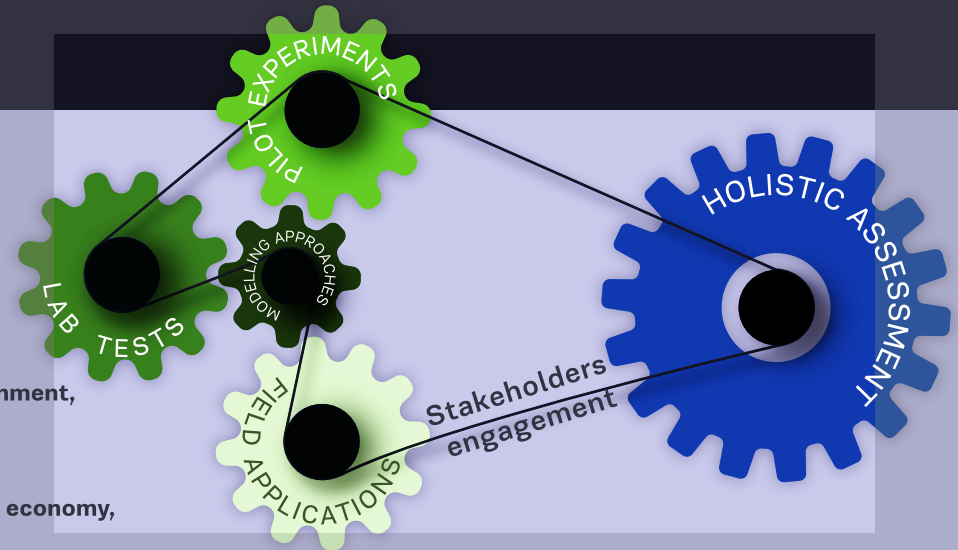
Pillar II focuses its activities on the use of treated municipal wastewater and desalinated water for irrigation and aquifer recharge. It will address both direct and indirect use of non-conventional water resources providing guidelines.

Pillar III will perform a holistic assessment of the use of non-conventional water resources to improve public and legal acceptance of treated wastewater. It will create a specific methodological framework for impact assessment and multi-stakeholder platform that will exploit the results and improve perception of non-conventional water resources.

| Non-conventional water resources | Municipal wastewater | Salt water /brines |
|----------------------------------|---|---|
| Basic existing technologies | Wetlands UASB AnMBR | Pre-treated unit PO membrane Brine treatment Brine reuse |
| | <ul style="list-style-type: none"> Absorption substrate Biochar/locally available materials Microbial fuel cells (MFCs), solar panels Improved aeration Molecularly imprinted polymers (MIPs) nano Zero Valance Iron (nZVI) Plant growth-promoting rhizobacteria (PGPR) UV disinfection | <ul style="list-style-type: none"> Pressure wave generator (PWG) Photo-bioreactor New saturation index Nanofiltration membrane Solar panels Biomass production Thermal evaporation Nutrient recovery Forward osmosis |
| Improvement | | |
| Added value | Improved removal of pathogens and emerging contaminants Controlled removal of nutrients Reduction of treatment costs, carbon and energy footprint Fertilizer and Salts Recovery | |

FIT4REUSE will perform research activities by means of:

- i) lab scale tests,
- ii) pilot scale experiments,
- iii) field application in relevant environment,
- iv) modelling approaches,
- v) integrated assessment considering economy, environment and society,
- vi) digital instruments and a dedicated event campaign to directly involve citizens and key-stakeholders.



This methodology will be applied (and adapted for) the different scenarios characterizing the Mediterranean area (i.e. Near Est, North Africa and Mediterranean Europe), in order to develop solutions and results that will be FIT for increasing the REUSE of treated wastewater and desalinated water in the overall Med basin.