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LITANI RIVER BASIN MANAGEMENT SUPPORT PROGRAM

ACTION PLAN FOR WATER RESOURCES AWARENESS AND ENFORCEMENT

JANUARY 2014

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ACRONYMS

IRG	International Resources Group
IQC	Indefinite Quantity Contract
IWRM	Integrated Water Resources Management
LRA	Litani River Authority
LRBMS	Litani River Basin Management Support
MEW	Ministry of Energy & Water
MoE	Ministry of Environment
MoF	Ministry of Finance
NWSS	National Water Sector Strategy
RWE	Regional Water Establishment
USAID	United States Agency for International Development

EXECUTIVE SUMMARY

BACKGROUND

The Litani River Basin Management Support (LRMBS) Program is a four-year program to improve water management in the Litani River Basin in the Bekaa. It is implemented by International Resources Group (IRG), in cooperation with the Litani River Authority (LRA), and is funded by USAID. The program began in October 2009 and has four components: building institutional capacity, water monitoring, irrigation management and risk management.

This report presents a simple action plan for the Litani River Authority, should it be empowered so, to implement actual field water management, in the form of both enforcement and awareness activities.

WATER SITUATION IN THE LITANI RIVER BASIN

The Litani River is the largest river in Lebanon and drains the central and south Bekaa Valley. Its water resources have been harnessed for human uses since the 1960s through the construction of the Qaraoun Dam. The Litani River Basin is today experiencing increasing water demands, groundwater over-exploitation, and extensive pollution. In summer, the Litani River shows a meager flow, much decreased from 40 years ago. The smell reveals its origin and contents: raw sewage, untreated industrial effluents, extensive garbage dumping, and agricultural runoff.

These activities are often illegal and result from inadequate water use practices by unaware and self-interested residents, farmers, industries who have no incentives or solutions to behave differently.

Overall water management is weak as:

- Information remains a source of power for government officials and is hidden, toyed with, or ignored as suitable; decisions are taken at central level in a opaque manner;
- Participation by water users, residents and other stakeholders is limited, with Municipalities, the direct link with residents, rarely involved in planning and decision processes; and
- Accountability and performance monitoring are absent in governmental agencies; departments and staff do not have clear responsibilities, nor annual objectives or targets.

IRBM APPROACH

The time when water management was a simple issue of water development, that is locating and mobilizing/harnessing water resources through engineering works to increase supply is now long over.

Today multiple and growing water needs often outstrip availabilities and most water issues involve pollutions and wastages due to inadequate water practices by users and weak water management. Water management is a political process that cannot be solely handled by water managers and engineers but should involve all stakeholders.

The successful Integrated River Basin Management (IRBM) framework combines four approaches:

- Infrastructure development (construction of networks, treatment plants, etc.), much needed, but alone not sufficient;
- Monitoring and enforcement to control withdrawals and releases, and protect water resources from illegal uses and abuses such as untreated releases and groundwater over-extraction;
- Improved water governance (i.e. laws, institutional roles, policies) to clarify and delegate roles, improve coordination and accountability and thus the overall performance of the water sector;
- Finally and essentially, water users' awareness and ownership to achieve lasting changes in the behaviors of water users once they better understand the consequences of their actions, feel responsible and adapt their water use practices. Water users are the issue since they tend to pollute and waste water. How can one hope to solve the water issue without involving them?

The Litani River Basin Management Support (LRBMS) program aims to promote the IRBM approach in the LRB and support the Litani River Authority (LRA) as the leading implementing agency to better manage water resources in the Litani River Basin. To that end, LRBMS proposed a revised mandate which notably empowers LRA to carry out:

- Regulation (issue and control/monitor permits for diversion/withdrawal of surface- and ground-waters, and for release of treated/untreated sewage);
- Information and awareness raising activities to reduce pollution and wastages and promote responsible water uses.

ACTION PLAN

This action plan assumes that LRA would be able to mobilize initially a few staff (up to five with hopefully one responsible manager/engineer) and thus provide only an initial set of awareness and enforcement activities, as a way to engage water users and offenders, and to build experience in this type of activities.

LRA would and should seek support from and collaboration with Municipalities for the implementation of these activities since Municipal Boards have extensive knowledge of the local situation, and also frequent interactions with water users.

Four awareness activities are proposed here:

- Information dissemination (focused first on local leaders then on the public at large);
- School activities to educate and engage the next generation;
- Concrete activities (such as river clean-ups ; and
- Agricultural extension activities with a more effective use of the LRA extension center in Kherbet Kanafar (which can provide water quality testing, soil analysis, and phytosanitary tests).

These activities would mostly use materials already produced by LRBMS that could be reprinted at minimal cost (posters, brochures, presentation, etc.).

Enforcement is also needed as it targets resilient offenders and abusers, but it is doubtful if a strict application of fines would be productive. Initially the best approach would be to engage some of the offenders in a dialogue, mention enforcement as an unfortunate last resort solution, and assist them to define and implement solutions. Two main groups can be thus targeted:

- Farmers, starting with those subscribing to receive water from canal 900 operated by LRA; LRA should define simple "good fertilization" rules and only subscribe complying farmers; and
- Large factories (notably in the food/beverage/dairy business), where that LRA could regularly publish a list of worst offenders to the medias and public (group pressure is an effective tool, with the threat of losing customers).

Likewise a simple approach to encourage Municipalities to become more active in the mitigation of all types of pollutions could be the regular (quarterly?) publication of a dashboard showing the current status, per Municipality, of the management of solid waste, residential sewage and industrial wastewater. Again the idea here is to prod Municipal Boards into action by having their residents more aware of their representatives' engagement and effectiveness (or lack thereof) in addressing water pollutions.

Within LRA, the Water Resources Management Unit, in charge of water monitoring and thus holding the necessary water data and information, is the most suitable entity to carry out both awareness and enforcement activities.

As a final comment, the impact of both awareness and enforcement activities should, if possible, be monitored over time, with a simple survey (administered yearly) regarding the level of knowledge and engagement of residents about water issues. The number of annual offenses and the level of compliance would also be good indicators.

ملخص تنفيذي

الخلفية

يستمر برنامج دعم ادارة حوض نهر الليطاني LRBMS الممول من الوكالة الامريكية للتنمية الدولية USAID لمدة اربع سنوات بهدف تطوير ادارة المياه في الحوض الاعلى (البقاع)، والذي تنفذه مجموعة الموارد الدولية IRG بالتعاون مع المصلحة الوطنية لنهر الليطاني .LRA بدأ تنفيذ المشروع في ايلول 2009 وهو يتألّف من اربعة اقسام: بناء القدرات، مراقبة المياه (نوعاً وكماً)، دعم ادارة مشاريع الري وإدارة المخاطر .

ويعرض هذا التقرير خطة عمل بسيط للمصلحة الوطنية لنهر الليطاني، ويجب تمكينها من ذلك، لتنفيذ إدارة المياه الميدانية الفعلية، لناحية التوعية وتحقيق القانون.

الوضع المائي في حوض نهر الليطاني

نهر الليطاني هو أكبر ألانهر في لبنان ويجري عبر سهل البقاع قي الوسط والجنوب . وقد تم تسخير موارده المائية للاستخدامات البشرية منذ العام 1960، من خلال بناء سد القرعون. يشهد حوض نهر الليطاني اليوم زيادة في الطلب على المياه، المياه الجوفية حيث الاستغلال المفرط ، والتلوث واسع النطاق. في فصل الصيف، يظهر نهر الليطاني تدفقه الهزيل، حيث انخفضت كميات المياه كثيرا عما كانت عليه قبل 40 عاما، كذالك تكشفت روائح كريهة مصدرها ومحتوياتها: مياه المجاري، النفايات السائلة الصناعية غير المعالجة ، والنفايات المنزلية، و الصرف الزراعي.

إن هذه الأنشطة التي تكون غالباً غير قانونية وتنجم عن عدم كفاية وصوابية الممارسات في استخدام المياه من قبل السكان الذين يجهلون مصلحتهم الذاتية ، ومن قبل المزارعين، والصناعيين الذين ليس لديهم حوافز أو حلول لتتصرف بشكل مختلف.

الإدارة العامة للمياه ضعيفة للاسباب التالية:

- لا تزال المعلومات مصدر قوة للمسؤولين الحكوميين و لا يتم تعميمها ، وتؤخذ القرارات من الادارة المركزية بحسب ما يلائم صناع القرار انفسهم

- مشاركة مستخدمي المياه والمقيمين وأصحاب المصلحة الآخرين يقتصر على البلديات ، التي لها صلة مباشرة مع السكان ، ولكنها نادرا ما تشارك في عمليات التخطيط واتخاذ القرار؛ و
- المساءلة ومراقبة الأداء غائبة في الوكالات الحكومية ؛ الإدارات والموظفين لم تكن لديهم مسؤوليات واضحة، ولا أهداف سنوية أو خطط عمل سنوية.

نهج الادارة المتكاملة لحوض النهر IRBM

في الوقت الذي كانت إدارة المياه قضية بسيطة في عملية تنمية الموارد المائية والتي تحدد التعبئة / وتسخير الموارد المائية من خلال الاعمال الهندسية التي تعمل على زيادة التغذية بالمياه على فترة طويلة. اليوم الاحتياجات المائية المتزايدة متعددة و غالبا ما تفوق الكميات المتاحة، إشراك معظم قضايا المياه والتلوث تحديداً، بسبب الممارسات الغير صائية من قبل المستخدمين وبنفس الوقت هناك إدارة ضعيفة للمياه. إدارة المياه هي العملية السياسية التي لا يمكن التعامل معها إلا من قبل مديري المياه والمهندسين ولكن يجب إشراك جميع أصحاب المصلحة والمستفيدين.

تجمع الادارة المتكاملة لحوض النهر ال(IRBM) أربعة أساليب:

- تطوير البنى التحتية (بناء شبكات ومحطات معالجة ، الخ)، قد تكون الحاجة اليها عالية جداً، ولكن وحدها لا تكفي؛
- الرصد و الإنفاذ للسيطرة على عمليات السحب (الضخ) والتوزيع للمياه الجوفية، حماية الموارد المائية من الاستخدامات الغير قانونية كذلك وقف التجاوزات في عملية تسجيل البيانات، والاهم الحماية من الإفراط في استخراج المياه الجوفية؛
- تحسين إدارة المياه (أي القوانين والأدوار المؤسسية والسياسات) لتوضيح وتحديد الأدوار ، وتحسين التنسيق و المساءلة ، وبالتالي الأداء العام لقطاع المياه؛
- أخيراً وبشكل أساسي، تعتبر التوعية لمستخدمي المياه امراً اساسياً لتحقيق تغييرات دائمة في سلوكيات مستخدمي المياه حيث انهم سيدركون بشكل أفضل وفهم اعمق لعواقب أفعالهم، وسيشعرون بالمسؤولية والتكيف مع الممارسات السليمة لاستخدام المياه. إن مستخدمي المياه هم انفسهم الملوثون، فكيف يمكن للمرء أن يأمل في حل قضية المياه دون إشراكهم؟

يهدف برنامج دعم إدارة حوض نهر الليطاني (LRBMS)إلى تعزيز نهج IRBM في حوض نهر الليطاني ودعم المصلحة الوطنية لنهر الليطاني (LRA) كوكالة منفذة ورائدة لإدارة أفضل للموارد المائية في حوض نهر الليطاني. تحقيقا لهذه الغاية ، اقترح LRBMS وثيقة منقحة تخول عند تحقيقها المصلحة الوطنية لنهر الليطاني لتنفيذ:

- تنظيم (المشاكل، المراقبة / رصد التحويل / الضخ من المياه الجوفية، وإعادة استخدام مياه الصرف الصحي المعالجة وغير المعالجة)؛

- أنشطة الإعلام و التوعية للحد من التلوث وتعزيز مسؤولة يستخدمي المياه .

خطة العمل

تفترض خطة العمل هذه ان المصلحة الوطنية لنهر الليطاني ستكون قادرة على حشد عدد قليل من الموظفين في البداية (خمسة موظفين مع المسؤول المدير / مهندس واحد)، وبالتالي لا توفر سوى مجموعة أولية من أنشطة التوعية والإنفاذ، باعتبارها وسيلة لإشراك مستخدمي المياه والملوثين او المخلين بالقانون لجهة التلوث، وبناء الخبرة والقدرات في مثل هذا النوع من الأنشطة.

أن المصلحة الوطنية لنهر الليطاني يجب أن تسعى إلى دعم البلديات والتعاون معهم لتنفيذ هذه الأنشطة حيث ان المجالس البلدية لديها معرفة واسعة للوضع المحلي، وكذلك التفاعلات المتكررة والانشطة المشتركة مع مستخدمي المياه.

تقترح الخطة أربعة أنشطة للتوعية هنا:

- نشر المعلومات (تركز الخطة أولاً على القادة والمسؤلين المحليين ثم على عامة الجمهور) ؛
- الأنشطة المدرسية لتثقيف وإشراك الاجيال القادمة؛
- الأنشطة الملموسة (مثل تنظيف النهر، و
- أنشطة الإرشاد الزراعي مع استخدام أكثر فعالية لمركز الإرشاد الزراعي التابع للمصلحة الوطنية لنهر الليطاني في خربة قنافار (والتي يمكن أن توفر اختبارات لنوعية المياه، وتحليل التربة، واختبارات الصحة النباتية)

إن هذه الأنشطة في الغالب تكون عبر استخدام المواد المنتجة بالفعل من قبل LRBMS والتي يمكن طبعها بأقل تكلفة ممكنة (كالملصقات ، والكتيبات ، ..... وما إلى ذلك)

هناك حاجة أيضا للإنفاذ (تحقيق القاونين وتنفيذها) حيث أنه يستهدف المخلين والملوثين وبنفس الوقت التعاطي بمرونة ، ولكن من المشكوك فيه ما إذا كان التطبيق الصارم عبر الغرامات ستكون مثمرة. في البداية أفضل النهج سيكون اشراك بعض المخلين في حوار ، وبعدها فرض القوة كحل أخير ومؤسف في آن، كذلك مساعدة مستخدمي المياه على تحديد الحلول و تنفيذها. هناك مجموعتين رئيسيتين يمكن بالتالي ان تستهدف :

- **المزارعون** ، بدءا بالمشتركين في المياه من القناة 900 التي تديرها المصلحة الوطنية لنهر الليطاني ، حيث يجب تحديد قواعد من قبل المصلحة تكون بسيطة ك" التسميد الجيد" وارشاد المزارعين المشتركين؛ و

- **المصانع الكبيرة** (لا سيما في قطاع الأغذية / المشروبات / الألبان)، حيث أن المصلحة الوطنية لنهر الليطاني يمكن أن تقوم بنشر وبانتظام قائمة لأسوأ المخالفين في وسائل الإعلام وندوات للجمهور (الضغط على المجموعة كأداة فعالة، مع العلم بخطر فقدان الزبائن)

وبالمثل يجب القيام بمقاربة بسيطة لتشجيع البلديات كي تصبح أكثر نشاطا بغية التخفيف من جميع أنواع التلوث وحيث يمكن أن يكون ذلك او تردد ذلك كل (ربع سنة ؟) إن النشر المنتظم للقوائم المذكورة من شأنها ان تبين الوضع الحالي ، في البلدية ، كذلك القيام بنشاطات لإدارة النفايات الصلبة والصرف الصحي السكني والصناعي.

مرة أخرى الفكرة هنا هي حث المجالس البلدية على العمل والقيام بحملات توعية لمعالجة تلوث المياه.

يجب ان تتضمن المصلحة الوطنية لنهر الليطاني، وحدة لإدارة الموارد المائية، تكون مسؤلة عن رصد المياه وبالتالي البيانات والمعلومات اللازمة لادارة المياه ، وتكون هذه الوحدة الكيان الأنسب لتنفيذ كل من أنشطة التوعية والإنفاذ (تحقيق القانون بالقوة).

كتعليق نهائي، ينبغي، إذا أمكن، أن ترصد أثر الأنشطة سواء الوعي اوالإنفاذ مع مرور الوقت، وذلك عبر عملية مسح او استقصاء بسيط (يدار سنويا) بما يتعلق بمستوى المعرفة عند الناس وتطوره ومستوى إشراك السكان حول قضايا المياه. ان عدد المخالفات السنوية ومستوى الامتثال (تطبيق القانون) تكون مؤشرات جيدة لنجاح هذه الخطة.

1. INTRODUCTION

1.1. AUTHORIZATION

International Resources Group (IRG) was contracted by USAID/Lebanon (Contract EPP-I-00-04-00024-00 Task Order No. 7) under the Integrated Water and Coastal Resources Management Indefinite Quantity Contract (IQC) II to implement the Litani River Basin Management Support (LRBMS) Program. The period for performance of the contract is September 29, 2009 to March 31, 2014.

1.2. PROGRAM OBJECTIVES

The purpose of the LRBMS Program is to set the ground for improved, more efficient and sustainable basin management at the Litani river basin through provision of technical support to the Litani River Authority and implementation of limited small scale infrastructure activities.

The LRBMS program is part of USAID's increasing support for the water sector in Lebanon. The Litani River Basin suffers the fate of many river basins around the world: increasing demands compete for limited natural resources. Groundwater over-exploitation, deforestation and overgrazing, unplanned urban sprawl, untreated wastewater effluents, and unsustainable agricultural practices contribute to environmental degradation in the form of declining water and soil quality.

Solutions do exist to reverse these trends and establish sustainable management practices. The key to successfully implement such solutions requires applying the principles of Integrated Water Resources Management (IWRM) through a single river basin authority rather than multiple agencies responsible for different aspects of water management as is the case in many countries. Fortunately, the existence of the Litani River Authority (LRA) provides a unique platform to become such an IWRM river basin authority that will mobilize stakeholders in the river basin and address these challenges in an integrated manner.

Successful implementation of LRBMS will prepare the LRA to assume the role of an integrated river basin authority upon the removal of the present legal constraints.

1.3. PROGRAM COMPONENTS

LRBMS works with national and regional institutions and stakeholders to set the ground for improved, more efficient and sustainable basin management at the Litani River basin. The LRBMS technical assistance team provides technical services and related resources to LRA in order to improve their

planning and operational performance and equip them with the necessary resources for improved river basin management.

To achieve the program objectives, LRBMS undertakes activities grouped under the following four components:

1) Building Capacity of LRA towards Integrated River Basin Management
2) Long Term Water Monitoring of the Litani River
3) Integrated Irrigation Management with two sub-components:
    a. Participatory Agriculture Extension, implemented on a Pilot Area, the West Bekaa Irrigation Management Project
    b. Machghara Plain Irrigation Plan
4) Risk Management with two sub-components:
    a. Qaraoun Dam Monitoring System
    b. Litani River Flood Management Model

1.4. PURPOSE AND CONTENTS OF THE REPORT

This report presents a simple action plan for the Litani River Authority, should it be empowered to, to implement actual field water management, in the form of both enforcement and awareness activities. To that end, the report includes, beyond the present introduction, the following chapters:

- Chapter 2 presents the technical and institutional background;
- Chapter 3 explains the Integrated River Basin Management (IRBM) approach upon which this action plan is based; and
- Chapter 4 defines the specific activities proposed for both awareness and enforcement under this action plan.

2. BACKGROUND

2.1. WATER SITUATION IN THE LITANI RIVER BASIN

The Litani River is the largest river in Lebanon and drains the central and south Bekaa Valley. Its water resources have been harnessed for human uses since the 1960s through the construction of the Qaraoun Dam.

The Litani River Basin is today experiencing increasing water demands, groundwater over-exploitation, and extensive pollution. In summer, the Litani River shows a meager flow, much decreased from 40 years ago. The smell reveals its origin and contents: raw sewage, untreated industrial effluents and agricultural runoff. A walk along the river shows:

- Extensive garbage dumping;
- Direct release of urban wastewater;
- Uncontrolled industrial discharges;
- Lack of riverbed maintenance, infringements and unauthorized diversions.

These activities are often illegal but there are rarely available alternatives for water users to behave differently.

The river is now a threat to public health as water pollution propagates to soils, crops, and animals, as well as an obstacle to the socio-economic development and well-being of riparian communities. It is also becoming a growing source of conflicts due to competing demands from farmers, industries, and residents. Moreover the Litani River is asked to provide electricity for Lebanon, irrigation and domestic water for Marjayoun, Saida, and soon Beirut, while serious water shortages already exist in Zahle and the central Bekaa, and the aquifers are getting depleted through over-extraction.

2.2. WATER GOVERNANCE FRAMEWORK IN LEBANON

Water management in Lebanon is similar to other Middle-eastern countries. Reforms and improvements are often hampered by:

- A political focus on engineering projects and constructions as being tangible/visible outcomes, while management reforms are avoided as more difficult, even if much cheaper and often more efficient;

- A lack of leadership and political will to:
    - Follow through and enforce reforms (notably those impacting governmental staff);
    - Address critical issues and take difficult decisions (e.g. water tariffs), especially if these challenge special interests or risk unpopularity;
- An overall lack of staff and capacity in governmental agencies, both at technical and managerial levels;
- The usual top-down management which centralizes decision power and stifles initiative;

Much remains to be done to improve water management in Lebanon generally and in the Litani River Basin specifically. The main requisite is to follow the universal principles of transparency, participation and accountability, which are unfortunately lacking[1]:

- Information remains a source of power for government officials and is hidden, toyed with, or ignored as suitable; decisions are taken at central level in a opaque manner;
- Participation by water users, residents and other stakeholders is token at best, with decisions and plans being presented when final; Municipalities which are the direct link with residents and the main vehicle for democracy are rarely involved in planning and decision processes; and
- Accountability and performance monitoring are absent in the public sector, governmental agencies, departments and staff do not have clear responsibilities, nor annual objectives or targets.

No governmental agency is effectively managing water resources in Lebanon in general. A review of standard water governance functions confirms that the water governance framework is defective in terms of legal roles, institutional capacities and effective policies:

Function	**Legally responsible entity**	**Actual action**	**Comment(s)/ Example(s)**
1. Organizing and building capacity in the water sector			
1.1 Creating and modifying an organizational structure	MEW	Little action, if any	- LRA organigram still pending after 60 years - Organigrams for RWEs are not standardized
1.2 Assigning roles and responsibilities	MEW	Little action, if any	No clear enforcement responsibilities (regarding industrial pollution, groundwater over-abstraction, etc.)

[1] See for example the World Bank - Country Water Sector Assistance Strategy (2012)

1.3 Setting national water policy	MEW	Only NWSS	No clear policies on water and wastewater tariffs
1.4 Coordinating and integrating among sectors and regions	National Water Council (per Law 221)	Never established	Little coordination, if any, between Ministries, CDR, RWEs, LRA, etc.
1.5 Establishing linkages with neighboring riparian countries	MEW	Little action, if any	No relationships with Israel, Syrian civil war
1.6 Building public and political awareness of water sector issues	MEW	Little action, if any	Limited awareness activities by donor projects
1.7 Securing and allocating funding for the sector	MEW	MEW, CDR, others	Apart from over-ambitious NWSS, no "business planning" approach
1.8 Developing and utilizing well-trained water sector professionals	MEW	Little action, if any	Promotion by WASTA or seniority
2. Planning strategically			
2.1 Collecting, managing, storing, and utilizing water-relevant data	MEW	Mostly LRA for collection	- Poor, if any, quality control - Secrecy of data
2.2 Projecting future supply and demand for water	MEW	Only NWSS	Only done at national level, not regional/basin level
2.3 Designing strategies for matching long-term supply and demand	MEW	Only NWSS	NWSS requires $7B in 5 y, 7 to 10 times more than current water investments
2.4 Developing planning and management tools to support decision making	MEW	Little action, if any	
3. Allocating water			
3.1 Awarding and recording water rights and corollary responsibilities	MEW	Little action, if any	Thousands of illegal wells in Lebanon
3.2 Establishing water rights transfer mechanisms	MEW	Little action, if any	Water rights based on authorizations and not transferable
3.3 Adjudicating disputes	MEW	Little action, if any	MEW has no staff to solve conflicts
4. Developing and managing water resources			
4.1 Constructing public infrastructure & authorizing private infrastructure development	MEW	- Public: MEW, CDR, others - Private: no regulation	
4.2 Forecasting and matching seasonal supply and demand	??	Ad-hoc, if any	
4.3 Operating and maintaining public infrastructure	MEW, RWE, LRA	Some structures operated properly, others are not	Most wastewater treatment plants are operated partially or not at all
4.4 Applying tariffs, incentives, sanctions for long & short term matching of supply/demand	MEW	Little action, if any	
4.5 Forecasting and managing floods and flood impacts	MEW	Little action, if any	Only flood management studies/plans by donor projects
5. Regulating water resources and services			
5.1 Issuing and monitoring operating concessions to water service providers	MEW	Not much supervision of RWEs	RWEs do not have specific targets/goals, no performance monitoring is done
5.2 Enforcing withdrawal limits associated with water rights	MEW	Little action, if any	Thousands of illegal wells, many illegal river diversions
5.3 Regulating water quality in waterways, water bodies, and aquifers (incl. enforcement)	MEW	Little action, if any	Many industrial releases of untreated wastewater
5.4 Protecting aquatic ecosystems	MoEnv	Little action, if any	Only pilot activities by donor

			projects
5.5 Monitoring and enforcing water service standards	MEW	Not much supervision of RWEs	

2.3. WATER MANAGEMENT IN THE LITANI RIVER BASIN

Looking specifically at the Litani River Basin, water management there is weak if not inexistent, as these few examples show:

- Over 300 factories operate in the LRB and most, if not all, have no treatment whatsoever for their wastewater; some large ones release directly into surface waters;
- Domestic sewage networks have been built without treatment plant and thus release directly into surface waters; conversely several treatment plants have been built without proper planning for their sustainable operation and financial upkeep or without serving networks;
- Thousands of illegal wells withdraw from groundwater, mostly for irrigation; aquifer tables are lowering, and there is no groundwater monitoring, planning, or management;
- The overall allocation of the Litani River Basin waters relies on Decree 14522 issued in 1970, which has not been revised in the past 44 years;
- Floods have impacted the Litani River and tributaries, last main event being February 2003; apart from some riverbed over-excavation in 2005-6, no action has been taken since; riverbed maintenance is not even carried out; MEW considered in 2011 transferring to LRA the responsibility for maintaining the Litani riverbed but relented, despite the fact that it has no staff in the Litani River Basin to assess, plan and possibly perform such task.

The main obstacle to effective water management is the extreme centralization of the GoL whereby the Ministry of Energy and Water is, per Law 221, and by default, responsible for most of water management, while having limited staff, capacity, information, and coordination processes with other ministries and regional/local authorities to effectively perform, or guide and coordinate the main water management functions.

3. IRBM APPROACH

3.1. WHAT IS IRBM?

The time when water management was a simple issue of water development, that is locating and mobilizing/harnessing water resources through engineering works to increase supply is now long over. Today multiple and growing water needs often outstrip availabilities and most water issues involve pollutions and wastages due to inadequate water practices by users and weak water management. **Bluntly said, infrastructure development is not sufficient to address water issues, water management is a political process that cannot be solely handled by water managers and engineers but should involve all stakeholders.**

All countries that successfully manage water resources (often reversing negative trends such as increasing pollutions or decreasing resources) have adopted the Integrated River Basin Management (IRBM) framework as the solution. IRBM combines four approaches:

- **Infrastructure development** (construction of networks, treatment plants, etc.), much needed, but alone **not sufficient.**
- **Monitoring and enforcement** to control withdrawals and releases, and protect water resources from illegal uses and abuses such as untreated releases and groundwater over-extraction.
- **Improved water governance (i.e. laws, institutional roles, policies)** to clarify and delegate roles, improve coordination and accountability and thus the overall performance of relevant governmental entities.
- Finally and essentially, **water users' awareness and ownership** to achieve lasting changes in the behaviors of water users once they better understand the consequences of their actions, feel responsible and adapt their water use practices. **Water users are the issue since they pollute and waste water. How can one hope to solve the water issue without involving them?**

Implied and universally applied (EU Water Framework Directive for example) is the idea that water management should be done at basin-level for better monitoring and enforcement, and closer interaction with residents and water users through their representatives. As mentioned in Lebanon's National Water Sector Strategy, MEW's role is a strategic one, i.e. to plan and finance large infrastructure, decide national

policies, and guide and regulate regional water agencies, and definitely not to operate and maintain or monitor and enforce.

3.2. JUSTIFICATION FOR THE ACTION PLAN

The Litani River Basin Management Support (LRBMS) program aims to promote the IRBM approach in the LRB and support the Litani River Authority as the leading implementing agency to better manage water resources in the Litani River Basin as:

- A well established and semi-autonomous public agency with the appropriate geographical mandate;
- Having field presence in terms of technical staff, infrastructure, equipment, and existing relationships with many water users, including farmers, municipalities and industries;
- Being self-financed and administratively autonomous (in principle if not in practice); and
- Already performing essential monitoring functions and having unique knowledge of the water situation in the basin.

To that end, LRBMS proposed a revised LRA mandate which notably empowers LRA to be the (currently inexistent) water manager for the Litani River Basin through:

- Regulation (issue and control/monitor permits for diversion/withdrawal of surface- and ground-waters, and for release of treated/untreated sewage);
- Information and awareness raising activities to reduce pollution and wastages and promote responsible water uses.

An action plan is provided next section to guide LRA in the first year(s) of implementation of such activities.

4. ACTION PLAN

This action plan has been prepared for LRA to implement awareness and enforcement activities should it be so empowered though a change in mandate. LRA would and should seek support from and collaboration with Municipalities for the implementation of these activities since Municipal Boards have extensive knowledge of the local situation, and also easy/direct contact with water users. Municipal Board members (and other local leaders) should be, along with school students, the first targets for awareness and enforcement activities, since they are by far the best actors to then raise awareness and assist enforcement. This is due to their directly knowledge/access to residents and water users and thus their capacity to facilitate the dialogue, and influence/change mentalities and practices.

4.1. DESCRIPTION OF SPECIFIC AWARENESS ACTIVITIES

Four activities are proposed here:

- Information dissemination (focused on prime targets then on the public at large);
- School activities to educate and engage the next generation;
- Concrete activities; and
- Agricultural extension activities.

4.1.1. INFORMATION DISSEMINATION

LRBMS already designed and provided materials which include:

- The 8-pager extract/summary from the RBMP volume 1 - assessment which describes the situation of water resources in the Litani River Basin;
- The walk-through PowerPoint presentation which provides about 100 pictures of the pollution sources and consequences in the Litani River and tributaries;
- Fiver posters/billboards alerting as to the four main types of pollution (residential sewage, industrial wastewater, solid waste and agricultural pollution) and also presenting the interdependency of the water cycle; and
- Five corresponding brochures which provide DOs and DONTs.

All these could be reprinted at minimal cost ($1 or less per copy). The first step would then to organize in each Municipality:

- A first meeting to present and discuss these with the Municipal Board (possibly inviting other local leaders, such as the Municipal water committee, when exists);
- One or several public meetings open to all residents with the same intent.

The further door-to-door dissemination of this information could be carried out by Municipal Board members and/or the Municipal water committee. Posters should be placed in prominent places (Municipality/Town Hall, others) to repeat the information and encourage discussion (and hopefully action). Likewise copies of brochures should be made available in each Municipality/Town Hall.

Another useful material is the monthly water quality report (1-page) prepared by LRA, which should be sent to each Municipality for public display.

4.1.2. SCHOOL ACTIVITIES

Similar activities as described above should be implemented in schools. LRBMS also designed a simple water PowerPoint which could be easily used, along with delivery of the "Save the Litani River" puppet show (or its video). LRBMS also designed notebooks (with the five brochures), as well as calendars with kid drawings. These could again be reprinted at minimal cost ($1 or less per copy).

4.1.3. CONCRETE ACTIVITIES (RIVER CLEAN-UPS)

LRBMS has encouraged concrete activities carried out by volunteers such as river cleanups (mostly collection of garbage on river/stream banks, and planting of trees). In Anjar, this activity ahs been going on for now three years and in six other Municipalities, Municipal Water Committees have been established in 2013 to identify and carry out such activities with minimal support from LRBMS.

LRA should encourage and advocate for continuing and repeating these activities as they engage residents to become actors, better understand the consequences (in terms of pollution) of their very existence and how simple steps can mitigate the negative environmental impacts.

4.1.4. FARMERS

The EU-funded IRWA project supported in 2006 the construction of an extension center for LRA in Kherbet Hanafar which can provide water quality testing, soil analysis, and phytosanitary tests. Unfortunately the lack of staff and leadership currently makes this center mostly inoperative, apart from some water and soil testing, and minor demonstration plots. Reviving this center should be a priority for LRA, with the main intent to provide testing, training, and advice to farmers in terms of:

- Proper soil management to prevent over-fertilization and pollution; and
- Water use efficiency, to reduce wastages.

4.2. DESCRIPTION OF SPECIFIC ENFORCEMENT ACTIVITIES

Awareness raising can definitely contribute to changing water use behaviors and practices of farmers, industries, residents. But enforcement is also needed as it targets resilient offenders and abusers. Indeed enforcement is mostly effective as a complement to awareness raising in the sense that a offender who has repeatedly been informed about proper and improper practices cannot claim ignorance and will be more likely to acknowledge the offense.

However given the overall lack of enforcement in Lebanon, due the unreliability and ineffectiveness of the judicial system, and the general disregard for simple social norms[2], it is doubtful if a strict application of fines would be productive. It would probably be counter-productive and provide a negative image for the LRA and its staff.

Limited enforcement and media exposure can however be carried out by LRA to target specific farmers, industries, and Municipalities.

4.2.1. COMPLIANCE OF FARMERS AND INDUSTRIES

The best approach is to engage offenders in a dialogue, threaten with enforcement as an unfortunate last resort solution, and assist them to define and implement solutions. Two main groups can be targeted:

- Farmers, starting with those subscribing to receive water from canal 900 operated by LRA; LRA should define and explain simple "good fertilization" rules (for example soil testing being compulsory) and only accept subscription from complying farmers; and
- Large factories (notably in the food/beverage/dairy business), where in collaboration with Mayors, LRA should explain and encourage compliance to sewage release standards from Ministry of Environment. Non-compliant factories would be given some time to comply but failing that LRA could regularly publish a list of worst offenders to the medias and public (group pressure is an effective tool, with the threat of losing customers).

[2] Driving being the very example in Lebanon where selfish individualistic misbehavior causes most of the traffic jams.

4.2.2. DASHBOARD FOR MUNICIPALITIES

Likewise a simple approach to encourage Municipalities to become more active in the mitigation of all types of pollutions could be the regular (quarterly?) publication of a dashboard such as the one presented next page, which assesses the current status, per Municipality, of the management of solid waste, residential sewage and industrial wastewater.

Again the idea here is to prod Municipal Boards into action by having their residents more aware of their representatives' engagement and effectiveness (or lack thereof) in addressing water pollutions.

Dashboard of Municipal management of (solid and liquid) wastes

Town	Solid Waste	Trend	Domestic Sewage	Trend	Industrial Pollution
Zahlé	Sorting, partial recycling, dumped at own sanitary landfill		Network partially built, WWTP being built	2013	Large industrial area
Bar Elias	Basic landfill (Bar Elias & Marj)		Network partially built, WWTP Anjar		medium industries, garages
Baalback	Sanitary landfill & sorting facility soon complete	2013	Network complete, own WWTP being built	2015 ?	Butcheries, plastic, olive oil
Qaraoun	Ad-hoc dumpsite, landfill of Quaroun Lake Municipal Union (when built)		Network complete, WWTP Aitanit working		Quarries, rock cutting, Food Industries Arab Company
El-Marj	Basic landfill (Bar Elias & Marj)		Network partially built, WWTP Anjar when built		Plastics, furniture
Qob Elias	Ad-hoc dumpsite		Network partially built, WWTP Ablah		Sicomo, wineries, ready mix concrete, dairy, steel, plastics
Joub Jannine	Ad-hoc dumpsite, Sanitary landfill to be completed soon		Network partially built, WWTP Joub Jannine		Olive oil and stone quarries
Hezzine	Haphazard dumping, Baalbak landfill soon	2013	Network incomplete, connect to Timneen WWTP later		Light industrial activity
Ferzol	Zahelh landfill		Network old/incomplete, Ferzol WWTP functioning		Wineries, garages, pickles, dairy, Master chips
Kherbet Kanafar	Ad-hoc dumpsite		Network complete, WWTP Joub Jenine		Wineries, Dairy, Commercial
Mashgharah	Ad-hoc dumpsite, soon Jub Jinnine and Yumor Sohmour sanitary landfill in future	2014	Network ok, Mashghara WWTP		Light industrial activity
Al-Mansoura	Ad-hoc dumpsite, to Sanitary landfill of Quaroun Lake Municipal Union in future	2014	Partial, connect WWTP Joub Jannine in future		Poppins
Kfar Zabad	Haphazard dumping		No network, WWTP Anjar in future		Light industrial activity
Ablah	Ad-hoc dumpsite		Network partially built, WWTP Ablah		Tanmia, rock cutting, diapers
Ain Zebde	Dumpsite in Saghbine		Present, need pump to connect with WWTP Joub Jannine		Light industrial activity
Kamed El-Loz	Dumpsite, to Sanitary landfill of Quaroun Lake Municipal Union in future	2014	Network partially built, WWTP Jub Jannine		Light industrial activity
Haouch Sneid	Haphazard dumping		No network, WWTP Anjar in future		Liban Lait, other dairy, rock cutting,
Bwarij	Haphazard dumping		Network partially built, WWTP Timnine Tahta later		Dairy products
Anjar	Bar Elias & Marj basic landfill		Network complete, WWTP Anjar in future		Light industrial activity
Makseh	Zahelh sanitary landfill		Network present, farmers irrigate with wow, WWTP unknown		Kassatly Chtura & other conserves (chtura,alfa), dairy, chicken farm
Jdita	Bar Elias & Marj basic landfill		Network partially used/old, WWTP Anjar in future		Dairy products, wineries, garages
Ammik	Adhoc dumpsite		Network complete, WWTP Jub Jannine		Wineries

LEGEND

- No or little management of wastes
- Some limited management of wastes
- Proper management of wastes

4.3. IMPLEMENTATION OF THE ACTION PLAN

This action plan assumes that LRA would be able to mobilize initially only a few staff (up to five with hopefully one manager/engineer) and thus provide only an initial set of awareness and enforcement activities, as a way to engage water users and offenders, and to build experience in this type of activities.

Within LRA, the Water Resources Management Unit, in charge of water monitoring and thus holding the necessary water data and information, is the most suitable entity to carry out both awareness and enforcement activities.

As a final comment, the impact of both awareness and enforcement activities should, if possible, be monitored over time, with a simple survey (administered yearly) regarding the level of knowledge and engagement of residents about water issues. The number of annual offenses and the level of compliance would also be good indicators.

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