



**16TH CONFERENCE OF
THE OIE REGIONAL COMMISSION
FOR THE MIDDLE EAST**

3-4 NOVEMBER 2021

- Litany experience
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Importance of Litani & Qaroun Lake

- **Litani river**
 - The Litani River Basin (LRB) of 2110 km² is the largest watershed in Lebanon and equals about 20% of the total Lebanese territory.
 - Litani River runs in Lebanon, along 174 km, and has 60 km of tributaries.
 - The basin encompasses a variety of climates ranging from coastal subtropical to dry continental.
 - It comprises 263 villages that are part of 12 districts in 4 governorates.
 - Water flowing in the Litani River equals about 30% of the water running in all Lebanese rivers.
 - It rises in the Beqaa valley and empties in Mediterranean sea.
 - The river originates and flows entirely inside Lebanon, that is, it is not a transboundary river.
- The reservoir has **been used for:**
 - **hydropower generation (190 MW or 250,000 hp),**
 - **domestic water supply,**
 - **and for irrigation of 27,500 ha (68,000 acres),**
 - **Fish product as food security.**

Interest and Outcomes



- Agricultural lands, 27,000 ha, specifically the most important productive region beginning at the Bekaa and ending in the south coast are contributing to the socio-economic benefits of the regions, reducing rural migration, ensuring land-reclamation works, and contributing to the national economy by developing the agriculture sector.
- This also contributes in securing the national food security and securing fertile lands from urbanization as well as from fish meat products resulted from fishing.
- Projects and Their Implementation:



1. Qaraoun Reservoir and Reservoir
2. Hydropower Plants
3. Irrigation Projects
4. Energy Production
5. Agriculture
6. Potable Water
7. Industry
8. Exploitation



Phytoplankton Community of the Qaraoun Reservoir

- Qaraoun Reservoir has been subject to major changes in its phytoplankton community during the last 20 years.
- Before the year 2000, diatoms dominated the reservoir and comprised 80% of the total phytoplankton community (Slim 1996).
- Qaraoun Reservoir has a high phytoplankton biodiversity. More than 90 species were identified between 2000 and 2001, among which about 60 species of planktonic diatoms were dominated by *Aulacoseira granulata* and dinoflagellates by *Ceratium hirundinella*.
- Between 2002 and 2003, *C. hirundinella* disappeared, and Filamentous green algae (*Cladophora glomerata*, *Spirogyra lambertiana*, *Oedogonium* sp., and *Ulothrix zonata*) dominated the reservoir.
- A complete list of the main phytoplankton species identified between early the 1990s and 2016.
- Toxic cyanobacterial blooms of two major species (*A. ovalisporum* and *M. aeruginosa*) were first reported in 2009. Since then, these two cyanobacterial species, together with other phytoplankton species, have been dominating the lake with a predictable and similar blooming pattern each year.



Zooplankton of the Qaraaoun

- Reservoir Phytoplankton represent an important feeding source for many herbivores that inhabit water bodies such as zooplankton, zebra mussels, and planktivorous fish.
- Zooplankton dominated in the Qaraaoun Reservoir when the cyanobacterial biomass was low.
- Four zooplankton species were reported in the reservoir during spring 2016.
- Nine zooplankton species were found in the lake in 2012 and 2013.





The pollution of the lake



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Suitability of Water for Different Uses



- Several negative economic impacts can result in the deterioration of the water quality of lakes. This may include the reduction and prevention of recreational and touristic activities, clogging of irrigation pumps, and breakdown in power-generation tools and mainly the zoology of the lack.
- Studies show that damage to liver and nerves has been detected after long-term exposure such as drinking potable water with toxic algal blooms. Although there is no confirmation of human death from those toxins, several studies have reported the death of animals and water inhabitants after being exposed to toxic cyanobacteria.
- Irrigation and fishing activities can also be at high risk during and after toxic cyanobacterial blooms. Transfer of microcystins and anatoxin-a to edible fish and diverse tissue distribution of MC variants were reported.



- The last incident (death of carps)

Tons of dead fish have washed up on the banks of the lake on Lebanon's Litany river, engulfing a nearby village in a pungent smell, in a disaster blamed on polluted waters.

Numéros	# Codes	# Dates	# Échantillons	# Poids de l'échantillon (g)	# Descriptions
1	Code 2204	22- 04- 2021	1 poisson	2200	Poisson complet capturé mort
2	Code 0305-1	03- 05- 2021	Organes de 2 poissons	115	Poissons capturés vivants
3	Code 0305-2			152	
4	Code 0505	05- 05- 2021	1 poisson	765	Poisson capturé vivant
5	Code 0705-1	07- 05- 2021	2 poissons	230	Capturé mort
6	Code 0705-2			523	Capturé vivant
7	Code 1105-1	11- 05- 2021	Organes de 2 poissons	1107	Poisson complet capturé vivant
8	Code 1105-2			480	Poissons capturés vivants
9	Code 1105-3			400	
10	Code 2105-1	21- 05- 2021	1 poisson	530	
11	Code 2105-2		Organes de 2 poissons	280	Poissons capturés vivants mais très fatigués -
12	Code 2105-3			242	

We have been assigned to apply Sampling procedures for Carp fish, soil sediments and water that were collected, dissected and prepared to be sent to the laboratory of “Agence Nationale de Sécurité Sanitaire de l'Alimentation, de l'Environnement et du Travail (ANSES), Laboratoire de Ploufragan ».

The results showed that Carp fish were the most affected by the disaster, and the carp fish were subjected to a viral disease known as Carp Edema Virus CEV.



Conclusions and Perspectives

We assessed the physico-chemical characteristics and ecological status of the Qaraoun Reservoir.

Several types of pesticides are present in the lake at both high and low concentrations.

The phytoplankton community in the lake has changed during the last few years with reduced biodiversity and dominance of toxic cyanobacterial blooms in addition to other phytoplankton species.

The zooplankton community remains understudied. Its water can be used for hydropower generation and limited recreational activities.

However, swimming and drinking should be avoided. Effective management of water quality in the Qaraoun Reservoir is highly recommended to improve it.

This may be started by treating wastewater discharges from industries and municipalities in the reservoir catchment area to control the levels of enriching nutrients (mainly phosphates and nitrates) and to prevent eutrophication. Also needed for effective management are raising awareness among LRB inhabitants; controlling and treating domestic sewage, municipal, and industrial solid wastes that flow into the river; and enforcing the on-site treatment of industrial wastewater effluents discharged into the Litany River and its tributaries.



Conclusions and Perspectives

- Unsustainable agricultural practices majorly impact groundwater quality. However, the risk of wastewater and SW from urbanized agglomerations and industrial enterprises is rapidly becoming very serious given the sudden increase in population due to the Syrian conflict and inflow of refugees into the country.
- Although the concentrations of trace metals (e.g., Ni, Cr, Cd, Zn, Pb) may be currently too low or moderate to generate any acute adverse impact, the effects of long-term increased contamination might well represent serious health problems in the future especially when simultaneous exposure to multiple metals occurs. This review calls for further assessment studies and long-term monitoring of groundwater quality as well as addresses the need to consider groundwater quality as an integral component of the management of the water resources of the basin.



Some solutions

- We need to make establish a project that study different stressing factor and to evaluate the carp fish disaster and to assess the immunity system of these carps.
- To treat the water quality of the lack by implementing the procedures for purified stations for treating these different type of pollutants.
- Others...