



ACTIVITY 1.3.6

ASSESSMENT OF IWRM MONITORING INDICATORS IN SELECTED MEDITERRANEAN COUNTRIES (EGYPT, JORDAN & LEBANON)

Version	Document Title	Author	Review and Clearance
V1	ASSESSMENT OF IWRM MONITORING INDICATORS IN SELECTED MEDITERRANEAN COUNTRIES	Hosny Khordagui	Stavros Damianidis and Vangelis Constantianos



The SWIM Program (2010 – 2015)

Contributing to Sustainable Water Integrated Management in the Mediterranean

Funded by the European Commission with a total budget of approximately € 22 million, Sustainable Water Integrated Management (SWIM) is a Regional Technical Assistance Program aiming to contribute to the effective implementation and extensive dissemination of sustainable water management policies and practices in the South-Eastern Mediterranean Region in view of increasing water scarcity, combined pressures on water resources from a wide range of users, desertification processes and in connection with climate change.

The SWIM Partner Countries (PCs) are: Algeria, Egypt, Israel, Jordan, Lebanon, Libya¹, Morocco, Palestine, Syria and Tunisia.

SWIM aligns with the outcomes of the Euro-Mediterranean Ministerial Conferences on Environment (Cairo, 2006) and Water (Dead Sea, 2008) and also reflects on the four major themes of the draft Strategy for Water in the Mediterranean (SWM), mandated by the Union for the Mediterranean, namely: Water Governance; Water and Climate Change; Water Financing and; Water Demand Management and Efficiency, with particular focus on non-conventional water resources. Moreover, it is operationally linked to the objectives of the Mediterranean Component of the EU Water Initiative (MED EUWI) and complements the EC-financed Horizon 2020 Initiative to De-Pollute the Mediterranean Sea (Horizon 2020). Furthermore, SWIM links to other related regional processes, such as the Mediterranean Strategy for Sustainable Development (MSSD) and the Arab Water Strategy elaborated respectively in the framework of the Barcelona Convention and of the League of Arab States, and to on-going pertinent programs, e.g. the UNEP/MAP GEF Strategic Partnership for the Mediterranean Large Marine Ecosystem (Med-Partnership) and the World Bank GEF Sustainable Mediterranean.

The Program consists of two Components, acting as a mutually strengthening unit that supports much needed reforms and new creative approaches in relation to water management in the Mediterranean region, aiming at their wide diffusion and replication.

The two SWIM Components are:

- A Support Mechanism (SWIM-SM) funded with a budget of € 6.7 million and
- Five (5) Demonstration Projects funded with a budget of approximately € 15 million

For more information please visit <http://www.swim-sm.eu> or contact info@swim-sm.eu

¹The situation in Spring 2012 is that following formal EC decision, activities have been stalled in Syria while Libya has officially become a Partner Country of the SWIM Program



1 EXECUTIVE SUMMARY

The present publication represents the outcome of a SWIM-SM activity to track current state of monitoring the implementation of IWRM concepts in three focus countries, namely, Egypt, Jordan and Lebanon. This effort has been designed to build on the information provided by many national water relevant institutions and entities that have been concerned with developing a set of indicators that could help them better monitor the adaptation of IWRM concepts. The main objective of the present activity is to measure the degree of incorporating various dimensions of IWRM and to track the complex interactions that takes place between these dimensions when monitoring for the implementation of IWRM.

This publication should be considered only as a starting point and as a malleable tool to assist SWIM-SM PCs that may wish to develop their own national monitoring programs using indicators to measure progress towards realizing IWRM principles. In this connection, it is important to note that no set of IWRM indicators is fixed or can be final and/or conclusive. Each SWIM PC must develop and cater its national IWRM implementation indicators over time to match its own specificities depending on its priorities and subject to its available resources.

Another purpose of this activity is to inspire, motivate and also lay the foundation for further work by developing and testing a number of IWRM implementation indicators, taking advantage of the newly approved EU SWIM-II mechanism, particularly by national governments. It is our anticipation that SWIM-PCs will take advantage of the results, analysis, conclusions and recommendations represented in this publication to further advance the work on developing monitoring systems to track implementation of IWRM concepts by merging their own unique perceptions to what has already been presented.

In an effort to materialize the above mentioned objectives, SWIM-SM has assessed the current IWRM monitoring systems that are utilized in the 3 focus SWIM PCs. This assessment has provided an answer to whether the three selected SWIM PCs have credible tools and methods to track their water sector performance within an integrated context at regular intervals using a set of measurable IWRM indicators that support the national sustainable development decision making process.

The approach used to achieve the objectives was based on the development of a comprehensive questionnaire (Annex I) to collect the relevant information from each one of the three SWIM SM focus countries. SWIM-SM KE selected and compiled IWRM guiding indicators developed by international and regional organizations through a review of literature. After collection of the information, a comparison was conducted to match IWRM indicators listed in the literature with currently available ones monitored and reported by the three selected SWIM focus countries.

The questionnaire consisted of five subgroups of questions. Each sub-group is composed of a number of questions. Each question was designed to lead to the development of an IWRM implementation indicator. This set of indicators, as listed in Annex I, were selected based on their relevance to IWRM concepts and because they are descriptive of the major water issues.



The selection process was also subject to factors such as measurability of the indicators including their techno-economic feasibility and acceptability.

The questionnaire was addressed to water officials in charge with national water planning and monitoring and water relevant institutions. These included the following four institutions (or their equivalent) in each one of the three focus countries:

1. Ministry of Water and Irrigation / Water Resources Monitoring and Studies Directorate.
2. Ministry of Environment / Monitoring and Evaluation Directorate.
3. Ministry of Planning and International Cooperation / Sustainable Development Division.
4. Department of Statistics / Environmental Statistics Division.

The study revealed the following conclusions:

1. No standard monitoring mechanism for the implementation of IWRM as yet exists in the three SWIM-SM selected focus countries, whilst a monitoring system for measuring progress in managing water resources as a separate sector is well established in the three focus countries. Mechanisms for integrating socio-economic and environmental aspects in managing water resources are yet to be developed for monitoring progress towards implementation of IWRM concepts.
2. Currently, there is no mechanism in place whereby focus countries can report and share information on their progress in implementing IWRM. However a conventional mechanism for reporting water resources management as an independent separate sector does exist.
3. There is a serious inadequacy in the generation, compilation, analysis and sharing of systematic data covering fundamental aspects of IWRM such as economics, social and to a lesser extent environmental dimensions related to water resources management.
4. The three focus countries have exhibited some progress in establishing an enabling environment for the implementation of IWRM through development of policies, amending legislations and reforming some institutions. However, National water policies and water laws in focus countries reflect only few basic IWRM principles.
5. Cost recovery and economic return, in particular, are not strong elements in the management of water resources in any of the three focus countries.
6. All questionnaires' feedback indicated that adequate data and information are already available for traditional water resources management. The problem seems to be first, the accessibility and exchange of these information by decision and policy makers and second, the adequate selection, analysis, interpretation and utilization of the information in a valuable manner for decision-maker and stakeholder.
7. There are further evidences and observations from the analysis of the questionnaires that the three SWIM focus countries have not spent either much time or significant resources on the development of IWRM monitoring and evaluation protocols. Furthermore, the stakeholders have not been often involved either in the monitoring



and evaluation, or in the establishment of benchmarks and indicators for monitoring implementation of IWRM principles. The high importance of an adequate monitoring and evaluation system and the limited role of stakeholders might explain the slow progress in implementing IWRM principles.

8. Primary data on traditional water resources management and necessary to populate IWRM indicators is available to a great extent in the three focus countries. However, this wealth of information isn't invested in developing well-structured indicators to support the decision making process for sustainable water resources management.
9. In SWIM-SM focus countries, IWRM concepts are already planned and some reforms are either completed or underway. What remains is the development of a set of indicators to monitor the implementation of IWRM concepts including the incorporation of socio-economic and environmental dimensions in a balanced way.
10. The gathered information gives a clear evidence that management of water resources in the three focus countries is not giving adequate considerations to the optimization of its economic value and/or the maximization of the economic return from the available water resources. This is a grave indication that a main principle and a vital IWRM pillar is overlooked in managing water resources.



TABLE OF CONTENTS

1	EXECUTIVE SUMMARY	3
2	INTRODUCTION	8
3	SCOPE OF WORK	9
4	DEFINITIONS OF MONITORING AND EVALUATION	10
4.1	Indicators for Monitoring Planning and Indicators for Monitoring Implementation of IWRM in SWIM PCs:	11
4.1.1	Monitoring IWRM Planning	11
4.1.2	Monitoring Implementation of IWRM concept	11
4.2	Necessity of having National Monitoring and Evaluation systems for the Implementation of IWRM in SWIM PCs?	12
5	GLOBAL EXPERIENCE IN MONITORING IWRM	13
6	RESULTS	16
6.1	Indicators for the Implementation of IWRM in Jordan:	17
6.1.1	Water resources indicators relevant to monitoring the implementation of IWRM	17
6.1.2	Economic indicators relevant to monitoring implementation of IWRM	17
6.1.3	Social indicators relevant to monitoring the implementation of IWRM	18
6.1.4	Environmental indicators relevant to monitoring the implementation of IWRM	19
6.1.5	Governance indicators relevant to the implementation of IWRM concepts	19
6.1.6	Interpretations of Results:	22
6.2	INDICATORS FOR THE IMPLEMENTATION OF IWRM IN EGYPT	23
6.2.1	Water resources indicators relevant to monitoring the implementation of IWRM	23
6.2.2	Economic indicators relevant to monitoring implementation of IWRM:	24
6.2.3	Social indicators relevant to monitoring the implementation of IWRM:	24
6.2.4	Environmental indicators relevant to monitoring the implementation of IWRM	24
6.2.5	Governance indicators relevant to the implementation of IWRM concepts.	25
6.2.6	Interpretations of Results	26
6.3	Indicators for the Implementation of IWRM in Lebanon	27
6.3.1	Water resources indicators relevant to monitoring the implementation of IWRM:	27
6.3.2	Economic indicators relevant to monitoring implementation of IWRM	27
6.3.3	Social indicators relevant to monitoring the implementation of IWRM	28



6.3.4	Environmental indicators relevant to monitoring the implementation of IWRM	28
6.3.5	Governance indicators relevant to the implementation of IWRM concepts.	29
6.3.6	Interpretations of Results	31
7	MAIN CONCLUSIONS	32
8	REFERENCES	34
	ANNEX I	35



2 INTRODUCTION

Chapter 18 of Agenda 21 in the UN Conference on Environment and Development (UN CED in Rio de Janeiro, 1992) called for “the implementation of integrated approaches to the planning, management and use of water resources”. Within such a context, countries of the world were requested to report on the status of water governance at the national level, how they progressed in integrating the management of their water resources and at what level mainstreaming of water into relevant sector policies and plans.

During its last three years of implementation, SWIM-SM revealed the fact that in all SWIM-SM PCs, IWRM concepts are already planned and some reforms are either completed or underway to adopt them. However, most of the PCs are also lacking the appropriate indicators and/or systems to systematically monitor progress in the implementation of their IWRM plans and policies to ensure that the actions and measures outlined in their IWRM national plans are being realized and that adequate resources are being allocated and used effectively.

IWRM Indicators can be defined as a value derived from parameters (i.e. primary data – first tier of the information pyramid), which points to, provides information about, or describes the state of integration in water resources management, with a significance extending beyond that directly associated with a parameter value.

Fortunately, SWIM countries recognized the importance of information in decision making and several efforts were already undertaken, at national and regional levels, to develop water information and decision support systems. Unfortunately, most of these efforts appeared to be based on water sector management traditions of monitoring and reporting primary water parameters as the sole data of importance for decision making within the water sector. It was also unfortunate to observe that some SWIM PCs didn't go through the process of identifying the prominent indicators needed to rectify their IWRM plans and to convey such information in an integrated manner to policy makers at different levels, the media and the public at large. On the other hand, many attempts were undertaken by United Nations – Water (UN-Water), United Nations – Department of Economic and Social Affairs (UN-DESA), GWP and Blue Plan, etc. to identify IWRM planning indicators, however, most of these efforts didn't materialize into the selection of a specific set of indicators that can be catered to the specificities of countries of the SWIM region. Furthermore, no serious attempts were ever made in the region to identify or use IWRM implementation indicators that reflect the links between the three main pillars of IWRM (socio, economic and environment).

Indicators to monitor implementation of IWRM plans are not a simple set that fit all situations and they cannot be applied as a checklist of actions. However, pragmatic and logically sequenced institutional approaches that respond to country specificities have the greatest chance of succeeding in practice. In principle, water resource planning, management and monitoring have to be strongly tied to the country's overall sustainable development strategy, legislations and public administration framework. Furthermore, awareness and participation of stakeholders as well as gender balance need to be reflected in monitoring and reporting systems to ensure public involvement and equity.

Many SWIM PCs have focused most of their investments and efforts in the development of ‘hard’ infrastructure, but as competition for water intensifies and environmental concerns grow, the ‘softer’ governance side of IWRM became even more relevant and evident. Experience from around the world also indicates that an IWRM concept that employs the right mix of hard and soft tools is the most successful. This means that SWIM PCs who are still in the process of developing their water resources



will need to invest in developing indicators to monitor the implementation of IWRM concept in order to follow-up on the management of their water infrastructures, protect the resource from over-exploitation, pollution and more important to ensure mainstreaming and optimum socio-economic returns from their scarce water resources in addition to the protection of their aquatic environment.

Objective:

The overall objective of the present activity is to ensure if the selected three SWIM-SM PCs do possess a credible system to monitor the implementation of their IWRM plans and policies using a set of indicators that reflects the IWRM holistic approach in managing their water resources. For comparison and in order to establish a point of reference, SWIM-SM reviewed the literature and investigated the state of the art in developing and utilizing IWRM monitoring indicators as developed and recommended by international and regional organizations for ensuring sustainable water resources management.

3 SCOPE OF WORK

In order to achieve the objectives, SWIM-SM Key Expert (KE) developed a comprehensive questionnaire (Annex I) to collect the relevant information from each one of the three SWIM SM focus countries for the materialization of the objectives of the activity. The IWRM guiding indicators developed by international and regional organizations were reviewed and compiled through the examination of literature. Information collected from literature was then used to structure the questionnaire and later served as a line of reference to compare it with the currently available IWRM indicators monitored and reported by the three selected SWIM focus countries.

The developed questionnaire consisted of five subgroups of questions. Each subgroup is composed of a number of questions. Each question can lead to the development of an IWRM implementation indicator. However, this will always be subject to the specificity and environmental endowment of each focus country.

This set of indicators, as listed in Annex I, were selected based on their relevance to IWRM concepts and because they are descriptive of the major water issues. The selection process was also subject to factors such as measurability of the indicators including their techno-economic feasibility and acceptability.

The five subgroups of indicators were as follows:

- 1 Indicators that are geared towards monitoring management of water resources and that can be used to monitor the implementation of IWRM. This subgroup is composed of nine questions leading to equivalent number of potential IWRM implementation indicators.
- 2 Economic indicators relevant to monitoring implementation of IWRM. This subgroup is composed of twelve questions leading to equivalent number of potential IWRM implementation indicators that are relevant to economic dimensions of water resources management.
- 3 Social indicators relevant to monitoring the implementation of IWRM. This subgroup is composed of only four questions driving to four potential IWRM implementation indicators relevant to the social aspects of relevance to water resources management.
- 4 Environmental indicators relevant to monitoring the implementation of IWRM. This subgroup is composed of six questions driving to six potential IWRM implementation indicators relevant to environmental flow and ecological allocations in water resources management.



- 5 Governance indicators relevant to the implementation of IWRM concepts. This subgroup is composed of ten categories composed of 52 questions leading to equivalent number of potential IWRM implementation indicators that are relevant to governance for water resources management.

The questionnaire was addressed to government officials in charge of national water planning and monitoring and water relevant institutions. These included the following four institutions (or their equivalent) in each one of the focus countries:

1. Ministry of Water and Irrigation / Water Resources Monitoring and Studies Directorate
2. Ministry of Environment / Monitoring and Evaluation Directorate
3. Ministry of Planning and International Cooperation / Sustainable Development Division.
4. Department of Statistics / Environmental Statistics Division.

The interview of officials of each institution was conducted in person and the information was recorded by a local Non-Key Expert (NKE) who was engaged due to his local expertise and familiarity with water, environment and development issues in the country. The questionnaire filled by the Ministry of Water Resources in the three focus countries was considered as the principle reference questionnaire for analysis and interpretation of results. The other three questionnaires were mainly used to test the degree of coordination, harmonization and to check on sharing of information among the water relevant sectors.

4 DEFINITIONS OF MONITORING AND EVALUATION

According to Organization for Economic Co-operation and Development (OECD - 2002) monitoring is defined as “a continuous function that uses the systematic collection of data on specified indicators to provide management and the main stakeholders of an ongoing development intervention with indications on the extent of progress and achievement of objectives and progress in the use of allocated funds”.

Monitoring implementation of IWRM plans involves collecting, analyzing, interpreting, sharing and reporting water relevant data on inputs, actions, outputs, results and impacts, with the aim of supporting effective sustainable water resources management within an integrated context. Monitoring implementation objective is mainly to provide water practitioners, executives, policies and decision makers, stakeholders, and the public at large with systematic feedback on progress in implementation, results achieved and early warning indicators of problems that need to be addressed and rectified. According to (Gilles et al., 2006) monitoring is mainly for reporting on actual performance against what was planned or anticipated.

On the other hand, evaluation can be defined as a time bound and periodic exercise in search to provide credible and useful information to answer specific questions to guide decision making by staff, managers and policy makers (Presidency 2007). Evaluation including analysis and interpretation of data and indicators will provide credible information that is useful in identifying gaps, challenges and in incorporating lessons learnt into the decision making process. Based on evaluations and interpretation, water officials will be in a better position to assess the sector’s efficacy, impact, relevance and sustainability. Evaluation and interpretation of water data and indicators are proved to be useful tools to examine if the IWRM concepts and assumptions were effective within the country specificities. It will also provide answers to decision makers on what worked, what did not work and why it didn’t work. It



will also provide indications to the potentially successful solutions for specific problems. In all cases, monitoring and evaluation require the use of indicators.

4.1 Indicators for Monitoring Planning and Indicators for Monitoring Implementation of IWRM in SWIM PCs:

Measuring progress towards IWRM must seek to capture and take into account the wide range of efforts made by SWIM-PCs to improve their water resources management in order to balance economic, social and environmental requirements.

4.1.1 Monitoring IWRM Planning

It is the process of monitoring how national and/or local strategies and plans were developed to adopt IWRM concepts in management of water resources. Despite their importance, once proper IWRM plans are in place IWRM planning indicators become of limited use.

Example of Indicators for monitoring **IWRM Planning**:

1. Political commitments towards IWRM concept.
2. Degree and level of multi-stakeholders participation in planning for IWRM.
3. Gender balance in preparing IWRM plan.
4. Number of water-relevant sectors involved in planning for IWRM using a holistic approach.
5. Socio-economic and environmental interests are integrated in IWRM plan.
6. Commitments of water relevant sectors towards IWRM concept.
7. Budget allocated to implement IWRM concept.
8. Capacity development identified to enable the implementation of IWRM plan.
9. Role of each water relevant sector in the IWRM plan is identified.
10. Adequacy of relevant information for planning IWRM.
11. Institutional and legislative reforms to implement IWRM concept.
12. Inclusion of national and sectoral strategies in IWRM plans that contribute to its promotion.

4.1.2 Monitoring Implementation of IWRM concept

Indicators for monitoring implementation IWRM concept is the process of assessing & reporting on actual progress in adopting IWRM concepts in managing water resources in relevant sectors.

Example of Indicators for monitoring **IWRM implementation**:

In implementing the IWRM concepts in managing water resources:

1. IWRM concept reflected in National constitutions or policies.
2. IWRM concept reflected in National water legislations.
3. Institutional framework conducive to IWRM concept.
4. Cross-sectoral water management coordination body in place and functional.



5. Institutional capacity developed to implement IWRM concept.
6. Adequacy of qualified human resources to implement IWRM concept.

Economic dimensions in implementing IWRM:

Economic aspects in implementing IWRM that reflect if SWIM-PC are producing optimum economic return or value from each m³ of water that is distributed, used, or stored. Examples of such indicators:

1. External water footprint to total water footprint in m³/capita/yr,
2. Change of water productivity in agriculture in US\$/cap/m³,
3. Percent change in hydropower productivity,
4. Change in productivity of industrial sector US\$/cap/m³, etc.

Social dimensions in implementing IWRM:

Social aspects of implementing IWRM that reflect if SWIM-PCs social dimensions and equity are considered in their water uses. Examples of such indicators:

1. Percent change in cases of water borne diseases or outbreaks,
2. Percent change in population using improved drinking water services,
3. Percent change in population using improved sanitation services, etc.

Environmental dimensions in implementing IWRM:

Environmental aspects of implementing IWRM that reflect if SWIM-PCs are considering environmental flow in their water resources uses. Examples of such indicators:

1. Degree of enhancement in water quality index (if available),
2. Percent reduction in BOD in fresh surface water,
3. Percent improvement in aquifers quality in terms of salinity and/or nitrates,
4. Percent change in biodiversity in surface water,
5. US\$ spent in constructing, maintaining and/or upgrading wastewater treatment plants,
6. number of threatened species in aquatic environment,
7. Pollution loads in tons/year to water bodies, etc.

4.2 Necessity of having National Monitoring and Evaluation systems for the Implementation of IWRM in SWIM PCs

Reason 1: Most SWIM PCs do not possess the appropriate indicators to monitor progress in the implementation of their IWRM policies to ensure that the actions and measures outlined in their IWRM national plans are being realized and that adequate resources are being allocated and used effectively.

Reason 2: Recognizing the importance of information in decision making, several efforts were undertaken, at national and regional levels, to develop water information systems. Unfortunately, these efforts were based on water sector management traditions of monitoring and reporting primary water parameters as the only data of importance for decision making without giving adequate considerations to socio-economic and/or environmental dimensions.



Reason 3: Most of the SWIM PCs don't go through the experience of identifying the prominent indicators needed to rectify their IWRM plans and to convey such information to policy makers at different levels, the media and the public at large.

Reason 4: Many attempts were undertaken by UN-Water, UN-DESA, GWP and Blue Plan, etc. to identify IWRM indicators, however, most of these efforts didn't materialize into an agreeable and/or tested selection of a specific set of indicators that can be catered to the specificities of countries of the SWIM region.

Reason 5: No attempt was ever reported in the region to identify IWRM indicators that reflect the links between the three main pillars of IWRM (socio, economic and environment).

5 GLOBAL EXPERIENCE IN MONITORING IWRM

IWRM was brought to light as an international priority since the Rio Summit in 1992. The concept gained momentum during the World Summit for Sustainable Development (WSSD) in Johannesburg in 2002. During WSSD, countries agreed to set a target to develop IWRM plans by 2005. This target created an international endorsement of IWRM concept as an efficient principle for improving water management. Most countries of the world including SWIM-SM PCs developed IWRM plans. However, implementation of these plans is at very diverse stages. In order to follow-up and monitor the degree of implementation of these plans in different countries, it was decided by UN Water and Global Water Partnership (GWP) to carry out global surveys to assess progress towards achieving the WSSD 2005-target on implementing IWRM.

IWRM indicators were often defined as indicators originating from different water-relevant sub-sectors pooled and/or aggregated together. Lack of useful indicators was assessed by water experts as a limiting factor to monitor progress on IWRM around the world and UNEP-DHI was entrusted to support UN Water in developing a set of relevant IWRM indicators for monitoring and reporting national progress towards IWRM to be included in the 3rd World Water Development Report. It was also decided by UNEP-DHI and UN Water to supplement the global surveys with a set of indicators that had undergone a pilot testing in selected, relevant countries. The main objective of such approach was to examine the challenges related to catering the indicators to specific conditions and environmental endowments in the different countries.

Most of the IWRM Indicators development were based on UNEP-DHI's experiences combined with a general screening of traditional indicators commonly used for water management. This effort culminated in the compilation of a list of 50 indicators that were checked for their relevance and applicability under specific circumstances.

According to UNEP-DHI Center,

[http://www.gwp.org/Global/ToolBox/References/A%20Structure%20for%20the%20Monitoring%20of%20Processes.%20Leading%20Towards%20IWRM%20\(UNEPDHI,%202007\)%20.pdf](http://www.gwp.org/Global/ToolBox/References/A%20Structure%20for%20the%20Monitoring%20of%20Processes.%20Leading%20Towards%20IWRM%20(UNEPDHI,%202007)%20.pdf), indicators for monitoring IWRM consists of four orders:

1st order: IWRM is planned on paper. This order is applicable where IWRM has been adopted. This can be in the form of a water reform plan, a resolution, a policy or a legislation adopting key elements of IWRM.

2nd order: IWRM reforms take place. This higher order is applicable when reforms are being implemented such as creating river basin organizations, establishing higher water councils for



coordinating water issues, decentralization of water management and/or reform institutions to mainstream water across relevant sectors.

3rd order: IWRM has been applicable on the ground and water is better managed. This order is pertinent when institutional and legislative reforms have already been implemented, necessary institutions have been established and water is being managed according to IWRM concepts.

4th order: Economical, environmental and social equity concerns are balanced and fully integrated in water resources management. This order is applicable when sustainability in water management is fully realized.

In most SWIM-SM countries, IWRM concepts are already planned and some reforms are either completed or underway. What remains is the development of a set of indicators to monitoring the third and fourth orders. SWIM PCs strive towards this goal and eventually hope to reach it. According to Dubreuil-Imbert (2013) from Plan Blue, in most South Mediterranean countries, the IWRM implementation and results are still at the first and second order.

According to Plan Bleu (2013),

http://planbleu.org/sites/default/files/upload/files/seminaire_gire_water_indicators.pdf

IWRM indicators can be grouped under 6 thematic areas:

1. Water resources availability (context indicators)
2. Water uses and allocation
3. Water demand management
4. Pollution control
5. Monitoring and information management
6. Level of IWRM implementation (governance indicators).

It is important to note that the first 5 thematic areas are already developed and many indicators are already referenced in literature as illustrated below. Meanwhile, thematic group number six is not well developed yet. Very few and incomplete attempts were made without confirmed conclusion. However, there might be some misconception calling IWRM implementation indicators as “governance indicators” for the following reasons:

1. Governance indicators encompass highly relevant but also sensible issues such as equity, transparency, accountability, right to know, right to participate, equity, right to access justice, etc.
2. In most SWIM-PCs, these indicators are either not monitored or extremely difficult to monitor. Therefore, it will be a waste of time and resources to develop IWRM governance indicators that will not be populated due to lack of such information.
3. In the SWIM region, many countries would often consider some of these issues as controversial and sometimes of political sensitivity.

According to Larsen and Feilberg (2011), the initial testing of the 50 indicators at 1st and 2nd stage were applied in Zambia and Bangladesh in cooperation with national water management institutions. Based on feedback from the participants the 50 indicators were narrowed down to a more easily applicable set of 16 indicators designed to be globally applicable. The SMART criteria were used for testing in the



countries whether participants found the indicators to be **Specific, Measurable, Attainable, Relevant/Realistic and Timely**. These indicators can be used for monitoring IWRM at the implementation level, where the focus is on adoption and implementation of reforms.

High Priority IWRM implementation Indicators (screening made by using the aforementioned SMART criteria) can be listed as follows:

1. IWRM principles in the national water policy
2. IWRM in national budgets
3. IWRM reflected in legislation & regulations
4. Gender mainstreaming
5. Stakeholder involvement
6. Institutional analysis and plans
7. IWRM & climate adaptation, vulnerability and risks
8. IWRM status (vision, roadmap, action portfolio, degree of implementation) and assessment of water resources
9. Information management requirements
10. Cost recovery
11. Stakeholder awareness
12. IWRM in other plans
13. Impact assessments and mitigation procedures to protect water resources
14. Capacity building
15. IWRM infrastructure implementation projects
16. Decentralization

Further testing and refinement of the IWRM implementation indicators based on the testing, along with inclusion of a framework for monitoring and reporting socio-economic and environmental benefits associated with the implementation of IWRM principles and resulting in the improvement of water management is still among the challenges for future activities related to indicator development.

Based on the work conducted by Larsen and Feilberg (2011), SWIM-SM project attempted (Khordagui 2012) to compile a set of IWRM indicators to track the degree of observance for the IWRM principles in managing water resources in SWIM-PCs. This attempt resulted in the identification of 39 different IWRM indicators under 10 sub-groups. These indicators were not subject to testing at national level.

At present, several monitoring efforts have been made by different actors to assess the degree of achievement towards agreed goals on IWRM. Most of these activities have provided valuable experience in monitoring IWRM planning processes, but methodologies are different and very few have gone the step further to evaluate outcomes of the processes.

Example of past relevant work on IWRM monitoring includes the following:

1. UN-Water taskforce on indicators, monitoring and reporting.
<http://www.unwater.org/activities/task-forces/indicators/en/>



2. World Water Assessment Program indicators in World Water Development Report-IV.
<http://unesdoc.unesco.org/images/0021/002156/215644e.pdf>
3. UN-Water Federated Water Monitoring System and Key Water Indicator Portal (FWMS & KWIP) project
<http://www.unwater.org/kwip>
4. UNEP Mediterranean Strategy for Sustainable development – Med action Plan, Plan Bleu
http://planbleu.org/sites/default/files/publications/idd_2013en.pdf
5. Project SWIM power point (2012)
http://www.swimsm.eu/index.php?option=com_phocadownload&view=category&id=19%3Atrainingiwrms&Itemid=5&lang=en
6. EEA water indicators,
http://www.eea.europa.eu/themes/water/indicators#c10=&c5=all&c7=all&c13=20&b_start=0&c6=water+indicators
7. UN-DESA indicators for sustainable development,
<https://sustainabledevelopment.un.org/index.php?page=view&type=400&nr=107&menu=920>
8. GWP (I)WRM indicators a GWP perspective (2010),
http://www.unwater.org/downloads/WCB/GWP_IWRM.pdf
9. UCC Water “A structure for monitoring processes leading towards IWRM”,
http://www.unepdhi.org//media/microsite_unepdhi/publications/documents/unep_dhi/2007%20structure%20for%20the%20monitoring%20of%20processes.pdf
10. UNEP-DHI Center,
http://www.unepdhi.org//media/microsite_unepdhi/publications/documents/unep_dhi/2007%20structure%20for%20the%20monitoring%20of%20processes.pdf
11. OECD Inventory Water Governance Indicators and Measurement Frameworks (Last up-dated on 10 July 2015).
<http://www.bing.com/search?q=OECD%20Inventory%20Water%20Governance%20Indicators%20and%20Measurement%20Frameworks%20&pc=cosp&ptag=D072115AE559B4096F&form=CONBDF&conlogo=CT3210127>

6 RESULTS

This report is an attempt to portray a structure for monitoring the implementation of IWRM progress in the three SWIM focus countries and to offer a guidance for developing indicators that would encompass the socio-economic and environmental factors relevant to the sustainable water resources management within an IWRM context.

Based on the information collected in the questionnaire, this chapter includes a description of the tools, measures and data presently used in the three SWIM-SM PCs (Egypt, Jordan and Lebanon) to monitor



for the implementation of IWRM concepts in managing water resources. It also includes an assessment of potential measures undertaken by the three SWIM focus countries for integrating Socio-economic and environmental dimensions in monitoring implementation IWRM. This chapter also covers an assessment of availability of primary data and if the selected indicators for monitoring implementation of IWRM are adequate and if they are satisfactorily populated. This chapter also covers an evaluation of the primary data in terms of its validity, the technical monitoring capacity, source of data, and coordination among water relevant institutions. The collected information is also providing an understanding of the procedures and techniques undertaken in the 3 SWIM focus countries to interpret and integrate water relevant information. This would include how IWRM indicators are reported and disseminated and to whom. In addition, it provides an answer on how the civil society, media, stakeholders, etc. are informed about IWRM indicators and if this is promoting their participation in managing water resources. It is important to note that emphasis was mainly given to the information gathered from the Ministry of Water Resources in drawing conclusions and main results. Information gathered from water relevant ministries and institutions was mainly to test the degree of coordination, uniformity and sharing of information in monitoring implementation of IWRM.

6.1 Indicators for the Implementation of IWRM in Jordan:

6.1.1 Water resources indicators relevant to monitoring the implementation of IWRM

- According the Jordanian Ministry of Water Resources and Irrigation, these nine indicators (refer to annex I) are mostly monitored except for two indicators, namely, 1- the percent water resources reserved for environmental flow of total available water resources and 2- Percent share of blue, green and virtual water in securing food for national consumption.
- Compared to the Ministry of Water Resources and Irrigation, the Ministry of Planning and International Cooperation (MoPIC) indicated that out of the nine indicators the following two different indicators are not monitored. They include: 1- Total water withdrawal as % of the total renewable water resources and 2- Percent tourism sector withdrawal of total available water resources.
- The Department of Statistics revealed that it is not aware of the presence of a 1-percent water reserved for environmental flow of total available water resources. The department was also not sure of the existence of information on the percent share of blue, green and virtual water in securing food for national consumption.
- The Ministry of Environment indicated that it is not sure of the availability of both 1- percent of water reserved for environmental flow of total available water resources and 2- percent share of blue, green and virtual water in securing food for national consumption. This statement confirmed the information revealed by the Ministry of Water Resources and Irrigation on the nonexistence of the same two indicators.

6.1.2 Economic indicators relevant to monitoring implementation of IWRM

When compared to traditional water resources management indicators, it was revealed that economic indicators are given lower priority in all water related national institutions in Jordan. Out of the 12 IWRM indicators of economic relevance the following was revealed:

- Ministry of Water Resources and Irrigation indicated that all 12 economic indicators relevant to water resources management are monitored except for the cost of fresh water degradation



indicator. However, when asked about the frequency of monitoring or the existence of historic data, the Ministry indicated that it is not sure of its existence.

- The Ministry of Planning and International Cooperation indicated that six out of the 12 economic indicators of relevance to water resources management were not monitored. These included: 1- Percent share of irrigated agriculture in GDP 2-Percent of population practicing irrigation agriculture, 3- Percent expenditure on clean water & sanitation from total national budget, 4- Public investments and expenditure in reducing water demand 5- Private sector participation in water and sanitation projects as percent of total of national expenditure and 6- Cost of fresh water degradation.
- The Ministry of Environment indicated that all 12 economic indicators are monitored regularly except for the last two namely 1- Private sector participation in water and sanitation projects as percent of total of national expenditure, and 2- The cost of fresh water degradation. This contradiction in information can be attributed to inadequate exchange of information, coordination and/or communication among water relevant sectors.
- The Department of Statistics indicated that six out of the twelve indicators are either not monitored or probably not checked. The indicator **not monitored** included 1- Hydropower capacity – Potential & installed and 2- The private sector participation in water and sanitation projects as percent of total national expenditure. Meanwhile, the department was **not sure** about the existence of the following four indicators: 1- Percent population practicing irrigation agriculture, 2- Percent population working in industry, 3- Percent population working in tourism sector, and 4- Cost of fresh water degradation.

6.1.3 Social indicators relevant to monitoring the implementation of IWRM

The social indicators of relevance to monitoring the implementation of IWRM were limited to only four (refer to Annex I).

- According to the Ministry of Water Resources and Irrigation, all IWRM indicators of social relevance are regularly monitored except for the cost of water pollution on environmental health.
- The Ministry of Planning and International Cooperation indicated that both 1- the number of cases with confirmed water borne diseases as well as 2- The cost of water pollution on environmental health indicators are not monitored.
- The Ministry of Environment indicated that it was **not sure** if both 1- The number of cases with confirmed water borne diseases and 2- The cost of water pollution on environmental health indicators are monitored.
- The Department of Statistics also indicated that both 1- The number of cases with confirmed water borne diseases and 2- The cost of water pollution on environmental health indicators are monitored.

There was no discrepancy among the four agencies on the fact that two of the four indicators were not monitored indicating a gap in integrating social aspects into sustainable water resources management in the country. This gap, if not bridged, would lead to overlooking important social aspects in IWRM.



6.1.4 Environmental indicators relevant to monitoring the implementation of IWRM

- The Ministry of Water Resources and Irrigation indicated that it is not sure if three out of the six environmental indicators are monitored. Among them 1- Number of threatened fresh water species, 2- Tons of fresh-water annual fish production, and 3- Tons of BOD discharged annually into fresh water bodies.
- The Ministry of Planning and International Cooperation indicated that none of the six indicators were monitored. These include, 1- Water quality (physicochemical, biological & radiological), 2- Percent of wastewater secondary treatment of the total generated domestic wastewater, 3- Number of threatened fresh water species, 4- Number of Climate Change adaptation & mitigation measures undertaken by the water sector, 5- Tons of fresh-water annual fish production, and 6- Tons of BOD discharged annually into fresh water bodies.
- The Ministry of Environment indicated that only two environmental indicators are not monitored including: 1- Number of threatened fresh water species, 2- Tons of fresh-water annual fish production.
- The Department of Statistics indicated that it is **not sure** if the 1- Number of threatened fresh water species, 2- the number of Climate Change adaptation & mitigation measures undertaken by the water sector, and the tons of BOD₅ discharged annually into fresh water bodies is monitored to be included as environmental aspects of relevance to form IWRM implementation indicators.

6.1.5 Governance indicators relevant to the implementation of IWRM concepts

- The Ministry of Water Resources and Irrigation revealed that out of the 52 IWRM implementation indicators of relevance to governance (Refer to Annex I) it is **not sure** of the availability of information on the following 20 indicators: On gender mainstreaming: 1- If the role of women in water management supported by law? On Stakeholder participation: 1- If there is a formal framework/mechanisms for stakeholder participation in IWRM? 2- If the above framework (in item 2) is functional and effective? On awareness of IWRM among different stakeholders: 1- If politicians and senior officials are aware of IWRM? 2- If water management staff is aware of the necessity of IWRM? 3- If NGOs are active in raising awareness on IWRM principles? On human resources to implement IWRM: 1- If the staff entrusted with the implementation of IWRM policies is qualified? 2- If the staff entrusted with implementation of IWRM policies motivated? On Institutional Capacity for undertaking IWRM: 1- If the institutions are capable of drafting water relevant legislations? 2- If National institutions have the capacity to monitor water-related issues? 3- If social data relevant to water resources management is collected and disseminated? On Institutional Framework: 1- In case of its existence, is the cross-sectoral water coordination body functional? On regulations supporting Water Laws: 1- If regulations supporting water laws are effective? 2- If the relevant sectors and the public are aware of water regulations? On National legislations: 1- If National legislations contain specific obligations by law for participation through public hearings, stakeholder participation, river basin management, decentralization, etc.? 2- If National legislations contain incentives for water efficiency? On IWRM in National Water Resources Management policies: 1- If water related primary data (parameters) is regularly monitored? 2- If the regularly collected primary data subject to quality control such as precision, accuracy, reproducibility, credibility etc.? 3- If civil society, NGOs and media understand and commonly use IWRM indicators for playing their participatory role in water resources management? And



4- If the central information system (Central Statistical Authority) in charge for the compilation, analysis, interpretation and dissemination of IWRM indicators? **The Ministry of Water Resources and Irrigation** also indicated that there is **no information** on the following 9 governance indicators: *On IWRM in National budget*: 1- If the National budget contains budget lines for planned expenditures that support the application of IWRM? *On awareness of IWRM among different stakeholders*: 1- If water users are aware of the IWRM principles? 2- If parliamentarians and local councils are aware of IWRM? *On human resources to implement IWRM*: 1- If the number of staff available to implement IWRM principles is adequate? *On Institutional Capacity for undertaking IWRM*: 1- If the institutional capacities are adequate to formulate water policies and maintain information systems and data processing? 2- If the institutions have adequate capacity to recover cost of water service? 3- If environmental data relevant to water resources management collected and disseminated? 4- If there is a central entity that interpret the water, socio-economic and environmental data for informed decision making within an IWRM context? *On regulations supporting Water Laws*: 1- If relevant water sectors have adequate monitoring & inspection capacities to ensure compliance with the water regulations?

- **The Ministry of Planning and International Cooperation** indicated that it is **not sure** of the availability of information on following 3 governance indicators: *On Institutional Capacity for undertaking IWRM*: 1- If there is a central entity that interpret the water, socio-economic and environmental data for informed decision making within an IWRM context? *On regulations supporting Water Laws*: 1- If there are any measures used to encourage efficient & responsible allocation and use of water resources including pricing, charges, subsidies and penalties? *On National legislations*: 1- If National legislations contains incentives for water efficiency? **The Ministry of Planning and International Cooperation** also revealed that information is **not collected** on the following 25 governance indicators: *On gender mainstreaming*: 1- If the role of women in water management is supported by law? *On IWRM in National budget*: 1- If the National budget contains budget lines for planned expenditures that support the application of IWRM? *On awareness of IWRM among different stakeholders*: 1- If water users are aware of the IWRM principles? 2- If parliamentarians and local councils are aware of IWRM? 3- If NGOs are active in raising awareness on IWRM principles? 4- If politicians and senior officials are aware of IWRM? *On Institutional Capacity for undertaking IWRM*: 1- If economic data relevant to water resources management is collected and disseminated? 2- If social data relevant to water resources management is collected and disseminated? 3- If environmental data relevant to water resources management is collected and disseminated? 4- If the institutions have adequate capacity to recover cost of water service? *On institutional framework*: 1- If there is a cross-sectoral coordination body at the national, local and river-basin levels to manage water resources? 2- If in case of its existence, is the cross-sectoral coordination body functional? 3- Are there information systems, maps/models, plans, guidelines and other decision support and management tools utilized for implementing IWRM concept? *On regulations supporting Water Laws*: 1- If the water regulations are harmonized with other laws such as environmental, health, trade, irrigation, etc.? 2- If the regulations supporting water laws are effective? *On IWRM in National legislations*: 1- If National legislations contain specific obligations by law for participation through public hearings, stakeholder participation, river basin management, decentralization, etc.? *On IWRM in National Water Resources Management policies*: 1- If IWRM referred to as a base for National water resources management? 2- If the role of private sector is specified in the National water resources management policies? 3- If the National



water management policies refer to the polluter pays principle? 4- If National water policies refer to Climate Change adaptation? 5- If IWRM indicators are routinely populated? 6- If the regularly collected primary data are subject to quality control such as precision, accuracy, reproducibility, credibility etc.? 7- If the central information system (Central Statistical Authority) is in charge for the compilation, analysis, interpretation and dissemination of IWRM indicators?

- **The Ministry of Environment:** indicated that it is **not sure** of the availability of information on following 4 governance indicators: *On Institutional Capacity for undertaking IWRM:* 1- If there is a central entity that interprets the water, socio-economic and environmental data for informed decision making within an IWRM context? *On stakeholder's participation:* 1- If the framework is functional and effective? *On gender mainstreaming:* 1- If the role of women in water management is supported by law? *On IWRM in National budget:* 1- If the National budget contains budget lines for planned expenditures that support the application of IWRM? *On IWRM in National Water Resources Management policies:* 1- If the role of private sector is specified in the National water resources management policies? **The Ministry of Environment** also revealed that the following 10 information needed to develop IWRM implementation indicators **do not exist**. They include the following: *On IWRM in National Water Resources Management policies:* 1- If the regularly collected primary data is subject to quality control such as precision, accuracy, reproducibility, credibility etc.? 2- If the IWRM indicators used at a higher policy and in decision making levels within a national sustainable development context? 3- If the civil society, NGOs and media understand and commonly use IWRM indicators for playing their participatory role in water resources management? 4- If the central information system (Central Statistical Authority) is in charge for the compilation, analysis, interpretation and dissemination of IWRM indicators? 5- If National legislations contain specific obligations by law for participation through public hearings, stakeholder participation, river basin management, decentralization, etc.? *On regulations supporting water laws:* 1- If the water regulations are harmonized with other laws such as environmental, health, trade, irrigation, etc.? *On institutional framework:* 1- If the institutional capacities adequate to formulate water policies and maintain information systems and data processing? 2- If the institutions have adequate capacity to recover cost of water service? 3- If economic data relevant to water resources management is collected and disseminated? 4- If the environmental data relevant to water resources management is collected and disseminated? *On human resources to implement IWRM:* 1- If the number of staff available to implement IWRM principles adequate? 2- If the staff entrusted with IWRM is trained on practical aspects of its implementation? *On awareness of IWRM among different stakeholders:* 1- If water users are aware of the IWRM principles?
- **The Department of Statistics** revealed that that it is **not sure** of the availability of information on the following 8 governance indicators: *On stakeholder's participation:* 1- If the above framework functional and effective? *On IWRM in National budget:* 1- If the National budget contains budget lines for planned expenditures that support the application of IWRM? *On IWRM in National Water Resources Management policies:* 1- If the role of private sector is specified in the National water resources management policies? 2- If the National water management policies refer to the polluter pays principle? 3- If the National water management policies refer to the user pays principle? 4- If IWRM indicators are routinely populated? **The Department of Statistics:** also revealed that the following 19 information necessary to develop IWRM implementation indicators **do not exist**. *On regulations supporting water laws:* 1- If the



water regulations are harmonized with other laws such as environmental, health, trade, irrigation, etc.? On National regulations: 1- If National legislations contain specific obligations by law for participation through public hearings, stakeholder participation, river basin management, decentralization, etc.? 2- If National legislations contain specific penalties for illegal withdrawals and pollution of water resources? 3- If National legislations contain incentives for water efficiency? 4- If measures which prescribe restrict or prohibit different water uses are in place? Including abstraction/discharge permits, codes of conduct and minimum standards, etc. On Regulations Supporting Water Laws: 1- If the regulations supporting water laws effective? 2- If the relevant sectors and the public are aware of water regulations? 3- If there are any measures used to encourage efficient & responsible allocation and use of water resources including pricing, charges, subsidies and penalties? 4- If there are measures to increase awareness of water issues and mobilize users to participate in planning, management and financing of water resource development? On Institutional framework: 1- If there is a cross-sectoral coordination body at the national, local and river-basin levels to manage water resources? 2- If in case of its existence, is the cross-sectoral coordination body functional? On institutional Capacity for undertaking IWRM: 1- If the institutions have adequate capacity to recover cost of water service? 2- Is there a central entity that interpret the water, socio-economic and environmental data for informed decision making within an IWRM context? On human resources to implement IWRM: 1- If the number of staff available to implement IWRM principles adequate? 2- If the staff entrusted with implementation of IWRM policies are motivated? 3- If the Staff entrusted with IWRM is trained on practical aspects of its implementation? On awareness of IWRM among different stakeholders: 1- Are politicians and senior officials aware of IWRM? 2- If water users are aware of the IWRM principles? 3- If NGOs are active in raising awareness on IWRM principles? On gender mainstreaming: 1- If the role of women in water management is supported by law?

6.1.6 Interpretations of Results:

Based on the analysis of this information, the following conclusions can be drawn:

1. Primary data on traditional water resources management that is necessary to populate IWRM indicators is available to a great extent. However, this wealth of information isn't invested in developing well-structured indicators to support the decision making process for water resources management.
2. The provided information gives a clear evidence that management of water resources in Jordan is not giving adequate considerations to the optimization of its economic value and/or the maximization of the economic return from the available water resources. This is a grave indication that a principle and vital IWRM pillar is overlooked in managing water resources in the country.
3. The provided information offers a clear indication that management of water resources in Jordan is not giving adequate thoughts to social aspects associated with the management of the available water resources. This is a critical indication that social aspects as one of the main IWRM principle is not adequately addressed when managing water resources in the country.
4. The provided information revealed that management of water resources in Jordan is not providing adequate attention to the environmental aspects associated with the management of the available water resources. This was particularly true for the regular monitoring of the



masses of pollutants discharged into the fresh water bodies and the number of endangered aquatic species.

5. The gathered information revealed that the water governance inherent with the implementation of IWRM principles is partially missing. Primary data and information available to develop indicators to track implementation of IWRM is not adequate and monitoring of water resources management in Jordan is following the traditional means for reporting on the state of water resources without much attention to the socio-economic and environmental dimensions.
6. According to Jordanian officials the primary data is valid and that technical monitoring capacity is adequate. However, it appears that there is a serious problem in sharing and exchanging information among water relevant sectors. The contradiction in the feedback about availability of the various IWRM indicators among water relevant authorities was a clear indication that sharing water information, horizontal coordination and/or communication need government attention and has to be resolved.
7. IWRM information is available but not complete. The use of this information in developing IWRM implementation indicators for decision making process needs further development. Focus should be given to the development of national technical capacities for the analysis and interpretation of Information and aggregation of IWRM indicators to support high level decision makers.
8. A misconception still persists about the nature and principles of IWRM. Implementation of IWRM cannot be monitored unless socio-economic and environmental dimensions related to water resources management are integrated within a coordinated monitoring system involving all water relevant sectors. So far, it appears that the indicators currently used in Jordan are designed to monitor traditional water resources management and not to monitor IWRM.

6.2 INDICATORS FOR THE IMPLEMENTATION OF IWRM IN EGYPT

6.2.1 Water resources indicators relevant to monitoring the implementation of IWRM

- According to **the Ministry of Water Resources and Irrigation**, the nine water resources indicators (refer to annex I) are regularly monitored on a yearly basis, except for the last two indicators namely 1- the percent share of blue, green and virtual water in securing food for national consumption and 2- The percent water reserved for environmental flow of total available water resources.
- **The Central Agency for Public Mobilization and Statistics (CAPMAS)** indicated that the following three indicators **are not monitored** as follows: 1- Percent domestic sector withdrawal from total available water resources, 2- Percent water reserved for environmental flow of total available water resources and 3- Percent share of blue, green and virtual water in securing food for national consumption.
- **The Ministry of Environment, Egyptian Environmental Affairs Agency (EEAA)** indicated that out of these nine indicators, it **is not sure** of the availability of information or records on the percent share of blue, green and virtual water in securing food for national consumption.



6.2.2 Economic indicators relevant to monitoring implementation of IWRM:

- **Ministry of Water Resources and Irrigation** indicated that all the economic indicators relevant to water resources management are monitored except for the cost of fresh water degradation indicator and public investments and expenditure in reducing water demand.
- **The Central Agency for Public Mobilization and Statistics** indicated that three out of the 12 economic indicators of relevance to water resources management were not monitored. These included: 1- Private sector participation in water and sanitation projects as Percent of total national expenditure, 2- Cost of fresh water degradation and 3- Percent share of tourism in GDP. The Agency also revealed that it was not sure of the existence of any monitoring for public investments and expenditure in reducing water demand.
- **The Ministry of Environment through EEAA** revealed that all economic indicators are monitored regularly except for two namely 1- Public investments and expenditure in reducing water demand and 2- The private sector participation in water and sanitation projects as percent of total national expenditure. The agency indicated that it is **not sure** of the monitoring the same two indicators.

6.2.3 Social indicators relevant to monitoring the implementation of IWRM:

The social indicators of relevance to monitoring the implementation of IWRM were limited to only four.

- According to **the Ministry of Water Resources and Irrigation**, all indicators **are regularly monitored** except for the cost of water pollution on environmental health.
- **The Ministry of Environment through (EEAA)** revealed that all four indicators **are monitored** properly.
- **The Central Agency for Public Mobilization and Statistics** indicated that both 1- the number of cases with confirmed water borne diseases as well as 2- The cost of water pollution on environmental health indicators **are not monitored**.

6.2.4 Environmental indicators relevant to monitoring the implementation of IWRM

- **The Ministry of Water Resources and Irrigation** indicated that all environmental indicators relevant to monitoring the implementation of IWRM are collected regularly, however, it is **not sure** if tons of BOD discharged annually into fresh water bodies is monitored.
- **The Central Agency for Public Mobilization and Statistics** indicated that only two of the six indicators were not monitored. These included, 1- The percent of wastewater secondary treatment of the total generated domestic wastewater and 2- The number of Climate Change adaptation & mitigation measures undertaken by the water sector.
- **The Ministry of Environment through (EEAA)** indicated that only one environmental indicator is not monitored, namely, the number of threatened fresh water species.



6.2.5 Governance indicators relevant to the implementation of IWRM concepts.

- **The Ministry of Water Resources and Irrigation** revealed that it is **not sure** of the availability of information on following 7 governance indicators: *On awareness of IWRM among different stakeholders*: 1- If water users aware of IWRM principles? And 2- If NGOs are active in raising awareness on IWRM principles? *On Institutional Capacity for undertaking IWRM*: 1- If the institutions have adequate capacity to recover cost of services? And 2- If social data relevant to water resources management is collected and disseminated? *On regulations supporting Water Laws*: 1- If regulations supporting water laws are effective? And 2- If the relevant sectors and the public are aware of water regulations? *On National legislations*: 1- If National legislations contain specific obligations by law for participation through public hearings, stakeholder participation, river basin management, decentralization, etc.? *On IWRM in National Water Resources Management policies*: 1- If civil society, NGOs and media understand and commonly use IWRM indicators for playing their participatory role in water resources management? **The Ministry of Water Resources and Irrigation** also indicated that there is **no information** on the following four governance indicators: *On awareness of IWRM among different stakeholders*: 1- If parliamentarians and local councils are aware of IWRM? *On regulations supporting Water Laws*: 1- If there are any measures used to encourage efficient & responsible allocation and use of water resources including pricing, charges, subsidies and penalties? *On National legislations*: 1- If National legislations contain specific obligations by law for participation through public hearings, stakeholder participation, river basin management, decentralization, etc.? *On IWRM in National Water Resources Management policies*: 1- If the National water management policies refer to the user pays principle?
- **The Central Agency for Public Mobilization and statistics (CAPMAS)** indicated that it has **no information** on any of the water governance issues needed for monitoring implementation of IWRM indicators and it goes beyond its mandate. This is a serious misunderstanding of the water governance issues as a fundamental necessity for the appropriate implementation of IWRM principles. This statement indicates serious unfamiliarity with IWRM essential concepts and the dire need to raise awareness and develop capacity of government officials on IWRM concepts with special focus on participation, horizontal coordination and integration among water relevant sectors.
- **Ministry of Environment through EEAA** indicated that it is **not sure** of the availability of information on following 8 governance indicators: *On awareness of IWRM among different stakeholders*: 1- If water users are aware of the IWRM principles? 2- If NGOs are active in raising awareness on IWRM principles? And 3- If parliamentarians and local councils are aware of IWRM? *On Institutional Capacity for undertaking IWRM*: 1- If economic data relevant to water resources management collected and disseminated? , 2- If social data relevant to water resources management collected and disseminated? And 3- If the institutions have adequate capacity to recover cost of water service? *On National legislations*: 1- If measures which prescribe restrict or prohibit different water uses are in place? Including abstraction/discharge permits, codes of conduct and minimum standards, etc. The **Ministry of Environment through EEAA** also indicated that the following water governance indicators are **not existing**: *On National legislations*: 1- If National legislations contain incentives for water efficiency? *On regulations supporting water laws*: 1- If there are any measures that are used to encourage efficient & responsible allocation and use of water resources including pricing, charges, subsidies and penalties?



6.2.6 Interpretations of Results

1. In Egypt, information is not fully shared among the water relevant sectors to realize an integrated management approach of water resources. This was evidenced by the contradiction on availability of information in the responses of water relevant sectors in the questionnaires.
2. Primary data on traditional water resources management that are necessary to populate water management indicators is available to a great extent. However, relevant socio-economic data needed to correlate with IWRM are not usually generated and/or shared.
3. The inconsistency on the availability of information among water relevant sectors indicates that information and primary data are available but fragmented and spread in different monitoring institutions. This wealth of dispersed information isn't invested in developing well-structured indicators to support the decision making process for water resources management.
4. The provided information gives clear evidence that management of water resources in Egypt is not giving adequate considerations to the optimization of its economic value and/or the maximization of the economic return from the available water resources. When compared to traditional water resources management indicators, it seems that economic indicators are given lower priority in all water related national institutions. This is a critical indication that a main principle and a vital IWRM pillar is overlooked in managing water resources in the country.
5. The Egyptian Central Agency for Public Mobilization and Statistics has a serious misunderstanding of the water governance issues as a fundamental necessity for the appropriate implementation of IWRM principles. Their statement indicates serious unfamiliarity with IWRM fundamental concepts and the dire need to raise awareness and develop capacity of government officials on IWRM concepts with special focus on participation, horizontal coordination and integration among water relevant sectors.
6. The provided information offers a clear indication that management of water resources in Egypt is giving adequate thoughts to social aspects associated with the management of the available water resources. This is a clear sign that one of the main IWRM principles is addressed when managing water resources in the country.
7. The provided information reveals that management of water resources in Egypt is providing adequate attention to the environmental aspects associated with the management of the available water resources. However, a discrepancy does exist among the water-relevant institutions on what information is available. This was particularly true for the regular monitoring of the masses of pollutants discharged into the fresh water bodies and the number of endangered aquatic species. It is important to note that monitoring doesn't necessarily mean that proper decision is taken to ensure the integrity of the environment when managing water resources.
8. The gathered information revealed that the water governance inherent with the implementation of IWRM principles is partially missing. Primary data and information available to develop indicators to track implementation of IWRM is not adequate and monitoring of water resources management in Egypt is following the traditional means for reporting on the state of water resources without much attention to the socio-economic and environmental dimensions.



9. According to Egyptian officials, the primary data needed to develop indicators to monitor implementation of IWRM is valid and that technical monitoring capacity is very adequate. However, it appears that there is a serious problem in sharing and exchanging information among water relevant sectors. The discrepancies in the feedback about availability of the various IWRM indicators among water relevant authorities provided a clear evidence that sharing water information, horizontal coordination and/or communication need government attention and has to be resolved.
10. In the case of Egypt, IWRM information is mostly available but never complete. The use of this information in developing IWRM implementation indicators for decision making process needs further development. Focus should be given to the development of national technical capacities for the analysis and interpretation of Information and aggregation of IWRM indicators to support high level decision makers.
11. A misconception still persists about the nature and principles of IWRM. Implementation of IWRM cannot be monitored unless socio-economic and environmental dimensions related to water resources management are integrated within a coordinated monitoring system involving all water relevant sectors. So far, it appears that the indicators currently used in Egypt are mainly designed to monitor traditional water resources management and not to monitor IWRM.

6.3 Indicators for the Implementation of IWRM in Lebanon

6.3.1 Water resources indicators relevant to monitoring the implementation of IWRM:

- According to **the Ministry of Energy and Water Resources**, these nine water resources indicators (refer to annex I) are regularly monitored on a yearly basis, except for the last indicator namely 1- the percent share of blue, green and virtual water in securing food for national consumption.
- **The Central Agency for Statistics (CAS)** indicated that it **has no access** to any of the nine IWRM indicators related to water resources management. This is a very grave situation where legislations need to be passed, budget to be allocated, institutional reform need to be considered and capacity need to be developed to include water and environment related statistics within the CAS.
- **The Ministry of Environment (MoE)**, indicated that out of these nine indicators, the following five are **not monitored**: 1- Total water withdrawal as percent of the total renewable water resources, 2- Percent of agriculture sector withdrawal of total available water resources, 3- Percent Industrial sector withdrawal of total available water resources, 4- Percent domestic sector withdrawal from total available water resources and 5- Percent water reserved for environmental flow of total available water resources. **The Ministry of Environment** also revealed that information or records on the percent share of blue, green and virtual water in securing food for national consumption **is not available**.

6.3.2 Economic indicators relevant to monitoring implementation of IWRM

When compared to traditional water resources management indicators, economic indicators are given lower priority in all water related national institutions as follows:



- **Ministry of Energy and Water Resources** revealed that seven of the twelve economic indicators relevant to water resources management are **not monitored** by the MEWR. The seven indicators are 1- GDP (GDP is monitored, but not necessarily by the MEWR), 2- Percent share of irrigated agriculture in GDP, 3- Percent of population practicing irrigation agriculture, 4- Percent share of industry in GDP, 5- Percent population working in industry, 6- Percent share of tourism in GDP, and 7- Percent population working in tourism sector.
- **The Central Agency for Statistics** indicated that it has **no access** to any of the 12 economic indicators of relevance to water resources management.
- **The Ministry of Environment (MoE)**, revealed that out of the 12 economic indicators (refer to Annex I) relevant to water resources management **only two** are monitored. The ten missing indicators that are **not monitored** and/or the MoE has no access to include the following: 1- The GDP, 2- Percent share of irrigated agriculture in GDP, 3- Percent population practicing irrigation agriculture, 4- Percent share of industry in GDP, 5- Percent population working in industry, 6- Percent share of tourism in GDP, 7- Percent population working in tourism sector, 8- Hydropower capacity – Potential & installed, 9- Public investments and expenditure in reducing water demand, 10- Private sector participation in water and sanitation projects as % of total national expenditure

6.3.3 Social indicators relevant to monitoring the implementation of IWRM

The social indicators of relevance to monitoring the implementation of IWRM were limited to only four (refer to Annex I).

- According to **the Ministry of Energy and Water Resources**, out of the four indicators, only two are monitored regularly. The other two missing indicators include the following: 1- Number of cases with confirmed water borne diseases and 2- The cost of water pollution on environmental health.
- **The Ministry of Environment** indicated that three out of the four indicators **are not monitored or not accessible** to the Ministry. They include 1- Change in the percent population with access to improved water, 2- Percent change in population with access to improved sanitation and 3- The number of cases with confirmed water borne diseases. The Ministry also revealed that it is **not sure** about the existence of the indicator on the cost of water pollution on environmental health
- **The Central Agency Statistics** indicated that it has no access to any of the four social indicators of relevance to water resources management or if they were monitored.

6.3.4 Environmental indicators relevant to monitoring the implementation of IWRM

- **The Ministry of Energy and Water Resources** indicated that all six environmental indicators relevant to monitoring the implementation of IWRM (refer to Annex I) are collected regularly, except for the 1- Tons of fresh-water annual fish production. The Ministry **wasn't sure** about 1- the availability of information on the number of threatened fresh water species.
- **The Central Agency for Statistics** indicated that it has no access to any of the six environmental indicators of relevance to water resources management or if they were monitored.
- **The Ministry of Environment** indicated that only five out of the six environmental indicators were either not monitored or they have no access to. The five **non existing** indicators were as



follows: 1- Percent of wastewater secondary treatment of the total generated domestic wastewater, 2- Number of threatened fresh water species, 3- Number of Climate Change adaptation & mitigation measures undertaken by the water sector, 4- Tons of fresh-water annual fish production, 5- Tons of BOD₅ discharged annually into fresh water bodies.

6.3.5 Governance indicators relevant to the implementation of IWRM concepts.

- **The Ministry of Energy and Water Resources** revealed that it is **not sure** of the availability of information on following twelve governance indicators: On Gender Mainstreaming: 1- If the role of women in water management supported by law? On Stakeholders participation: 1- If the mechanism or framework for stakeholders participation is functional and effective? On awareness of IWRM among different stakeholders: 1- If politicians and senior officials are aware of IWRM? On Institutional Capacity for undertaking IWRM: 1- If economic data relevant to water resources management is collected and disseminated? 2- If social data relevant to water resources management is collected and disseminated? 3- If environmental data relevant to water resources management is collected and disseminated? 4- Are the institutions capable of drafting water relevant legislations? 5- If the institutions have adequate capacity to recover cost of water service? And 6- If National institutions have the capacity to undertake water-related assessments? On regulations supporting Water Laws: 1- If relevant water sectors have adequate monitoring & inspection capacities to ensure compliance with the water regulations? On IWRM in National Water Resources Management policies: 1- If the regularly collected primary data subject to quality control such as precision, accuracy, reproducibility, credibility etc.?, 2- If the IWRM indicators are used at a higher policy and in decision making levels within a national sustainable development context? 3- If the National water management policies refer to the user pays principle? 4- If IWRM referred to as a base for National water resources management? **The Ministry of Energy and Water Resources** also indicated that there is **no information** on the following 19 governance indicators: On awareness of IWRM among different stakeholders: 1- If water users are aware of the IWRM principles? On Human Resources to implement IWRM: 1- If the number of staff available to implement IWRM principles is adequate? On Institutional Capacity for undertaking IWRM: 1- If there is a central entity that interpret the water, socio-economic and environmental data for informed decision making within an IWRM context? 2- If the National institutions have the capacity to monitor water-related issues? 3- If National institutions have the capacity for planning water use and conservation? 4- If the institutions are capable of drafting water relevant legislations? 5- If the institutions have adequate capacity to recover cost of water service? On Institutional Framework: 1- If there is a cross-sectoral coordination body at the national, local and river-basin levels to manage water resources? 2- If in case of the existence of the cross-sectoral body, this coordination body is functional? 3- If there are information systems, maps/models, plans, guidelines and other decision support and management tools utilized for implementing IWRM concept? On regulations supporting Water Laws: 1- If there are any measures used to encourage efficient & responsible allocation and use of water resources including pricing, charges, subsidies and penalties? 2- If there are any measures to increase awareness of water issues and mobilize users to participate in planning, management and financing of water resource development? 3- If the regulations supporting water laws are effective? And 4- If the relevant sectors and the public are aware of water regulations? On National legislations: 1- If National legislations contain incentives for water efficiency? On IWRM in National Water Resources Management policies: 1- If the civil society, NGOs and media are regularly informed about IWRM indicators? 2- If civil society, NGOs and media understand and commonly use IWRM indicators for playing their participatory role in



water resources management? 3- If the central information system (Central Agency for Statistics) in charge for the compilation, analysis, interpretation and dissemination of IWRM indicators? 4- If IWRM indicators are routinely populated?

- **The Central Agency for statistics (CAS)** indicated that it has no information on any of the water governance issues needed for monitoring implementation of IWRM indicators. This is a serious misunderstanding of the water governance issues as a fundamental necessity for the appropriate implementation of IWRM principles.
- **Ministry of Environment** indicated that out of 52 water governance indicators (refer to Annex I), it is not sure of the availability of information on following 30 indicators: On Stakeholders participation: 1- If there is a formal framework/mechanisms for stakeholder participation in IWRM? 2- If the above framework is functional and effective? On Gender Mainstreaming: 1- If the role of women in water management is supported by law? On awareness of IWRM among different stakeholders: 1- If politicians and senior officials are aware of IWRM? On Human Resources to implement IWRM: 1- If the number of staff available to implement IWRM principles is adequate? 2- If the staff entrusted with the implementation of IWRM policies is qualified? 3- If the staff entrusted with implementation of IWRM policies is motivated? 4- If the Staff is entrusted with IWRM trained on practical aspects of its implementation? On Institutional Framework: 1- If there is a cross-sectoral coordination body at the national, local and river-basin levels to manage water resources? 2- If in case of its existence, is the cross-sectoral coordination body functional? 3- If there are information systems, maps/models, plans, guidelines and other decision support and management tools utilized for implementing IWRM concept? On Regulations Supporting Water Laws: 1- If the regulations supporting water laws are effective? 2- If relevant water sectors have adequate monitoring & inspection capacities to ensure compliance with the water regulations? 3- If the water regulations are harmonized with other laws such as environmental, health, trade, irrigation, etc.? 4- If the National water regulations are harmonized with international signed agreements? 5- If there are any measures used to encourage efficient & responsible allocation and use of water resources including pricing, charges, subsidies and penalties? On National legislations: 1- If National legislations contain specific obligations by law for participation through public hearings, stakeholder participation, river basin management, decentralization, etc.? 2- If National legislations contain incentives for water efficiency? 3- If IWRM concepts exist in National water policies? On IWRM in National Water Resources Management policies: 1- If IWRM is referred to as a base for National water resources management? 2- If the role of private sector is specified in the National water resources management policies? 3- If the National water management policies refer to the polluter pays principle? 4- If the National water policies refer to Climate Change adaptation? 5- If the National water management policies refer to the user pays principle? 6- If water related primary data (parameters) are regularly monitored? 7- If IWRM indicators are routinely populated? 8- If the regularly collected primary data is subject to quality control such as precision, accuracy, reproducibility, credibility etc.? 9- If the IWRM indicators are used at a higher policy and in decision making levels within a national sustainable development context? 10- If the civil society, NGOs and media are regularly informed about IWRM indicators? 11- If the civil society, NGOs and media understand and commonly use IWRM indicators for playing their participatory role in water resources management? 12- If the central information system (Central Agency for Statistics) in charge for the compilation, analysis, interpretation and dissemination of IWRM indicators? **The Ministry of Environment** also indicated that the following water governance indicators are **not existing**: On Awareness of IWRM among different



stakeholders: 1- If politicians and senior officials are aware of IWRM? 2- If water users are aware of the IWRM principles? *On Institutional Capacity for Undertaking IWRM*: 1- If the institutional capacities are adequate to formulate water policies and maintain information systems and data processing? 2- If the institutions capable of drafting water relevant legislations? 3- If the institutions have adequate capacity to recover cost of water service? 4- If National institutions have the capacity to undertake water-related assessments? 5- If National institutions have the capacity to monitor water-related issues? 6- If National institutions have the capacity for planning water use and conservation? 7- If economic data relevant to water resources management is collected and disseminated? 8- If social data relevant to water resources management collected and disseminated? 9- If environmental data relevant to water resources management collected and disseminated? 10- If there is a central entity that interpret the water, socio-economic and environmental data for informed decision making within an IWRM context? *On National legislations*: 1- If National legislations contain incentives for water efficiency? *On regulations supporting water laws*: If there are measures to increase awareness of water issues and mobilize users to participate in planning, management and financing of water resource development? 2- If the relevant sectors and the public are aware of water regulations?

6.3.6 Interpretations of Results

1. Similar to Egypt and Jordan, IWRM information in Lebanon is not fully shared among the water relevant sectors to realize an integrated management approach of water resources. This was evidenced by the contradiction on availability of information among water relevant sectors responding to the questionnaires.
2. Despite the fact that few basic environmental parameters are monitored, the environmental flow was almost overlooked as one of the main pillars of IWRM. With such limited environmental monitoring, the integrity of the environment can be compromised in managing water resources.
3. Primary data on traditional water resources management and necessary to populate traditional water management indicators is available to a great extent. However, relevant socio-economic data needed to monitor for the implementation of IWRM are not usually generated and/or shared in Lebanon.
4. The inconsistency and discrepancy of the available information among water-relevant sectors indicates that some information and primary data are available but suffer from fragmentation and are scattered in different monitoring institutions. This inadequate and dispersed information isn't invested in developing well-structured indicators to support the decision making process for water resources management.
5. The provided information gives clear evidence that management of water resources in Lebanon is not giving adequate considerations to the optimization of its economic value and/or the maximization of the economic return from the available water resources. When compared to traditional water resources management indicators, it seems that economic indicators are given lower priority in all water-related national institutions. This is a grave indication that a main principle and a vital IWRM pillar is disregarded in managing water resources in the country.
6. The Lebanese Central Agency for statistics (CAS) claimed to have no information on any of the water or environment issues needed for monitoring implementation of IWRM indicators. This is



- a serious gap in monitoring water management issues considered as a fundamental necessity for the appropriate implementation of IWRM principles. Lack of water and/or environment information at the Central Agency for Statistics represents a serious unfamiliarity with IWRM essential concepts and points to the dire need to raise awareness and develop capacity of government officials on IWRM concepts with special focus on participation, horizontal coordination and integration among water relevant sectors.
7. The provided information offers a clear indication that management of water resources in Lebanon is not giving adequate thoughts to social aspects associated with the management of the available water resources. This is a clear indication that one of the main IWRM principles is disregarded and not properly integrated when managing water resources in the country.
 8. The gathered information revealed that the water governance inherent with the implementation of IWRM principles is mostly discounted. Primary data and information available to develop indicators to track implementation of IWRM is not adequate and monitoring of water resources management in Lebanon is following the traditional means for reporting on the simple state of water resources with minimum attention to the socio-economic and environmental dimensions necessary to implement IWRM concepts.
 9. The discrepancies in the feedback about availability of the various IWRM indicators among water relevant authorities in Lebanon provided clear evidence that sharing water information, horizontal coordination and/or communication need government attention and has to be resolved.
 10. In the case of Lebanon, information necessary to develop indicators to monitor implementation of IWRM is far from complete. The capacity to generate this information to develop IWRM implementation indicators for decision making process needs significant development. Focus should be given to the development of national technical capacities for monitoring, analysis and interpretation of Information and aggregation of IWRM indicators to support high level decision makers.
 11. A misconception still persists about the nature and principles of IWRM. Implementation of IWRM cannot be monitored using indicators unless socio-economic and environmental dimensions related to water resources management are integrated within a coordinated monitoring system involving all water relevant sectors. So far, it appears that the indicators currently used in Lebanon are mainly designed to monitor traditional water resources management and not applicable to monitor IWRM.

7 MAIN CONCLUSIONS

It is anticipated that this activity and the reported findings shall ultimately help regional and national efforts towards the development of a long lasting monitoring and reporting framework to track implementation of sustainable management of freshwater resources in the SWIM-SM region. The outcomes of this activity will hopefully result into the development, testing and institutionalization of a practical set of IWRM implementation indicators that can facilitate information exchange among water-relevant sectors, national governments, international bodies and civil societies.

The information perceived in the filled questionnaire was found to be subject to some influencing factors such as the traditional and historically unchanging management of water resources as a totally separate and independent sector. This has influenced the response of the interviewed government



officials to a great extent. Furthermore, the implementation of IWRM principles in most SWIM PCs is relatively new and has not matured enough to monitor its long term impacts including better management of the water resources with an integrated context. There might be some institutional reforms in the three focus countries such as the establishment of decentralized regulatory structures, or mainstreaming water in water relevant sectors, however, this wasn't unfortunately accompanying by adequate legislative, institutional and/or management reforms, which might have led to a more successful situations. The study revealed the main following conclusions:

1. No standard or formal monitoring mechanism for the implementation of IWRM as yet exists in the three SWIM-SM selected focus countries. Whilst a monitoring system for measuring progress in managing water resources as a separate sector is established in the focus countries. Mechanisms for integrating socio-economic and environmental aspects in managing water resources are yet to be established for monitoring progress towards IWRM concepts.
2. There is currently no mechanisms in place whereby focus countries can report on their progress on IWRM. However a conventional mechanism for reporting water resources management as an independent sector does exist.
3. There is a serious inadequacy in the generation, compilation and sharing of systematic data covering all aspects of IWRM such as economics, social and to lesser extend environmental dimensions related to water resources management.
4. The three focus countries have exhibited some progress in establishing an enabling environment for the implementation of IWRM through development of water policies, amending legislations and reforming some institutions. National water policy and water laws in focus countries reflect only some basic IWRM principles.
5. Cost recovery and economic return, in particular, are not strong elements in the management of water resources in any of the three focus countries.
6. Based on the information focus countries seem to holistically advocate for social equity, conservation of natural environmental and efficiency of water management which represent an understanding but not implementation of the basic principles of IWRM.
7. Developing an IWRM enabling environment in the three focus countries appear to be providing a good background and basis for implementing IWRM plans in the country. However, the existing policies, plans, and legislative framework is not providing adequate elements and/or a sound foundation for IWRM implementation.
8. All questionnaires feedback indicated that adequate data and information are already available for water resources management. The problem seems to be first the accessibility and exchange of these information by decision and policy makers and second the adequate selection, analysis, interpretation and utilization of the information in a valuable manner by decision-maker and stakeholder.
9. Cross-sectoral coordination and inclusion of IWRM on national and sectoral development plans is not fully conceived and/or implemented in focus countries.
10. At the current stage and when compared to global attempts, several water related monitoring efforts are underway in the three focus countries with the involvement of various actors to track the degree of achievement towards IWRM. However, most of these efforts are providing valuable knowledge on monitoring IWRM planning processes, but approaches are different and



no efforts have addressed the challenge of developing IWRM monitoring indicators to evaluate the outcomes of adopting IWRM concepts.

11. There is the further evidences and observations from analysis of the questionnaires that the three SWIM focus countries have not spent neither much time nor significant resources on the development of monitoring and evaluation protocols. Furthermore, the stakeholders have not been often involved neither in the monitoring and evaluation, nor in the establishment of benchmarks and indicators for monitoring IWRM. The high importance of an adequate monitoring and evaluation system and the limited role of stakeholder might explain the slow progress in implementing IWRM principles.
12. The questionnaires analyses revealed that IWRM is often implemented without a substantial shift in the underlying management paradigm of the three focus countries. However, a paradigm-shift also reflected in the institutional setting and/or reform might be needed for the successful and operative integrated water management.

8 REFERENCES

Gilles, B., Deitchler, M., Bilinsky, P. and Swindale, A., 2006. Monitoring and evaluation framework for Title II Development-oriented Projects, Food and Nutrition Technical Assistance Project, Academy for Educational Development, Washington D.C.

OECD, 2002. Glossary of key terms in evaluation and results based management. OECD/DAC, Paris.

Presidency, 2007. Policy framework for the government wide monitoring and evaluation system, The Presidency, Government of South Africa, Pretoria.

Larsen Henrik ¹ and Feilberg Miriam ² (2011) "INDICATORS FOR MEASURING IWRM PROGRESS AT NATIONAL LEVEL" 1: Head of Water Policy, DHI Water & Environment & Health, hel@dhigroup.com.2: Project Manager, DHI Water & Environment & Health, mfe@dhigroup.com. In <http://www.bing.com/search?q=INDICATORS%20FOR%20MEASURING%20IWRM%20PROGRESS%20AT%20NATIONAL%20LEVEL%20&pc=cosp&ptag=D072115AE559B4096F&form=CONBDF&conlogo=CT3210127>

Céline Dubreuil-Imbert (2013) "Indicators for Integrated Water Resources Management", in Technical workshop on integrated water resources management, Plan Blue, Barcelona, 30/09-1/10/2013.

Khordagui, H. (2012) 5- Project SWIM-SM power point (2012) http://www.swim-sm.eu/index.php?option=com_phocadownload&view=category&id=19%3Atrainingiwrm&Itemid=5&lang=en



ANNEX I

CHECK-LIST TO ASSESS MONITORING OF IWRM INDICATORS IN SELECTED MEDITERRANEAN COUNTRIES

The present checklist is meant to guide local Non-Key-Experts (NKE) on the information to be collected from national water, environment, central national statistics and planning authorities to portray the current level of indicator systems in place to monitor Integrated Water Resources Management (IWRM) in the three selected Countries from ENPI-South, beneficiaries of the Sustainable Water Integrated Management – Support Mechanism (SWIM-SM PCs) namely Egypt, Jordan and Lebanon.

Kindly fill in the check list as described and send it to Dr. Hosny Khordagui, Team Leader (TL) of SWIM-SM project at khordagui@yahoo.com

Objective: The overall objective of this activity is to ensure if SWIM-SM PCs do possess a credible system to monitor the implementation of their IWRM plans and policies using a set of indicators that reflects the IWRM holistic approach for managing their water resources.

The check-list shall be completed in 4 copies by the local NKEs engaged to interview the following 4 national officials or their delegations.

- 1- The head of the Water Planning Department at the Ministry of Water Resources,
- 2- The Head of Water and Environment Monitoring Department at the Ministry of Environment,
- 3- The Head of Water and Environment Department at the Central Statistical Bureau and
- 4- The Director of sustainable Development Division (higher council or equivalent) at the Ministry of Planning or its equivalent.

Information for local NKEs:

Indicators are fundamental instruments for tracing water sector progress, supporting policy evaluation, informing decision makers, rectifying plans and raising public awareness.

Definitions:

Indicator: A parameter, or a value derived from a parameter or a cluster of parameters, which points to, provides information about, or describes the state of water resources, with a significance that extends beyond its face value.

Parameter: A property that is analytically measured or monitored.

Index: A set of a mathematically aggregated or weighted parameters or indicators that describes a status.

Answers to questions shall be as follows:

- 1- Availability of data: Yes - No or Not sure
- 2- Frequency of updating: Regular period of updating.
- 3- Presence of historic data sets: Yes - No or Not sure



4- Source of data: Primary generator of data

IWRM indicators: Kindly provide a list of IWRM indicators currently in use to monitor progress in sustainable water resources management and a listing of institutions in charge of this monitoring.

Check list

I- WATER RESOURCES INFORMATION RELEVANT TO MONITORING THE IMPLEMENTATION OF IWRM:

Parameters needed to monitor implementation of IWRM	Availability of data	Frequency of updating	Presence of historic data sets	Primary Source of data
Total available water resources				
Per capita share of total available water resources				
Total water withdrawal as % of the total renewable water resources.				
% Agriculture sector withdrawal of total available water resources				
% Industrial sector withdrawal of total available water resources				
% Tourism sector withdrawal of total available water resources				
% Domestic sector withdrawal from total available water resources				
% Water reserved for environmental flow of total available water resources				
% share of blue, green and virtual water in securing food for national consumption				

II- ECONOMIC INFORMATION RELEVANT TO MONITORING IMPLEMENTATION OF IWRM:

Parameters needed to monitor implementation of IWRM	Availability of data	Frequency of updating	Presence of historic data sets	Source of data
GDP				
% Share of irrigated				



agriculture in GDP				
% Population practicing irrigation agriculture				
% share of industry in GDP				
% population working in industry				
% share of tourism in GDP				
% population working in tourism sector				
Hydropower capacity – Potential & installed				
% Expenditure on clean water & sanitation from total national budget				
Public investments and expenditure in reducing water demand				
Private sector participation in water and sanitation projects as % of total national expenditure				
Cost of fresh water degradation				

III- SOCIAL INFORMATION RELEVANT TO MONITORING IMPLEMENTATION OF IWRM:

Parameters needed to monitor implementation of IWRM	Availability of data	Frequency of updating	Presence of historic data sets	Source of data
Change in the % population with access to improved water				
Change in the % population with access to improved sanitation				
Number of cases with confirmed water borne diseases				
Cost of water pollution on environmental health				



IV- ENVIRONMENTAL INFORMATION RELEVANT TO MONITORING THE IMPLEMENTATION OF IWRM:

Parameters needed to monitor implementation of IWRM	Availability of data	Frequency of updating	Presence of historic data sets	Primary Source of data
Water quality (physicochemical, biological & radiological)				
% of wastewater secondary treatment of the total generated domestic wastewater				
Number of threatened fresh water species				
Number of Climate Change adaptation & mitigation measures undertaken by the water sector				
Tons of fresh-water annual fish production				
Tons of BOD discharged annually into fresh water bodies				

V- GOVERNANCE INFORMATION RELEVANT TO IMPLEMENTATION OF IWRM CONCEPTS:

Information needed to monitor implementation of IWRM	YES	NO	Not Sure
I. IWRM in National Water Resources Management policies:			
Does IWRM exist in National water policies?			
Is IWRM referred to as a base for National water resources management?			
Is the role of private sector specified in the National water resources management policies?			
Do the National water management policies refer to the polluter pays principle?			
Do National water policies refer to Climate Change adaptation?			
Do the National water management policies refer to the user pays principle?			
Are water related primary data (parameters) regularly monitored?			
Are IWRM indicators routinely populated?			
Is the regularly collected primary data subject to quality control			



such as precision, accuracy, reproducibility, credibility etc.?			
Are the IWRM indicators used at a higher policy and in decision making levels within a national sustainable development context?			
Are the civil society, NGOs and media regularly informed about IWRM indicators?			
Do civil society, NGOs and media understand and commonly use IWRM indicators for playing their participatory role in water resources management?			
Is the central information system (Central Statistical Authority) in charge for the compilation, analysis, interpretation and dissemination of IWRM indicators?			
II. In National Legislations:			
Do National legislations include specific water code or law?			
Do National legislations contain specific obligations by law for participation through public hearings, stakeholder participation, river basin management, decentralization, etc.?			
Do National legislations contain specific penalties for illegal withdrawals and pollution of water resources?			
Do National legislations contain incentives for water efficiency?			
Are measures which prescribe restrict or prohibit different water uses are in place? Including abstraction/discharge permits, codes of conduct and minimum standards, etc.			
III. Regulations Supporting Water Laws:			
Are the regulations supporting water laws effective?			
Are the relevant sectors and the public aware of water regulations?			
Do relevant water sectors have adequate monitoring & inspection capacities to ensure compliance with the water regulations?			
Are the water regulations harmonized with other laws such as environmental, health, trade, irrigation, etc.?			
Are the National water regulations harmonized with international signed agreements?			
Are there any measures used to encourage efficient & responsible allocation and use of water resources including pricing, charges, subsidies and penalties?			
Are there measures to increase awareness of water issues and mobilize users to participate in planning, management and financing of water resource development?			
IV. Institutional Framework:			
Is there a cross-sectoral coordination body at the national, local and river-basin levels to manage water resources?			
In case of its existence, is the cross-sectoral coordination body functional?			
Are there information systems, maps/models, plans, guidelines			



and other decision support and management tools utilized for implementing IWRM concept?			
Is water mainstreamed into National development policies, strategies or plans?			
V. Institutional Capacity for undertaking IWRM			
Are the institutional capacities adequate to formulate water policies and maintain information systems and data processing?			
Are the institutions capable of drafting water relevant legislations?			
Do the institutions have adequate capacity to recover cost of water service?			
Do National institutions have the capacity to undertake water-related assessments?			
Do National institutions have the capacity to monitor water-related issues?			
Do National institutions have the capacity for planning water use and conservation?			
Is economic data relevant to water resources management collected and disseminated?			
Is social data relevant to water resources management collected and disseminated?			
Is environmental data relevant to water resources management collected and disseminated?			
Is there a central entity that interpret the water, socio-economic and environmental data for informed decision making within an IWRM context?			
VI. Human resources to implement IWRM:			
Is number of staff available to implement IWRM principles adequate?			
Is the staff entrusted with the implementation of IWRM policies qualified?			
Is the staff entrusted with implementation of IWRM policies motivated?			
Is the Staff entrusted with IWRM trained on practical aspects of its implementation?			
VII. Awareness of IWRM among different stakeholders			
Are politicians and senior officials aware of IWRM?			
Is water management staff aware of the necessity of IWRM?			
Are water users aware of the IWRM principles?			
Are NGOs active in raising awareness on IWRM principles?			
Are parliamentarians and local councils aware of IWRM?			
VIII. IWRM in National budget			
Does the National budget contain budget lines for planned expenditures that support the application of IWRM?			
IX. Gender Mainstreaming			
Is the role of women in water management supported by law?			



X. Stakeholders participation			
Is there a formal framework/mechanisms for stakeholder participation in IWRM?			
Is the above framework functional and effective?			