



Report on the outcomes of the participatory approach and the indicative policy targets and PoM of the Nahr El-Kelb River Basin

SWIM and Horizon 2020 Support Mechanism

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ABBREVIATIONS

BMLWE	Beirut-Mount Lebanon Water Establishment
CDR	Council for Development and Reconstruction
GWR	Greywater Reuse
m.s.l.	Mean Sea Level
MCM	Million Cubic Meters
Mm3	Million Cubic Meters
MoA	Ministry of Agriculture
MoEW	Ministry of Energy and Water
MoE	Ministry of Environment
NGO	Non-Governmental Organization
RB	River Basin
RWH	Rainwater Harvesting
WWTP	Wastewater Treatment Plan
WRMM	Water Resources Management Models



EXECUTIVE SUMMARY

The current report is related to the SWIM-H2020 SM expert facility activity EFS-LB-1: “IWRM at the river basin scale, with a focus on capacity building and implementation aspects” and aspires overall to support aspects of policy development and reform, and to provide institutional training, technical assistance and capacity building, through a series of sub-activities. The report presents the outcomes of the participatory process implemented with the stakeholders of the Nahr El-Kelb river basin towards defining indicative policy targets and related measures to mitigate the problem of unmet demand in the Nahr El-Kelb RB, following an assessment of the current and future water balance in the basin which highlighted the issues of prevailing unmet demands in the urban and agricultural sectors. This assessment analyzed the water balance in the Nahr El-Kelb basin on the basis of a semi-distributed physical-based water resources management model developed in WEAP, looking at the reference 2000-2017 and future 2020-2040 periods, and evaluated (through model simulation) the cost-effectiveness on a bundle of demand management measures for the urban and agricultural sectors.

The annual unmet demand (as estimated by the WEAP model) in all the demand sites in the Nahr El-Kelb basin was about 3.7 Mm³/year on average, ranging from 1 to 6 Mm³/year depending on the climate variability. Out of these 3.7 Mm³, about 1.1 Mm³ (i.e. ~30%) is the urban unmet demand, and 2.6 Mm³/year (i.e. ~70%) is the agricultural unmet demand. In the year 2018 the total unmet demand (all sectors) reached 5.47 Mm³/year. The average annual unmet demand will increase in the future 2020-2040 period, and will reach about 6 Mm³/year on average, i.e. a 62% increase (ranging from 1.4 to 15.4 Mm³/year), with the highest unmet demands occur in July-September. The highest increase, about 135%, is expected in the urban unmet demand which will reach 2.5 Mm³/year on average. The agricultural unmet demand will increase about 33%, reaching 3.5 Mm³/year on average. In view of this projected increase in the unmet demand in both sectors it is paramount to implement demand management measures (either water saving or increase supply measures) to mitigate the problem.

Two Consultation Workshops have been organized by the MoEW for this purpose in order to mobilize the participatory process with the stakeholders. In this context, the objectives of the participatory approach with the stakeholders included three sub-objectives:

1. Assess the level of awareness of the Nahr El-Kelb stakeholders on the problem of unmet demand in the basin, its drivers and root causes, and future projection (Step 0).
2. Discuss and select a mix of measures (first screening) to be simulated in the WEAP Nahr El-Kelb model, in order to safeguard their relevance and acceptability (Step 1).
3. Define relevant policy targets and an associated Programme of Measures (PoMs) in the Nahr El-Kelb based on results of the cost-effectiveness analysis that has been previously performed for the screened measures of Step 1 within the WEAP model (Step 2).
4. Jointly discuss the additional and follow-up actions needed.



In line with the aforementioned objectives, the first workshop focused on the screening and selection of plausible demand management measures to be subsequently simulated in the physical-based water resources management model of the basin developed in WEAP, while the second workshop focused on the definition of policy targets based on the results of the ex-ante cost-effectiveness analysis of the measures simulated in the Nahr El-Kelb WEAP model. The measures selected for simulation included options for the urban sector, namely the installation of low water using fixtures and appliances (low flow taps and shower heads, etc.), on-site Domestic Greywater Reuse (GWR) and on-site Rainwater Harvesting (houses, hotels, villages), as well as options for the agricultural sector, namely the transition to drip irrigation systems and to closed pipes. Additional measures have been selected for increasing supply at the meso-scale and the marco-scale, namely the investigation of building detention/ retention ponds, dams and wastewater treatment plans.

As a result of the participatory process with the stakeholders a set of policy targets have been defined for the Nahr El-Kelb river basins, to be subsequently presented in a Policy Document, with the purpose of mitigating the issues of unmet demand and the prevailing water stress conditions in the basin which can affect socio-economic growth and welfare. These policy targets seek to:

- Introduce domestic water saving of 15%
- Increase irrigation efficiency by 10-12% (mixed field application and conveyance efficiencies)
- Promote rainwater harvesting at altitudes of 700m and below
- Explore the potential of detention ponds for irrigation/ capturing also snowmelt in the higher areas (either at individual or collective scale)
- Investigate the construction on rainwater harvesting lakes of 200-500 m³ for irrigation
- Wastewater reuse to supply at least 10 Mm³/yr for irrigation to cover current demands. If we want to “free-up” potable water, then a larger amount should be provided through wastewater reuse



1. INTRODUCTION

The current report is related to the SWIM-H2020 SM expert facility activity EFS-LB-1: “IWRM at the river basin scale, with a focus on capacity building and implementation aspects” and builds on the respective Project Identity Form (PIF). The activity falls under the SWIM theme “Decentralized water management and Growth” and aspires overall to support aspects of policy development and reform, and to provide institutional training, technical assistance and capacity building, through a series of sub-activities.

The current report presents the outcomes of the participatory process with the stakeholders of the Nahr El-Kelb river basin towards defining indicative policy targets and related measures the Nahr El-Kelb RB, following an assessment of the current and future water balance in the basin which highlighted the issues of prevailing unmet demands in the urban and agricultural sectors.

Two Consultation Workshops have been organized for this purpose by the MoEW in order to mobilize the participatory process with the stakeholders. The first workshop focused on the screening and selection of plausible demand management measures to be subsequently simulated in the physical-based water resources management model of the basin developed in WEAP, while the second focused on the definition of policy targets based on the results of the ex-ante cost-effectiveness analysis of the measures simulated in the Nahr El-Kelb WEAP model.

2. BACKGROUND AND OBJECTIVES

2.1 THE STUDY AREA: THE NAHR EL-KELB RIVER BASIN

The Nahr El-Kelb River Basin is located on the windward part of Mount Lebanon. The Basin has an area of 287 km². Elevation ranges from 0 m.s.l. (mean sea level) at the basin outflow in the Mediterranean Sea to 2,626 m.s.l. (mean sea level) at Mnt. Sannine. Climate is typical Mediterranean with precipitation falling between October and May. Most precipitation is observed between December and March. Precipitation above 1,200 m.s.l. (mean sea level) falls as snow. Precipitation is enhanced topographically and has a high spatial and inter-annual variability. The average estimated annual precipitation for the time period 2000-2017 ranged from 570 mm in the coastal part to 2,750 in the mountain regions.

The major land cover in the basin is woodland (34% of the basin total area) followed by grassland (27%). Agriculture land use is 10.6%, urban areas occupy around 10%, while the remainder of the basin area is bare rocks and soils.

The basin is managed by the Beirut and Mount Lebanon Water Establishment (BMLWE). Population estimates for 2017 are about 190,000 inhabitants. Water from the Jeita springs, at 60 m.s.l. (mean sea level), supplies approximately 60% of Beirut’s fresh water demand, which makes this basin of major source of water for around 2 million people (around 35% of Lebanon's total population).

The main challenges in the basin with regards to water management can be summarized as follow:



- Water availability is dependent on the seasonal precipitation and the high karstification which has an impact on the discharge of most springs. Spring discharge has a high seasonal variability ranging from 0-3.7 m³/sec during the dry season (June - November) to 1.9 - 9.6 m³/sec between February and May.
- Water demand increases during the summer months with increasing demands from urban areas and agricultural lands. Water stress is more frequent during dry years. There is a limitation in the quantification of water demand, water supply, and water consumption which limits the proper assessment of the water imbalance (i.e. the difference between water demand and water availability).
- Water contamination increases with the increase of urban and agricultural activities at mid-elevation to lowland areas and impacts the usability of water in downstream areas. There is a limited competition between water users due to the limited agricultural practices in the basin. The major impacts are related to the water available for transfer to the Beirut area from the Spring of Jeita.

A water balance model was developed for the El-Kelb basin for the reference period 2000-2017, for 19 sub-catchments and 15 demand sites in the basin, in order to assess water balance in the basin and identify the percentage unmet demand (i.e. the water demand that fails to be satisfied by the existing water availability). A simulation for the future period 2020-2040 was also performed. The model results demonstrated that the water supply in the basin cannot meet all demands, resulting in an unmet demand every year. The annual unmet demand (as estimated by the WEAP model) in all the demand sites in the Nahr El-Kelb basin was about 3.7 Mm³/year on average, ranging from 1 to 6 Mm³/year depending on the climate variability. Out of these 3.7 Mm³, about 1.1 Mm³ (i.e. ~30%) is the urban unmet demand, and 2.6 Mm³/year (i.e. ~70%) is the agricultural unmet demand. In the year 2018 the total unmet demand (all sectors) reached 5.47 Mm³/year. The average annual unmet demand will increase in the future 2020-2040 period, and will reach about 6 Mm³/year on average, i.e. a 62% increase (ranging from 1.4 to 15.4 Mm³/year), with the highest unmet demands occur in July-September. The highest increase, about 135%, is expected in the urban unmet demand which will reach 2.5 Mm³/year on average. The agricultural unmet demand will increase about 33%, reaching 3.5 Mm³/year on average. In view of this projected increase in the unmet demand in both sectors it is paramount to implement demand management measures (either water saving or increase supply measures) to mitigate the problem, which is advised to be selected on the basis of an ex-ante evaluation of their cost-effectiveness and through a consultation process with the competent stakeholders.

2.2 OBJECTIVES OF THE PARTICIPATORY APPROACH

Evidence on the impacts of applied response measures is generally limited and no concrete conclusions can be drawn on their effectiveness (Schmidt and Benitez, 2012). It is thus important to simulate response measures (and a bundle of them) against the physical system, in order to test their application and assess their true potential under specific conditions and constraints. The process of testing response measures can be underpinned by their simulation in a physical-based distributed



water resources management model (WRMM), which can capture all the salient features of water availability and demand per source and user (Kossida, 2015). To ex-ante assess the impact of these measures, the cost-effectiveness function of water saved (or water gained) versus investment cost must be investigated for each measure and mix of measures. Each measure comes with a potential water saving (or water gain) and an associated investment cost. On top of the results of the modelling approach, additional socio-economic factors come into interplay, such as the readiness of the technological solution, the social acceptability, the equitability, any constraints related to the implementation of the measures, etc. which can facilitate or impede the uptake and effectiveness of the measure. It is thus of paramount importance to stimulate a discussion with the local stakeholders. Who bring in their local knowledge and expertise, and screen through the results of the modelling approach to verify the applicability of the findings, or highlight their constraints. In this context, the objectives of the participatory approach included three sub-objectives:

5. Assess the level of awareness of the Nahr El-Kelb stakeholders on the problem of unmet demand in the basin, its drivers and root causes, and future projection (Step 0).
6. Discuss and select a mix of measures (first screening) to be simulated in the WEAP Nahr El-Kelb model, in order to safeguard their relevance and acceptability (Step 1).
7. Define relevant policy targets and an associated Programme of Measures (PoMs) in the Nahr El-Kelb based on results of the cost-effectiveness analysis that has been previously performed for the screened measures of Step 1 within the WEAP model (Step 2).
8. Discuss additional and follow-up actions needed.

3. METHODOLOGY AND STRUCTURE OF THE PARTICIPATORY PROCESS

The guiding principle of this participatory approach was the “science to policy interfacing”. The science (i.e. Nahr El-Kelb river basis modelling in WEAP) provided the necessary evidence base, and shed light into the drivers of the experienced unmet demand in the basin. Furthermore, it supported the ex-ante assessment of the cost-effectiveness of a bundle of demand management measures (both for the urban and agricultural sectors) through modelling and simulation in the physical-based Nahr El-Kelb WEAP model. The policy sphere comes now to scrutinize these findings, verify their level of implementability in practice, as delineated by the local context and practical constraints, and elucidate a set of policy relevant targets.

In more detail, the assessment and trends in the unmet demand as depicted by the WEAP model subsequently guided the design and testing (via simulation) of a bundle of measures (technical and/or institutional), with the purpose of selecting the most cost-effective ones, and subsequently defining relevant policy targets (on the basis of specific criteria) through a stakeholders’ process. These policy targets can now be communicated upstream to the central decision-making level (i.e. the Ministry) with the purpose of being integrated into development frameworks and action plans related to the Water Law (and other sectors).



The identification and mobilization of the relevant stakeholders has been carried out by the MoEW, and the following stakeholders have been involved in the process:

Ministry of Energy and Water (MoEW) – different departments, the Ministry of Environment (MoE), the Ministry of Agriculture (MoA), the Beirut-Mount Lebanon Water Establishment (BMLWE), the Municipality of Jeita, the NGO Acted.

The delivery mechanism involved 2 Consultation Workshop as described below:

- 1st Participatory Workshop with stakeholders to discuss measures to reduce the unmet demand in Nahr El-Kelb River Basin, held on 06 July 2018 in Beirut
- 2nd Consultation Workshop with stakeholders to define indicative policy targets and a Programme of Measures in the Nahr Elkelb River Basin, held on 14th March in Beirut

Both workshop were designed to be participatory and interactive, making use of the knowledge and expertise of the participants including: knowledge infusion (presentations), structured discussion, interactive question & answer, and facilitated experience sharing allowing the exchange of local and national perspectives. They have been structured, the first part including presentations of the scientific-based results of the modeling work, and the second part including interactive discussions leading to decisions (of the preliminary list of measures to be tested in WEAP and of the policy-relevant targets respectively). Relevant Input Questionnaire (IQ) have also been distributed and collected by the Consultant during the workshop to facilitate the participatory process of the workshop.

4. CONSULTATION WORKSHOPS WITH THE STAKEHOLDERS (MAIN POINTS AND DISCUSSIONS)

The objectives, main discussion points and outcomes of the 2 Consultation Workshops are presented in the following sections.

4.1 1st Consultation Workshop

The objective of the 1st Consultation Workshop, held on 06/07/2018 in the MoEW in Beirut, was to bring together stakeholders who are involved in water allocation, management and planning and in the Nahr El-Kelb river basin and interactively discuss on potential measures which can reduce the problem of unmet demand in the basin. Unmet demand is the result of the imbalance between water demand and water availability, when demand exceeds the availability of water resources. An analysis of the unmet demand (magnitude, extend, etc.) as calculated from the WEAP model for the reference period 2000-2017 and for the future 2020-2040 has been presented to the participant to kick-off the discussion. It was further explained that to mitigate this problem a variety of measures (technical, institutional, economic, etc.) can be implemented, opting to either reduce demand (i.e. water saving measures), or increase supply (i.e. wastewater reuse, rainwater harvesting, etc.), and/or both, each one having relevant costs and benefits. A bundle of such measures has been presented to the



workshop participants and an interactive discussion took place in order to collect input and feedback on possible measures they felt that were suitable for mitigating the problem of water imbalance in Nahr El-Kelb river basin. The overall goal was to reach a consensus and propose a preliminary list of measures which adequately capture specific local and national priorities, and are considered feasible and socially acceptable. These measures would then be simulated and evaluated in the WEAP model to assess their cost-effectiveness.

The participants from the Ministry of Energy and Water (MoEW), the Ministry of Environment (MoE), the Ministry of Agriculture (MoA), the Beirut-Mount Lebanon Water Establishment (BMLWE) and the SWIM-H2020 SM team engaged in an interactive discussion and reached a consensus regarding the adaptation measures (reduce demand and increase supply measures) which would be meaningful to simulate in the Nahr El-Kelb basin in order to assess their impact on the water balance of the basin and on the potential reduction of the unmet demand. As a result of this participatory approach, the following measures have been selected (to be flowingly simulated), which concern the domestic and agricultural sectors, while their scale of application varies from micro to marco-scale (Table 4-1). Some of these measures aim at introducing water savings (U1, A1, A2), while others at increasing supply (U2, U3, U4, U5, U6, A3, C1).

Table 4-1: Selected measures to be simulated in the Nahr El-Kelb River Basin for the domestic and agricultural sectors

Sector / Scale	Domestic/ Urban	Agriculture	Cross-Cutting
Micro-scale	U1. Low water using fixtures and appliances (low flow taps and shower heads, etc.) (combined with awareness campaigns) U2. Domestic Greywater Reuse (GWR) on-site (houses and hotels) in villages U3. Rainwater Harvesting (RWH) on-site (houses, hotels, villages)	A1. Precision agriculture at the farm level (combined with education on crop productivity) A2. Drip irrigation at the farm level	
Meso-scale	U4. Detention/ Retention ponds (small damming and RWH) in urban areas U5. The WWTP of Bourj Hammoud is quite downstream so this water cannot be reused (needs to be pumped up). Maybe divert it to Beirut for some re-use?	A3. Detention/ Retention ponds (small damming and RWH) in agricultural areas	
Macro-scale			C1. Dams



During the discussion the following common understanding has been developed: The bundle of measures investigated could benchmark the effect of an “alternative policy” in the Nahr El-Kelb River Basin focused on the reduction of unmet demand across the main economic sectors. It is yet clear, that simulating each and every measure and technology is a time consuming process, while consensus on the optimal mix of measures requires the additional application of an optimization process, explicitly tuned for the specific water system, as well as the involvement of stakeholders, in order to promote ownership and responsibility, and facilitate the internalization of the programme of measures (PoM) in development frameworks. While this ex-ante assessment is deemed important prior to any decision of implementation of the measures, it bears some uncertainties: socio-economic factors always come into interplay, such as the readiness of the technological solution, the social acceptability, the equitability, constraints related to the implementation of the measures, etc., which can facilitate or impede the uptake and effectiveness of the measures. People’s behavior is also an unpredictable factor, thus it is necessary that the measures are combined with campaigns to increase public awareness and motivation. Finally, it is always recommended to perform ex-post assessments of the measures based on monitored data after their implementation to evaluate their actual effectiveness and redesign or fine-tune them if needed.

Key Outcomes:

- The participants were very engaged and motivated, and the discussion was very fruitful and constructive. Exchanges between the BMLWE and the MoEW were extremely helpful for both sides, and allowed for a better understanding of the WEAP Nahr El-Kelb model for both entities. Overall, the meeting was successful and the stakeholders were brought closer in a very friendly atmosphere.
- The extended presentation of the Nahr El-Kelb WEAP model allowed the participants to obtain a thorough understanding of the state of water resources and water balance in the Nahr Elkelb river basin and of the model capabilities and limitations. Valuable knowledge on the operation of the water supply system was conveyed by the BMLWE which will improve the model representation.
- The discussion on provision of some data (by the BMLWE) which are needed for improving the model’s robustness was constructive and the MoEW will immediately follow up on this.
- Participants have a common understanding of the measures suggested for the Nahr Elkelb river basin (technical aspects, economic aspects, etc.)
- The participants reached a consensus regarding the adaptation measures (reduce demand and increase supply measures) which would be meaningful to simulate in the basin, and the relevant list of measures has been drafted (as presented in Table 4-1 above)
- The meeting would have benefited from the presence of the CDR (Council for Development and Reconstruction) who deals with the wastewater treatment in the area. Unfortunately CDR didn’t manage to attend the meeting



4.2 2nd Consultation Workshop

The objective of the 2nd Consultation Workshop, held on 14/03/2019 in the MoEW in Beirut, was to bring together stakeholders who are involved in water allocation, management and planning and in the Nahr Elkelb river basin and interactively discuss on potential measures which can reduce the problem of unmet demand in the basin, and generate a potential surplus to cover additional water needs for Beirut. Unmet demand is the result of the imbalance between water demand and water availability, when demand exceeds the availability of water resources. To mitigate this problem a variety of measures (technical, institutional, economic, etc.) can be implemented, opting to either reduce demand (i.e. water saving measures), or increase supply (i.e. wastewater reuse, rainwater harvesting, etc.), and/or both, each one having relevant costs and benefits. The measures that have been selected during the 1st Consultation Workshop have been presented to the workshop participants to allow them to understand their design parameters, along with the results of the simulation of these measures in the physical-based model of the Nahr El-Kelb. An interactive discussion took place in order to collect input and feedback on possible measures the stakeholders feel that are suitable for mitigating problems of water imbalance in the basin and/or generating a water surplus for other purposes. The overall goal was to reach a consensus and propose a set of policy-relevant targets which adequately capture specific local and national priorities, and a Programme of Measures (PoM) which is considered feasible and socially acceptable. These targets and measures would then be communicated to a higher level, with the purpose of being integrated into development and financial frameworks and action plans related to the Water Law (and other relevant sectors).

The participants from the Ministry of Energy and Water (MoEW), the Ministry of Environment (MoE), the Ministry of Agriculture (MoA), the Beirut-Mount Lebanon Water Establishment (BMLWE), the Jeita Municipality, Acted NGO and the SWIM-H2020 SM team engaged in an interactive discussion and reached a consensus regarding the definition of specific policy targets for the Nahr El-Kelb basin in order to mitigate unmet demand. The developed targets are presented in the following Chapter 5.

Key Outcomes:

- The participants were very engaged and motivated, and the discussion and exchanges was very fruitful and constructive. Overall, the meeting was successful and the stakeholders were brought closer in a very friendly atmosphere.
- Participants have a improved understanding of the state of water resources and water balance in the Nahr Elkelb river basin for the reference 2000-2017 and future 2020-2040 period, and the resulting impact of the implementation of various demand management measures (water saving and increase supply measures)
- The extended presentation of the conceptualization, design and parameterization of the simulated measures allowed the participants to obtain a thorough understanding of the process and its limitations, and increase the transparency of the results.
- Participants have a common understanding of the measures suggested for the Nahr Elkelb river basin (technical aspects, economic aspects, etc.)
- The participants reached a consensus regarding the definition of policy targets, and thus asset of targets for the Nahr El-kelb has been drafted (as presented in Chapter 5 below)



- Participants have gained valuable knowledge on the process of designing and selecting measures and defining policy-relevant targets through a participatory approach
- The meeting would have been benefited from the presence of the CDR (Council for Development and Reconstruction) who deals with the wastewater treatment in the area as some key questions regarding the planned WWTPs could not be addressed. Unfortunately CDR didn't manage to attend the meeting

5. RESULTS: INDICATIVE POLICY TARGETS AND POM

As a result of the participatory process with the stakeholders a set of policy targets have been defined for the Nahr El-Kelb river basins, to be subsequently presented in a Policy Document, with the purpose of mitigating the issues of unmet demand and the prevailing water stress conditions in the basin which can affect socio-economic growth and welfare. Some additional goals have also been defined as presented below:

Policy Target for the Nahr El-Kelb River Basin

- Introduce **domestic water saving of 15%**
- Increase **irrigation efficiency by 10-12%** (mixed field application and conveyance efficiencies)
- Promote **rainwater harvesting** at altitudes of **700m and below**
- Explore the **potential of detention ponds for irrigation/** capturing also snowmelt in the higher areas (either at individual or collective scale)
- Investigate the **construction on rainwater harvesting lakes of 200-500 m³** for irrigation
- **Wastewater reuse to supply at least 10 Mm³/yr** for irrigation to cover current demands. If we want to "free-up" potable water, then a larger amount should be provided through wastewater reuse

Additional Goals for the Nahr El-Kelb River Basin

- Obtain data from the smaller wastewater treatment plans (Masterplan for small WWTPs)
- Execute wastewater treatment plan and wastewater network
- Draft a River Basin Management Plan
- Draft a Masterplan for irrigation
- Update the Masterplan for potable water, including drinking water protection zones
- Implement water metering
- Develop a Registry of all groundwater wells (incl. illegal)
- Decrease pollution (so minimize industrial land use)
- Promote the rational land use planning in the new Masterplan for land use (conflict between urban and agri. areas), limit the expansion of urban areas



- Improve Governance: Law 77/2018 - application decrees, establishment of River Basin Organization (RBO)

6. CONCLUSIONS AND POLICY RECOMMENDATIONS

This bottom-up process in defining targets and measures in the Nahr El-kelb river basin can definitely act as a pilot application, to be replicated in other river basins, so that systematic assessment of the water balance is performed, and information on needs and remedies drawn through a participatory work is communicated from the local level to the central level, to better inform the national water policy.

The participatory approach implemented has proven to be adequate in supporting the design of medium to longer-term mitigation options, helping thus to remove structural barrier, and successfully links science to decision-making, enables the definition of sectoral policy targets, and supports the development of river basin management plans providing a robust decision-support mechanism.

Governance and follow-up actions are now required in order to integrate the targets into the existing regulatory and institutional framework and proceed to implementation. These are summarized as follows:

Integration phase – Drafting of Policy Document:

- Present and disseminate the targets at the higher-level
- Define possible entry points
- Initiate instruments and mechanisms to internalize the targets
- Draft suggestions how to implement the targets in action plans, development programmes, etc.
- Identify the necessary preconditions and enabling factors

Implementation phase:

- Define the time-frame to achieve the target (long vs. short, dual framework)
- Estimate and define the resources to be secured (financial & human)
- Define the placement of the target at the appropriate level (national, subnational, regional), i.e. suitable entry points
- Define the nature of the target (binding, non-binding, conditional, pre-requisite)
- Define the enforcement method (voluntary agreement, legal requirement, obligation, financial incentives, public accountability)
- Suggest the governing bodies: River Basin Organization and other authorities as appropriate



7. REFERENCES

Kossida, M. (2015). [Methods and tools supporting operational drought risk management in water stressed areas](#). PhD Dissertation, National Technical University of Athens, School of Civil Engineering, Department of Water Resources and Environmental Engineering, December 2015.