



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: LEBANON

WP5 – A Common Mediterranean Policy Perspective

ACTIVITY 5.2 – Local, National and Regional Strategic Documents

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Table of Contents

1. Introduction	4
2. Country Background	6
3. Strategic Approach.....	9

Table of Figures

Figure 1: Classification of water supply resources in Lebanon	6
Figure 2: Classification of population between urban and rural areas.....	6
Figure 3: Sectoral water use in Lebanon.....	7
Figure 4: Classification of (average) household water consumption in Lebanon.....	7



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

The water supply resources in Lebanon are based on conventional water resources, reflecting the relative abundance of natural freshwater resources in the country. Non Conventional Water Resources such as sea-water desalination and wastewater treatment and reuse do not form part of the National Water Supply mix.

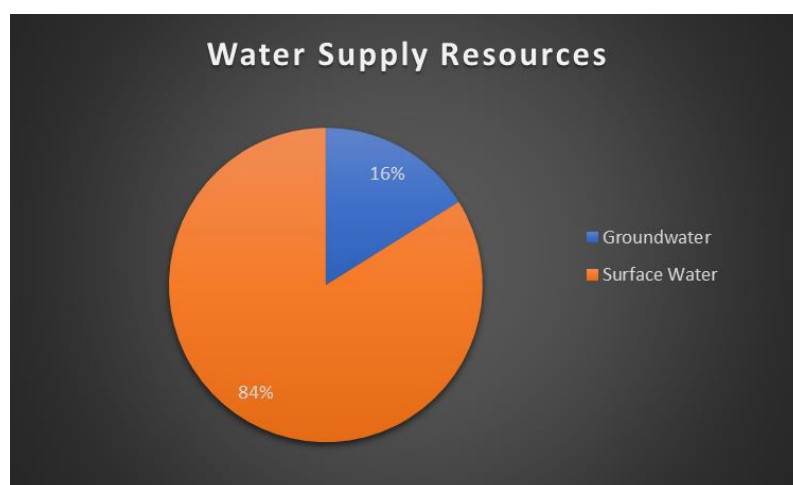


Figure 1: Classification of water supply resources in Lebanon

The population of the country is concentrated in urban centres, with over 88% of the 6.8 million persons living in urban areas. Urban areas such as the main cities are therefore expected to be the main hotspots of municipal water demand in the country.

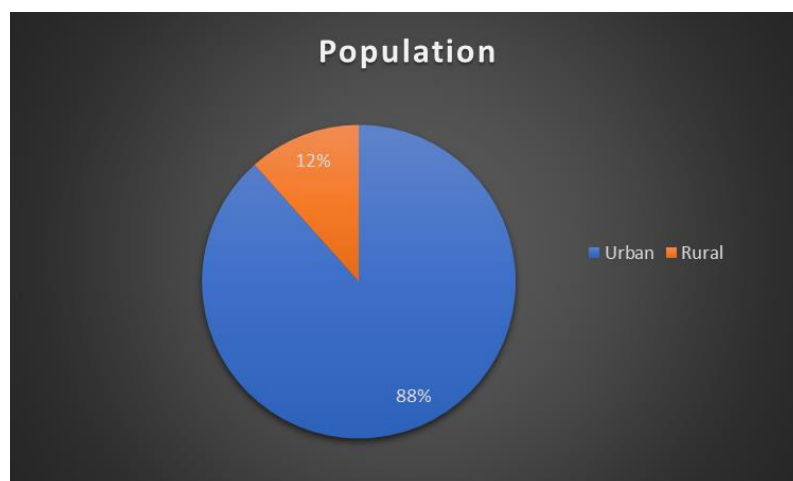


Figure 2: Classification of population between urban and rural areas



Municipal water use accounts for around 36% of the national water demand in Lebanon. The largest water consuming sector is the agricultural sector with around a 46% share of the national water demand.

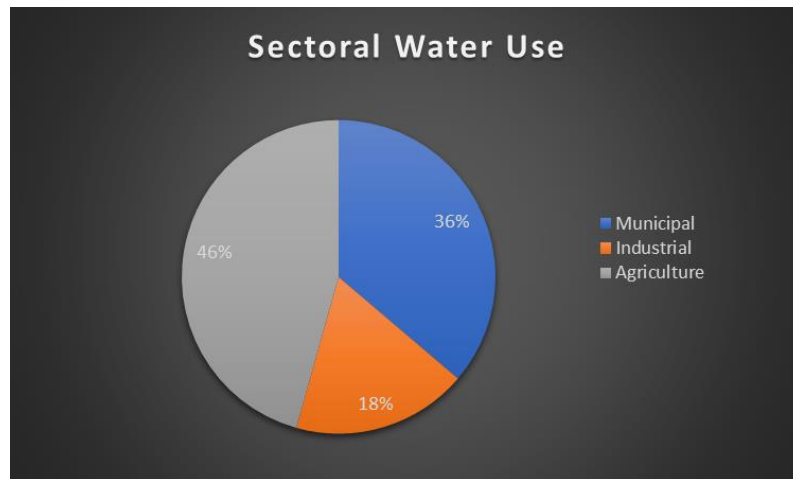


Figure 3: Sectoral water use in Lebanon

Household water use follows similar trends as other Mediterranean countries, where second class (non potable) water can address up to 50% of the household water needs such as toilet flushing, washing and garden irrigation, thereby opening up opportunities for the use of greywaters generated on site. The per capita consumption of water in Lebanon's urban areas stands at around 200 litres per capita per day. This goes down to 100 litres per capita per day in rural areas.

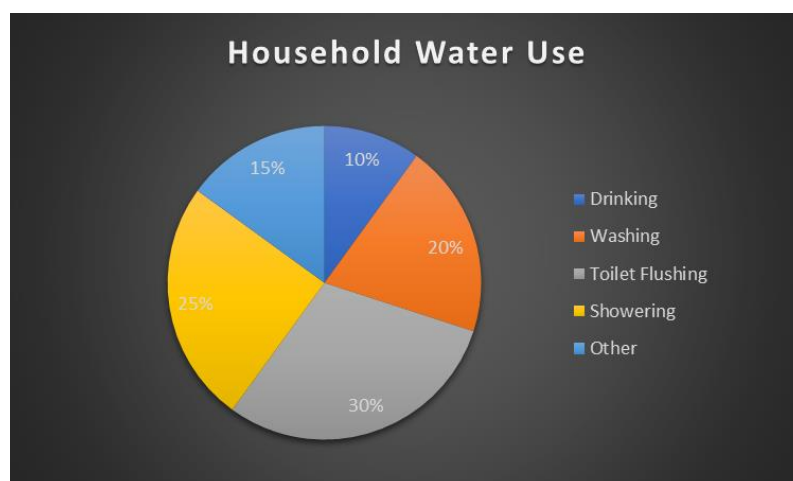


Figure 4: Classification of (average) household water consumption in Lebanon



Urban water users pay a flat annual rate on the basis of a consumption of one cubic metre per day. In 2022, the government approve a new Water Establishments' tariff for the annual water bill of between 8.1 and 9.89 Euro per household per year for a maximum of 1 cubic meter a day – an increase of between 268-335%. A tiered tariff is being developed but requires further development and parliamentary approval to be applied.

The main Government institutions that might be involved in permitting NCWR applications in Lebanon are the Ministry of Energy and Water (MoEW), the Council for Development and Reconstruction (CDR), and four regional water establishments (NLWE in North Lebanon, SLWE in South Lebanon, BWE in Bekaa BMLWE in Beirut Mount Lebanon) and the Litani River Authority (LRA). In addition to local municipalities, the Ministry of Public Health, the Ministry of Public Works and Transportation (including the Council for Urban Planning) and the Ministry of the Interior and Municipalities would also be involved at different levels in NCWR planning and implementation.



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 Lebanon, based on the following four measure typologies:

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

(i) Implementation Actions

In view of the fact that Non Conventional Water Resources do not form part of Lebanon's freshwater resource base, the undertaking of a water demand assessment to assess the capacity of natural freshwater resources to sustainably meet demand up to 2050 is recommended. Investments in utility scale NCWR solutions could be considered based on the result of this assessment.

Additionally, the following actions are recommended to promote the adoption of NCWR solutions at the point of use:

- 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 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

A review of the following national regulations with a view of consolidating them into a technical guideline (code) for the application of NCWR solutions is recommended.

Ministry of Energy and Water Circular No.83/2009 on Rainwater Harvesting: This circular provides guidelines and regulations for the implementation of rainwater harvesting systems, particularly in urban areas. It outlines technical requirements and procedures for capturing, storing and utilizing rainwater.

Ministry of Energy and Water Circular No.115/2016 on Reclaimed Water Reuse: This circular promotes the use of reclaimed water (treated wastewater) for agricultural irrigation and other non-potable purposes. It establishes guidelines and criteria for the safe and controlled reuse of reclaimed water.

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

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 of Energy and Water 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 Energy and Water of Lebanon to enable the actions to be integrated in the national water management plan.