



LEBANON

COST ASSESSMENT OF WATER RESOURCES DEGRADATION AND REMEDICATION OF THE LITANI BASIN

POLICY NOTE¹ -- DECEMBER 2013

The Government of Lebanon is fully conscious of the water challenges in Lebanon. Despite its overall political instability, sluggish economic performance and frequent changes of the Council of Ministers, there have been significant efforts in the past five years to initiate a series of reform in the water and wastewater sectors. The Ministry of Energy and Water (MOEW) has completed the draft of the Water Code with the assistance of the Agence française de Développement, which is still awaiting the Government approval. The Council of Ministers has adopted in March 2012 the National Water Sector Strategy (NWSS). The overall goal of the strategy is “to ensure water supply, irrigation and sanitation services throughout Lebanon on a continuous basis and at optimal service levels, with a commitment to environmental, economic and social sustainability. MOEW has also completed a strategy in 2012 for the wastewater sector which complements the NWSS. The main objective is to value the cost of water resource degradation in the Litani watershed to assist decision-makers at national and local levels to identify and prioritize specific actions to improve the management of this basin through potential funding of projects related to environmental benefits and the reduction of externalities. The expected results are: (a) an overview of the economic aspects of watershed management problems in Lebanon; (b) an assessment of the cost of the environmental degradation in the Litani River basin to encompass environmental health and ecological degradations; (c) a valuation of the main benefits linked to different response alternatives (in the selected watershed); (d) an economic analysis of these response alternatives; (e) concrete recommendations to internalize environmental benefits and improve watershed management.

The CAWRD of the ULB reaches LP 342 billion (US\$ 227 million) in 2012 with a variation between LP 283 and 404 billion equivalent on average to 2.2% of GDP in the ULB and 0.5% of GDP current national of Lebanon in 2012. Degradation cost associated to human health reached LP 102 billion in 2012 or 30.6% of the CAWRD of the ULB with LP 74 billion for waterborne diseases and LP 28 billion for respiratory diseases in the region of Zahleh and Baalbeck (Table 1 and Figure 1). Air pollution was covered as it affects water resources in terms of reducing agricultural productivity (smog requiring additional fertilizers that could indirectly increase run-off) and particulate wash off into water resources during the rainy season.

Table 1: CAWRD of the Upper Litani Basin, 2012, in LP billion

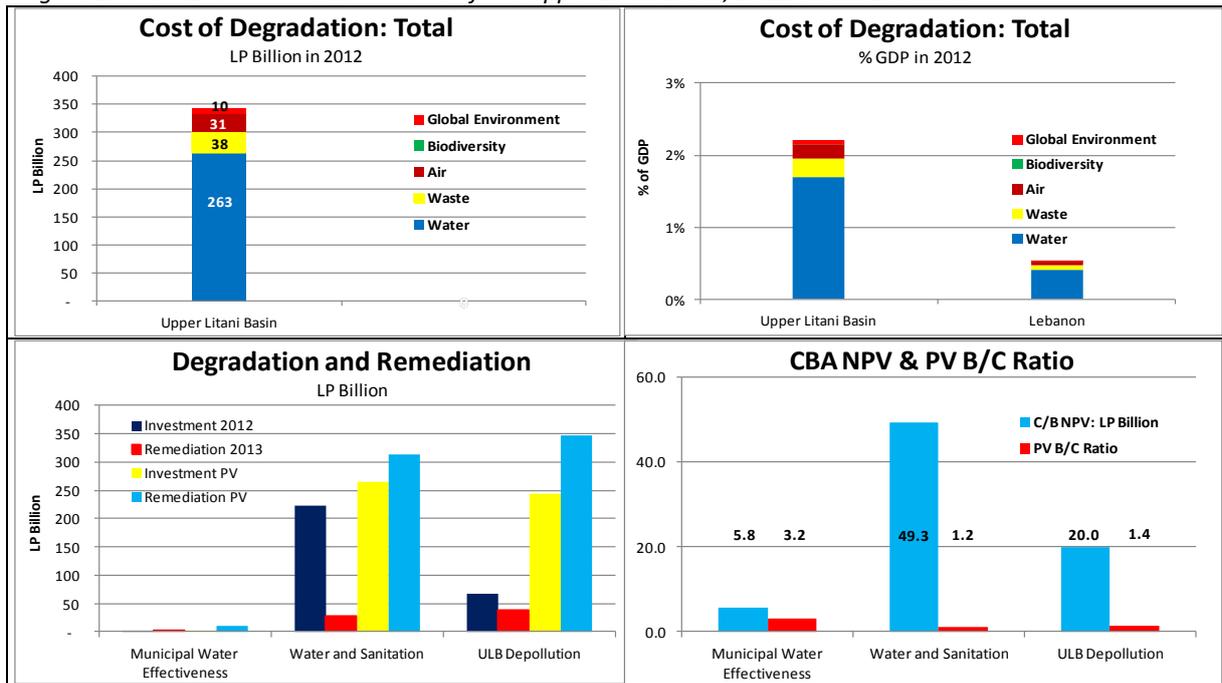
Category	Upper Litani Basin	%	Lower bound	Upper bound
Water	263.5	77%	218.8	312.2
Solid Waste	37.8	11%	29.5	44.3
Air (Baalbeck and Zahleh)	31.3	9%	26.6	36.0
Biodiversity	0.3	0%	0.2	0.3
Natural Disaster and Global Environment	9.8	3%	8.0	11.6
Total	342.6	100%	283.0	404.3
% GDP Upper Litani Basin	2.2%			
% GDP Lebanon	0.5%			

¹ This Note was prepared by Sherif Arif and Fadi Doumani and is based on the report: *Lebanon, Cost Assessment of Water Degradation in the Litani Basin*, prepared in the SWIM-SM context.



Broken down by category, the water degradation is the most significant in the ULB with a relative value with 77% of the total in 2012. Waste ranks second with 11% followed by air pollution with 9%, then by natural disasters and the global environment including flood disruption and forest loss that occurred in the region of the basin in 2012 with 3% and finally biodiversity coming last with 0.1% due to the difficulty of valuing the annual indirect effects on ecosystem services. Broken down by the water subcategory (LP 264 billion in 2012), water quality represents almost half the degradation costs of the ULB (LP 129 billion and 49%), followed by water-borne diseases (LP 74 billion and 28%) and finally water quantity (LP 61 billion and 23%). This category has a small impact on the global environment but costs were not calculated.

Figure 1: CAWRD and Remediation Cost of the Upper Litani Basin, 2012 and in LP billion



The most relevant scenarios were selected and are shown in Figure 1. Two scenarios were considered for improvement efficiency of municipal water to reduce unaccounted for water from 50% to 20% where: (A1) costs were based on 5% incremental cost incurred by households; and (A2) cost were based on optimal incremental cost incurred by households that is the switch off point that would justify the investment. For water and sanitation, three scenarios are suggested: (B1) improved drinking water supply exists but the connection to the sewer system does not exist, (B2) improved drinking water and sewer connection access do not exists, and B3 where B1 and B2 are both considered collectively. Two scenarios were considered for the ULB depollution to reach water resource quality standards where: Scenario C1 being the combined cost of ongoing, planned and additional investments as reported by the Government/Development Partners and MOE/UNDP/EIARD; and Scenario C2 being Stand alone additional investments as suggested by MOE/UNDP/EIARD. In other words, the full benefits of Scenario C2 cannot materialize without the full implementation and operationalization of the Government/Development Partner ongoing and planned investments. The results are a very preliminary estimate that needs to be refined as the Government has recently moved ahead with this ambitious project. Alternatively, a cost/benefit analysis should be performed for each ongoing and planned intervention by the Government/Development Partners and MOE/UNDP/EIARD to prioritize and sequence investments based on their efficiency.

On the basis of these challenges, five axes of intervention are recommended:





- a) **Support the River Basin Agency Concept to be implemented by the Litani River Authority (LRA).** The underlying issues of the Litani Basin and its socio-political impacts are so complex that the present status quo of the present fragmented responsibilities will not ensure the environmental sustainability of this important basin. There is an urgent need to establish an integrated river basin management at LRA in which water management should be made at the basin level for water allocation, monitoring, compliance and enforcement and closer interactions with water users and operators. MOEW strategic role in developing water policies, regulating the regional water establishment and planning and financing large hydraulic infrastructures will certainly be maintained.
- b) **Focusing first on “the low hanging fruits” for reduction of the water losses and for non-revenue water in the water and irrigation networks as well as practices.** The cost of remediation showed for instance that the reduction of 7.2 MCM/year leakage represents only 1.5% of the actual annual incremental cost already paid by households to supplement water for their domestic use. In this regard, it will be important to implement the first elements of the NWSS Infrastructure initiative investment # 1.4 related to water supply transmission and distribution. This intervention is both economically feasible and will contribute to job creation. This will require:
- i. Preparation of an inventory and an action plan with costs for the rehabilitation of the water, wastewater, and irrigation networks and the establishment of outcome-based technical and financial targets for reducing losses in these systems.
 - ii. Implementation of the action plans using the local manpower for replacing existing old transmission and distribution of potable water and irrigation systems.
 - iii. Establishment and maintenance a leak detection system and irrigation techniques, cropping patterns, surfacing soil, drainage systems, etc. as well as establishing specific indicators of management and performance for the water and irrigation systems to be contracted out to professional engineering firms.
- c) **Improving the programming, investment efficiency and the maximization of environmental benefits in the wastewater sector.** At present, the investments programmed by the Government and the Development Partners in the wastewater sector will not cover the entire population of the Litani Basin. The remaining population will not have access to any improved sanitation let alone that their effluents will not be treated before being discharged or percolate in the water bodies. Furthermore for the population, which has access to improved sanitation and for which municipal wastewater is being treated in WWTPs, the major constraint lies in the weak coverage, low installed capacity and lack of O&M and qualified staff to operate the plants. The proposed intervention will be:
- i. To improve first the sanitation in rural and urban poor areas to cover about 688,000 inhabitants by 2032 that could not have access to improved sanitation, through the adoption of low cost technologies and subsidized capital and operation and maintenance costs.
 - ii. To increase also the coverage and the treatment capacities of the existing wastewater treatment plants which are either not functioning or not operating at



their initial installed capacity. These measures will have to be undertaken within an effective reprogramming and sequencing of investments which take into account the capital and the operation and maintenance costs as well as the operation of these plants by qualified utilities.

d) Reducing environmental threats due to the 4 pollution pressures in the ULB. The preliminary results of the ongoing and planned Government and Development Partners investments to which is added the additional investments suggested by the MOE/UNDP/EIARD Qaraoun Depollution project so that water resources parameters will reach acceptable standards is not economically viable. In order to proceed with the suggested investments, the following recommendations are proposed:

- i. To conduct additional pre-feasibility and economic studies to prioritize investments based on efficiency out of a long list of interventions proposed in this program regarding municipal wastewater discharge, industrial effluents, solid waste leachate and agricultural runoff.
- ii. To adopt, based on results of these pre-feasibility and economic studies, a structured and sequenced approach to pollution control by investing in: (a) building, densification and calibration of the sewer network and connect it to the operating and planned WWTPs and set up check and balances to monitor the efficient management of the system; (b) the in situ treatment of industrial effluents; (c) closing/rehabilitating open dumps near by the Litani River and its tributaries with high pollution risks as identified in the 2011 MOE/UNDP/EIARD study and establishing municipal treatment facilities in major cities using the model established in Zahleh and its neighbouring municipalities; and federate under the Ministry of Agriculture tutelage all the efforts to optimize the utilization of fertilizers, fungicides and pesticides in ULB.
- iii. To reinforce the monitoring and enforcement and compliance system by ensuring that polluting enterprises would comply with auto-control and self-monitoring as required by the Framework of the Environment Protection Law 444 and the environmental compliance certification system (Decree 8471-2012) and by outsourcing regular inspections to certified laboratories or universities to enable the MOE to take the necessary legal actions against polluters in conjunction with both the MOEW and Ministry of Industry.

e) Strengthening the knowledge on the development of water resources in the Lower Litani Basin (LLB) and future transfers by:

- i. Institutionalizing the water quality and quantity monitoring system which was developed under the LRBMS.
- ii. Conducting a strategic regional environmental assessment of the LLB to evaluate the environmental consequences and impacts of transferring the polluted water from the ULB to the LLB, canal 800 that is under construction for mainly irrigation purposes in Southern Lebanon, and Beirut through the planned conveyor.