



NAWAMED

Nature Based Solutions for Domestic Water Reuse in Mediterranean Countries

Thematic objective: B.4 Environmental protection, climate change adaptation and mitigation

Priority: B.4.1 Water efficiency



STRATEGY FOR THE INTEGRATION OF NON-CONVENTIONAL WATER RESOURCES IN WATER MANAGEMENT PLANNING: MALTA

WP5 – A Common Mediterranean Policy Perspective

ACTIVITY 5.2 – Local, National and Regional Strategic Documents

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1. Introduction

Non Conventional Water Resources (NCWR) can provide significant opportunities for optimising the management of water resources by diversifying the available freshwater resource-base. In this way NCWR enable security of water supply to be achieved whilst ensuring the sustainable use of natural freshwater resources.

The role of NCWR within a comprehensive water management framework can have two different (but complementary) aspects:

- (i) that of carrying over water capacity from the wet season to the dry season – and hence primarily rainwater harvesting techniques, and
- (ii) that of supplementing existing natural freshwater resources and making use of such resources in substitution of natural freshwater resources – in particular for cases where lower quality water to drinking water is required – such as landscape irrigation and toilet flushing.

Therefore the application of NCWR can have a different context, depending on the spatial extent of the application typically varying between local and regional/national levels. Application at the local level considers technologies and techniques which can be applied at the point of use, that is at the level of the water user. Typical examples include rainwater harvesting at the field or household level, or decentralised technologies such as green walls and other greywater treatment systems. On the other hand, the regional/national level refers to larger structures, involving significant capital investment. Typically such applications would large dam retaining structures for water runoff, or the construction of water treatment plants such as desalination plants for sea-water or treatment/polishing plants for wastewater. Both levels of application are relevant from the perspective of integrated water management, and can be considered as complementary to each other. This highlights the flexibility in the application of NCWR, where different approaches can be adopted to ensure the integration of NCWR at different water management levels.

NCWR applications related to water reuse also include an element of efficiency in water use, since these applications enable water demands at the local and/or regional level to be met with a lower input volume in the water supply system, entailing lower pressures on natural water resources.

NCWR therefore provide additional flexibility in water management planning particularly under conditions of water stress, particularly where natural freshwater resources are not sufficient to meet water demands. NCWR solutions provide functionality in the diversification of water supply resources, enabling the development of additional water resources to sustain the water supply system, whilst favouring the sustainable use of limited natural freshwater resources. NCWR development however needs to be undertaken in parallel with the development and application of water demand management solutions, to avoid that increases in water supply availability be matched by a corresponding increase in water demand through what is commonly known as the rebound effect.



The adoption of NCWR solutions provides added focus on the links between water and energy, given the energy requirements for the operation of NCWR solutions. Hence the adoption of such solutions will need to be aligned with the availability of energy supplies, and can be particularly relevant to drive the uptake of renewable energy solutions to increase the green credentials of NCWR solutions. The efficient use of energy in the whole urban water management cycle will therefore gain more relevance in water management planning, with energy efficiency measures in water production and distribution becoming increasingly important in water management plans. The adoption of NCWR solutions therefore calls for the increased mainstreaming of the WEFE (Water-Energy-Food-Ecosystems) Nexus in water management planning.

Considerations to the quality of water produced by NCWR solutions is also of relevance, in particular to ensure the safe use of these solutions. Water Quality standards reflect the intended use of the product water, where various uses requiring lower quality (second class) water can be addressed with NCWR solutions, including within an urban context landscape irrigation and applications such as toilet flushing. The development of risk assessment and management protocols during the planning of NCWR solutions is therefore important to ensure that such applications can be implemented in a safe manner which ensures a high level of protection to human health and the environment.

This report provides high level recommendations for the promotion of NCWR solutions at the local or user level in Italy, in alignment with the outcomes of the NAWAMED Project.



2. Country Background

Non Conventional Water Resources address over 2% of Tunisia's water demand, where sea-water desalination is used to sustain water supplies to cities and wastewater treatment and reuse is used to sustain agricultural water demand. Further investments in the application of these technologies at the scale of the utility (water services provider) to further increase production are planned to reduce dependence on natural freshwater resources and address increasing demands.

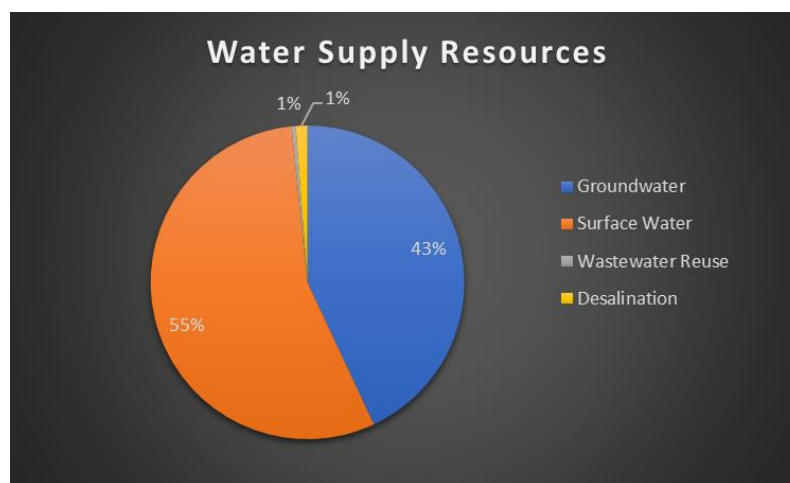


Figure 1: Classification of water supply resources in Tunis

The population of the country is concentrated in urban centres, with over 70% of the 11.8 million persons living in urban areas. However, Tunisia still has a sizeable 30% of the population living in rural area. Demographic growth is expected to increase Tunisia's population to 13 million persons by 2050, where an increase in the urban population is expected. In fact, urban population is expected to rise to 10 million by 2050. This will inevitably be accompanied by an increase in individual and collective water needs, which are much higher in urban than in rural areas.

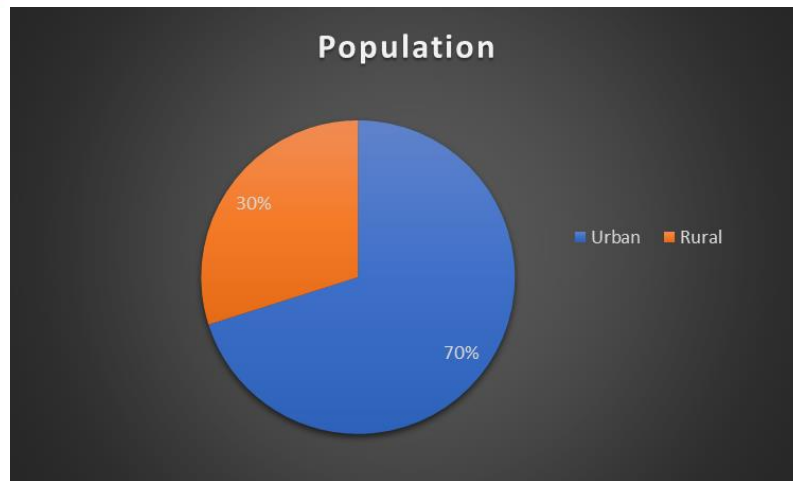


Figure 2: Classification of population between urban and rural areas

Municipal water use accounts for around 15% of the national water demand in Tunisia. The largest water consuming sector is the agricultural sector with around an 80% share of the national water demand.

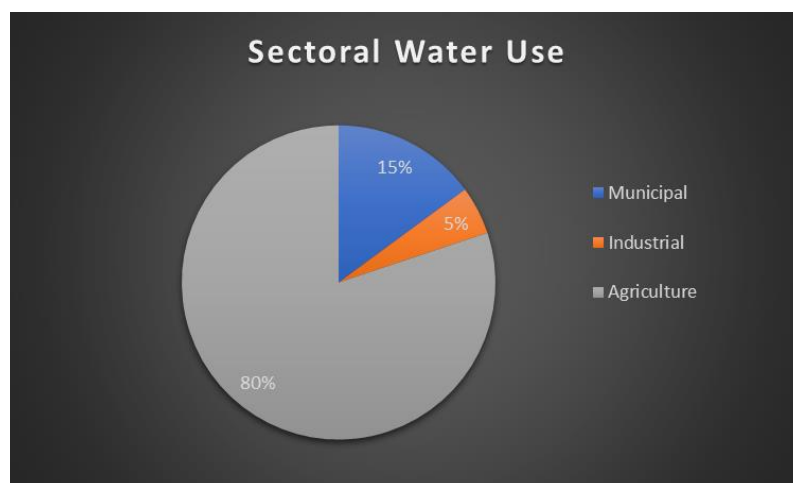


Figure 3: Sectoral water use in Tunis

Although no data is available, household water use is expected to follow similar trends to other Mediterranean countries, where second class (non potable) water can address up to 50% of the household water needs, thereby opening up opportunities for the use of greywaters generated on site. The per capita consumption of water in Tunisia stands at 120 litres per capita per day.

The water distributed to customers is metered and billed according to a progressive (rising block) tariff schedule with several quarterly water consumption bands. The tariff system, which is the same for the whole country, has six consumption bands with one tariff per band. The tariffs vary



from 0.06Eur/m³ for the first social bracket (<20m³/quarter) to 0.60Eur/m³ for the highest consumption bracket (>150m³/quarter).

The key regulatory authorities involved in permitting NCWR applications in Tunisia are identified as:

- Ministry in charge of Water and Agriculture DGGREE: General Direction of rural engineering and water exploitation in charge of wastewater valorisation in agriculture.

- National Office of Sanitation, created in 1974 under the supervision of the Ministry for the Environment. Its main missions are the prevention of all forms of water pollution; the management, operation, maintenance and renewal of the sanitation network; the planning and implementation of sanitation projects; the promotion, reuse and marketing of by-products of the Wastewater Treatment Plants, the elaboration of any legal or regulatory text and the undertaking of studies and assistance of public or private organizations in the fight against all kinds of pollution including industrial wastewater.

- National Environmental Protection Agency, created since 1988, under the supervision of the Ministry of the Environment. Its main missions include the participation in the elaboration and the implementation of the general policy of the government in the field of pollution control and environmental protection, ensuring the implementation of the policy of the State as regards the fight against pollution and the protection of the environment, and in particular the measures tending to ensure the preservation of the environment and to reinforce the mechanisms which lead to it, and in general to propose the measures of prevention of the risks and the natural or industrial catastrophes. The National Environmental Protection Agency is in charge of the monitoring of the pre-treatment and discharge of industrial wastewaters and the quality of WW discharged in the natural system.

- The Ministry of the Environment is responsible for developing, in collaboration with the Ministries and Agencies concerned, the general policy of the State in the fields of environmental protection, nature conservation, promotion of the quality of life and to implement the imperatives of sustainable development in general and sectoral policies and to ensure their execution.

- The Ministry of Health is responsible to ensure the health of the population in order to allow the harmonious development of its physical and mental faculties and its adaptation to the natural and social environment of the country by fighting against the causes of deterioration of the physical or mental well-being which can affect it individually or collectively. The Department of Environmental Hygiene and Protection of the Environment (DHMPE) is the main actor of the Ministry of Public Health on water sector. At the regional level, it is represented by a Regional Direction. The role of the Ministry of Public Health is crucial in the field of reuse of treated wastewater. It is on the effectiveness of its action that the confidence of the population and their perception of the health risks linked to reuse depends.

- The Ministry of Equipment is in charge of urban management as well as the management of rainwater. Within this Ministry, the Directorate General of Urban Hydraulics (DGHU) is in charge



of the control and follow-up of the studies for the protection of cities against floods as well as the maintenance of the works of protection of the cities against floods.



3. Strategic Approach

Following the discussions and analysis undertaken in the national stakeholder water tables undertaken through the NAWAMED project, the following strategic approach for promoting the mainstreaming of NCWR solutions in national water management planning is being proposed in the case of Tunisia, based on the following four measure typologies:

- Implementation Actions
- Governance Actions
- Financial Support Actions
- Capacity Building Actions

(i) Implementation Actions

The following actions are recommended:

- The development of rainwater harvesting infrastructure (such as underground cisterns) is promoted in low density urban areas and rural areas. Measures promoting the rehabilitation of existing cisterns in these areas should also be considered.
- NCWR constructed wetland solutions for the treatment of greywater should be promoted in rural households, to facilitate the reuse of treated greywater for secondary purposes including garden irrigation.
- NCWR solutions are to be promoted for communal buildings (residential or public), guaranteeing a high flow of greywater. The indicated NCWR typology is vertical green-wall systems, with the treated greywater being utilised for subsequent secondary uses in the communal buildings such as toilet flushing or landscaping of common areas. This approach will provide a platform for the progressive adoption of NCWR solutions in urban areas.

(ii) Governance Actions

Decree No 2006-2112 of 31 July 2006 is reviewed and consolidated into a technical guideline (code) for the application of nature based greywater treatment systems in rural areas and communal buildings. This Decree concerns non-conventional water resources, i.e. TWW, but also brackish water and desalinated seawater. It provides some guidelines for industrialists, hotels and other private operators wishing to produce and reuse such water (recycling of TWWs, for example). The main elements of these specifications are as follows:

- Any natural or legal person may produce or use these resources, provided they are located in a specific tourist or industrial zone.
- The administrative procedure for developing a water production unit is detailed. In particular, the future producer must submit a dossier to the DGGREE.



- The water produced and the equipment used must comply with Tunisian standards.

- Raw water and produced water must be monitored by the producer and controlled by the Ministry of Health.

The provision of clear requirements on the integration of green-NCWR solutions in rural areas and communal buildings will facilitate their adoption during the planning, construction or refurbishment of rural and communal urban buildings.

It is also suggested that a specific Public Agency, ideally with responsibility for the building sector, is identified to coordinate the application of the eventual technical guideline (code).

(iii) Financial Support Actions

The Finance Act of 2023 already considers the possibility of interest-free loans for rainwater cisterns construction. It is recommended that this Act is reviewed to include the possibility of extending the interest-free loans to all NCWR installations including constructed wetlands and green walls.

Furthermore, opportunities for the development of additional financial support schemes for NCWR installations should be considered based on an economic analysis of the impact of NCWR installations which takes into consideration the environmental and social benefits of these installations and the foregone costs in subsidising the water consumption avoided through the installation of these solutions,

(iv) Capacity Building Actions

In order to develop the necessary awareness and technical capacity on the application of NCWR solutions the following actions are recommended:

- Inclusion of training on NCWR solutions in University Courses for Engineers and Architects, who are expected to be on the forefront of building design. Training courses for existing Engineers and Architects on the application of NCWR solutions are also to be introduced through cooperation with the respective representative bodies (such as Chamber of Architects and Chamber of Engineers).

- Long term (multi-year) promotional campaign on the application of NCWR solutions in communal buildings is to be undertaken by the Ministry for Water and Agriculture targeting municipalities and the general public to raise awareness on the effectiveness of these solutions. Ideally the promotional campaign would also highlight the specific financial support actions set for promoting NCWR solutions.

Finally it is recommended that the high level coordination of the above action plan is led by the Ministry for Water and Agriculture of Tunisia to enable the actions to be integrated in the national water management plan.



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