



**LEbanese Water  
Actors Platform**



**Impact of climate change on water and wastewater services in Lebanon**



**Minutes of the workshop**

Friday, 16th of November 2018  
At the Rhone Mediterranean Corsica Agency  
14 Jonas SALK Street, Lyon, France



## OBJECTIVES

Through presentations and exchanges with stakeholders of the Lebanese water and wastewater sector, this workshop aimed to:

- Make an inventory of the evolution of water availability in a context of climate change in Lebanon;
- Improve understanding of the issues faced by Lebanese actors to adapt to climate hazards;
- Understand the difficulties arising from the management of water and wastewater services;
- Develop a better appreciation of stakeholders involved in water, wastewater and climate change issues;
- To discuss the solutions that can be implemented in Lebanon, the conditions of their implementation, their advantages and limits.

## PROGRAM

### 10:00 am – Welcoming session

*Mr. Nicolas Guerin, Director of the Data, Royalties and International Relations Department at the Rhone Mediterranean Corsica Agency (AERMC)*

### 10:15 am – WASH services and climate change

*Ms. Colette Genevoux, Project Officer, pS-Eau*

### 10:30 am – Climate change adaptation strategy for Rhone Mediterranean Corsica catchment basin

*Mr. Thomas Pelte, Expert Climate change, AERMC*

### 11:00 am – Hydrological functioning of Lebanese watersheds in the context of climate change

*Mr. Antoine Allam, PhD Student, Saint-Joseph University and SupAgro Montpellier*

### 11:30 am – Which governance for the irrigation in a context of water scarcity?

*Mr. Nassim Abou Ahmad, Head of governance department, Litani River Authority*

### 12:00 pm – Round table: Impact of climate change on water and wastewater services in Lebanon

*Mr. Jean Gebran, General Director of Beirut and Mount Lebanon Water Establishment*

*Mr. Khaled Obeid, General Director of North Lebanon Water Establishment*

*Mr. Rizk Rizk, General Director of Bekaa Water Establishment*

### 2:00 pm – 4:30 pm Open forum

## WELCOMING SESSION

*Mr. Nicolas Guerin, Director of the Data, Royalties and International Relations Department at the Rhone Mediterranean Corsica Agency*

AERMC intervenes in the fields of water, hygiene and sanitation at an international level. This involvement is divided into three components:

- Cooperation and international solidarity by supporting projects implemented by local authorities and non-governmental associations (example: pS-Eau and the LEWAP platform);
- Institutional cooperation with institutional partnerships between AERMC and basin organizations or states (example : Watershed Bassin of Souss Massa);
- Emergency aid.

Countries in the Mediterranean basin face similar challenges with resource management and climate change adaptation. As such, the Mediterranean basin is a priority area for the Water Agency to develop experience sharing among the countries of the Mediterranean.

This meeting was set in the aftermath of the Water and Climate Change Symposium, organized in partnership with the six French Water Agencies, and attended by members of the Lebanese delegation.

## WASH SERVICES AND CLIMATE CHANGE

*Ms. Colette Genevoux, Project Officer, pS-Eau*

Since 2015, pS-Eau has facilitated a working group on climate change in order to understand the risks and challenges of water and sanitation services and improve the understanding of adaptation and mitigation measures.

As part of this work, a [pamphlet](#) and a [guide](#) on water, hygiene and sanitation services and climate change were published by pS-Eau.



The presentation underlines the following points:

- The main climatic hazards;
- Impact on water supply;
- Impacts on sanitation;
- The principles of adaptation and mitigation;
- The major stages of adaptation (assessing risks, developing and implementing solutions, monitoring and building on experiences);
- Adaptation to impacts on the quality of the drinking water supply services;
- Adaptation to impacts on the operation of the sanitation services;

[Download the presentation](#)

## CLIMATE CHANGE ADAPTATION STRATEGY FOR RHONE MEDITERRANEAN CORSICA CATCHMENT BASIN

*Mr. Thomas Pelte, Expert Climate change, AERMC*

In 2014, the AERMC was the first to adopt an adaptation strategy for climate change.

This strategy, which was submitted to water stakeholders, includes:

- **Review of scientific knowledge;**
- Identification of priority areas through a methodology to assess the vulnerability of territories defined as the product of sensitivity by exposure;
- Toolbox of about sixty solutions;
- **Characterization of the level of efforts** to be provided according to the territories;

Climate change exacerbates pre-existing issues and problems.

[Download the adaptation strategy for climate change \(French\)](#)

## HYDROLOGICAL FUNCTIONING OF LEBANESE WATERSHEDS IN THE CONTEXT OF CLIMATE CHANGE

*Mr. Antoine Allam, PhD Student, Saint-Joseph University and SupAgro Montpellier*

After presenting the Lebanese climate and characterizing the different watersheds and hydrological regimes, this presentation looks at the impacts of climate change on:

- The hydrological regimes (**no change in average rainfall but increase in the variability of seasonal rainfall patterns**);
- The evolution of temperatures (**increase of 2° since the 1970s**);
- The evolution of the sources' flows;
- The evolution of the snow cover (**loss of 30% of its surface and 50% of its thickness**) and its early melting (10 to 15 days).

Avenues for reflection have been identified in order to promote a continuous review of management strategies, integrate young people in the search for solutions at the local level, raise awareness, and reinforce scientific research.

[Download the presentation](#)

## WHICH GOVERNANCE FOR THE IRRIGATION IN A CONTEXT OF WATER SCARCITY?

*Mr. Nassim Abou Ahmad, Head of governance department, Litani River Authority*

After explaining the context of creation, the mandates, and the **competences** of the Litani River Authority; this presentation details the stakes and consequences of global warming on the Litani basin:

- **Negative impact of climate change on agricultural yields** when 50% of agricultural land in Lebanon is located in the Upper Litani Basin;
- Part of **irrigation schemes is unrealistic** due to the evolution of resources availability;
- Sanitary impact of water pollution with **discharge of domestic and industrial wastewater without treatment** in the Litani river;
- Absence of control of abstractions on groundwater, springs and rivers.

In response to these challenges, solutions have been identified to promote water demand management, control resource withdrawals, have groundwater management plans, and develop rainwater harvesting systems.

[Download the presentation](#)

## ROUND TABLE: IMPACT OF CLIMATE CHANGE ON WATER AND WASTEWATER SERVICES IN LEBANON

*Mr. Jean Gebran, General Director of Beirut and Mount Lebanon Water Establishment*

The institutional framework of the sector is defined by law 221/2000 which created the four Water Establishments. In April 2018, the Parliament adopted the Water Code, Law 77/2018, which entry into force will be effective after the adoption of the decrees of application.

This presentation is about:

- The jurisdiction of the Water Establishment of Beirut and Mount Lebanon;
- Characterization of available resources (dam, sources and wells);
- Water balance with the existence of **large deficits of water supply**;
- The main challenges: **lack of staff**, limited water resources, deterioration of quality, the importance of **leaks and cuts in water supply**;
- The consequences of climate change with **saline intrusions, increase in water levels, increase in risk of fire...**

To meet these challenges, mitigation measures are proposed such as improving storage capacities (groundwater recharge, rainwater harvesting), re-using treated wastewater, enhancing the performance of irrigation, reinforcing controls on water withdrawals, and setting up of volumetric pricing. Emphasis must also be placed on awareness to reduce water consumption.

[Download the presentation](#)

*Mr. Khaled Obeid, General Director of North Lebanon Water Establishment*

The Water Establishments of North Lebanon and Beirut and Mount Lebanon observe similar problems with climate change. In order to cope with them, reforms, mitigation and adaptation measures are planned by the Water Establishment of North Lebanon:

- Develop a strategic vision and **clarify the institutional framework**;
- **Strengthen regional cooperation** and facilitate the transfer of skills;
- Long-term water management plan;
- **Strengthen the role of civil society**;
- Demand regulation with volumetric pricing;
- Increased irrigation performance and re-use of treated wastewater;
- Awareness campaigns.

[Download the presentation](#)

*Mr. Rizk Rizk, General Director of Bekaa Water Establishment*

In his presentation, Mr. Rizk Rizk emphasized on the importance of behavior changes. In Lebanon, where water is perceived as a gift from God, it is difficult to achieve cost recovery of water services. Significant advocacy should be conducted to allow users to understand the need to pay for waste water treatment as well.

During their lives, people can notice the impacts of climate change (example: evolution of the snow cover on the Lebanese mountain). This perception does not, however, call into question consumption behaviors that have changed significantly over the past 50 years with an increase in water consumption. The focus should be on awareness, so that users understand the implications of climate change and modify their behavior accordingly.

The problems encountered by the Bekaa Water Establishment are similar to those of the two other Water Establishments. In addition, there is significant demographic pressure following the influx of one million refugees while the population of the Bekaa is 800,000 inhabitants.

[Download the presentation](#)

## OPEN FORUM

### METHODOLOGICAL OVERVIEW

Participants were asked to submit written questions about what they wished to further explore on the second part of the day. The questions submitted had to be related to the theme of the day and enable participants to learn and share in smaller groups.

The prioritization, the grouping and the choice of the subjects discussed, were thought out, and decided collectively. Questions and topics that could not be addressed are kept as an appendix for record.

The participants were divided into three discussion groups, with representatives of the Lebanese delegation in each group. The organization of the groups was done in self-management. In each group, a reporter was appointed for the restitution of the exchanges in plenary. At the end of the workshop, each reporter presented a summary of the discussions.

This method of facilitation enabled all the participants in the workshop to go into depth regarding some subjects and encourage their involvement. The dynamics of exchanges had been strengthened by the allocating the participants into small groups. This format allowed them to interview the Lebanese representatives on the functioning of the sector and the difficulties encountered.

### SELECTED THEMES

- Technical solutions
- Communication and awareness
- Institutional framework

## SYNTHETIC RESTITUTION OF EXCHANGES

### Technical solutions

**Optimize water usage:** the agricultural sector accounts for 80% of the Lebanese water consumption. In order to reduce consumption, irrigation techniques should be improved by renovating irrigation canals and developing drip irrigation.

**New water resources:** interest in improving the exploitation of existing water resources (rainwater harvesting systems) before moving towards new resources (desalination).

**Developing renewable energies:** recover the energy produced by fecal sludge thanks to biogas units; develop the use of solar energy.

**Storage:** use snow dams, reinforce infiltration into the soil. Use surface water as a priority and conserve groundwater for strategic storage.

**Natural waste water treatment:** a solution was adapted to the Lebanese context and to encourage communities of less than 2000 p.e.



### Communication and awareness

#### Questions:

- How to raise awareness to introduce behavior change?
- Which actors are responsible for implementing awareness-raising activities?
- How to facilitate citizen participation?

**Finding:** institutional actors are aware of the challenges of climate change. The challenge lies in the awareness of the population.

**Water Establishments:** create internal and external departments for communication and awareness.

**Ministry of Energy and Water:** promote transition toward volumetric pricing.

**Education:** the need to introduce the theme of climate change into the curriculum, train teachers, and ensure exemplary behaviors within schools (recycling, saving water, waste water treatment...).

**Citizen participation:** encourage dialogue, share





issues, and increase transparency. Rely on facilitators to ensure awareness at the territorial level.

**Pilot projects:** encourage the development of pilot projects at the community level to develop exemplarity and implement awareness-raising activities.

**Temporality of solutions:** the urgent and short-term with implementing the Water Code (prohibition of water withdrawals, etc.), the medium-term to encourage through communication, and the long-term with the evolution of representations on the environment through education.

---

## Institutional framework

**Policing of water:** the Water Code (Law 77/2018) provides for the creation of water policing. Prior work had been done in consultation between the National River Authority and the municipalities. Municipal officers have been trained to identify polluting industries. Many conflicts were raised with industries, but links have been reinforced with municipalities. The current challenge is how to maintain the coordination between the LRA and municipalities.

**Involvement of the private sector:** Water Establishments are legally in charge of the operation and maintenance of wastewater treatment plants. In the absence of financial and technical capacities, the Ministries of Energy and Water and the Council for the Development of Reconstruction entrust this management provisionally to the private sector.

**Conflicts of use:** existence of conflicts between central and regional institutions over the allocation of water resources (example: source of Anjar).



**Governance:** the necessity to develop watershed management and engage in a process of decentralization of water management.



## OPEN FORUM: SUBJECTS SUBMITTED BY PARTICIPANTS

<b>Institutional framework</b>
How can local institutions improve the waste water services?
How can local authorities and other stakeholders be involved?
Can coordination between stakeholders be reinforced by working toward adaptation to climate change?
Can a coordination be done between Water Establishments in order to share experiences and reduce costs?
How can the private sector be involved in the water sector?
How competences for water and wastewater services would be distributed?
Which institutional solutions limit the impact of refugees on the environment?
Is there water policing?
What are the types of scholar training sciences and water related issues? Which job opportunities are there within central and regional institutions, municipalities and private sector?
How is the distribution of competences organized for collective sanitation between Water Establishments and Municipalities? How is this distribution organized financially?
Which distribution of competences for groundwater is there?
What are the obstacles to cooperate with municipalities?
<b>Technical solutions technique</b>
To improve storage capacities, is it better to focus on dams or wells?
What prospective research for new sources of water is there?
What are the technological choices for the sanitation of small communities?
How can the quality of water and sanitation services in small towns in Lebanon be improved?
Energy and treatment: what issues, what solutions?
<b>Communication and awareness</b>
How can the culture of water saving at the level of each individual be spread?
How can climate change adaptation through awareness campaigns be improved? Awareness raising and training of actors to save resources
Can democracy participate in better resource management?
Should awareness departments be set up within Water Establishments? What would their missions be?
<b>Philosophical questions</b>
Will water be a rare economic asset?
How to define water ownership in Lebanon
Should an international water code be adopted?
How can national strategies be differentiated from programs of international organizations? Are they suitable?
<b>Data collection monitoring</b>
Are there any scientific and laboratory resources to analyze pollution and mitigate the impacts on public health?
Is there an aggregation of water data in qualitative and quantitative terms? If so, how accessible? In which format? How often is the update done?
<b>Distribution of water resources</b>
Is there an opportunity to initiate IWRM procedures aside from the Litani?
How water resources are shared? Are there conflicts of use?
How transboundary basins can be managed?

## LIST OF PARTICIPANTS

	Nom	Organisation	Position	e-mail / phone
1	Abou Ahmad Nassim	Office National du Litani	Directeur du Département Gouvernance	<a href="mailto:governance@litani.gov.lb">governance@litani.gov.lb</a>
2	Allam Antoine	Université Saint Joseph	Doctorant	<a href="mailto:antoine_allam@hotmail.com">antoine_allam@hotmail.com</a>
3	Béal Frédéric	Institut Bioforce	Coordinateur pôle sectoriel Eau, hygiène et assainissement, Nutrition, Protection	<a href="mailto:f.beal@institutbioforce.fr">f.beal@institutbioforce.fr</a>
4	Boucher Mathilde	SIMEV	Responsable communication	<a href="mailto:mathilde.boucher@umontpellier.fr">mathilde.boucher@umontpellier.fr</a>
5	Chaabane Ratib	Institut Méditerranéen de l'Eau	Expert – Chargé de Mission IME	<a href="mailto:ratib.chaabane@gmail.com">ratib.chaabane@gmail.com</a>
6	Charlet Laurent	Université Grenoble Alpes	Professeur en eau et géochimie	<a href="mailto:laurent.charlet@univ-grenoble-alpes.fr">laurent.charlet@univ-grenoble-alpes.fr</a>
7	Clément Fabien	Ecobird	Directeur général	<a href="mailto:f.clement@ecobird.fr">f.clement@ecobird.fr</a>
8	Debair Alexandra			<a href="mailto:alexandra.debair@gmail.com">alexandra.debair@gmail.com</a>
9	Deratani André	Institut Européen des Membranes / CNRS	Directeur de recherches	<a href="mailto:andre.deratani@umontpellier.fr">andre.deratani@umontpellier.fr</a>
10	Dussaux Vincent	pS-Eau	Directeur projets / réseaux pays Liban et Madagascar	<a href="mailto:Dussaux@pseau.org">Dussaux@pseau.org</a>
11	Fadous Maurice	GT robotique	Directeur	<a href="mailto:mauricefadous@hotmail.com">mauricefadous@hotmail.com</a>
12	Franc Bruno	APIEU	Directeur	<a href="mailto:bruno.franc@cpie-apieumontpellier.fr">bruno.franc@cpie-apieumontpellier.fr</a>
13	Gebran Jean	Etablissement des Eaux de Beyrouth et du Mont-Liban	Directeur	<a href="mailto:jeanygebran@gmail.com">jeanygebran@gmail.com</a>
14	Genevaux Colette	pS-Eau	Chargée mission recherche et développement	<a href="mailto:genevaux@pseau.org">genevaux@pseau.org</a>
15	Guerin Nicolas	AERMC	Directeur des Données, Redevances & Actions Internationales	<a href="mailto:nicolas.guerin@eurmc.fr">nicolas.guerin@eurmc.fr</a>
16	Ibrahim Imad Antoine	gLAWcal	Doctorant	<a href="mailto:imad.ibrahim@coleurope.eu">imad.ibrahim@coleurope.eu</a>
17	Kennou Hachmi	Institut Méditerranéen de l'Eau	Directeur exécutif	<a href="mailto:hkennou@ime-eau.org">hkennou@ime-eau.org</a>
18	Lalaude Labayle Marie-Pierre	Hydroconseil	Ingénieur en génie de l'eau et de l'environnement	<a href="mailto:lalaude@hydroconseil.com">lalaude@hydroconseil.com</a>
19	Lazzarini Aude	Solidarités International	Responsable du pôle EAH	<a href="mailto:alazzarini@solidarites.org">alazzarini@solidarites.org</a>
20	MOUTON Philippe	pS-Eau	Antenne Lyon-Méditerranée / réseaux pays Bénin et Togo	<a href="mailto:mouton@pseau.org">mouton@pseau.org</a>
21	Obeid Khaled	Etablissement des Eaux du Nord Liban	Directeur	<a href="mailto:obeid_khaled@hotmail.com">obeid_khaled@hotmail.com</a>
22	PAPIN-STAMMOSE Claire	pS-Eau	Animatrice plateforme LEWAP	<a href="mailto:Papin-stammose@pseau.org">Papin-stammose@pseau.org</a>
23	Parrel Irvina	pS-Eau	Chargée de mission - animation Sud Ouest	<a href="mailto:irvina.parrel@pseau.org">irvina.parrel@pseau.org</a>
24	Pelte Thomas	AERMC	Expert changement climatique	
25	Prost-Boucle Stéphanie	IRSTEA	Ingénieur d'études	<a href="mailto:stephanie.prost-boucle@irstea.fr">stephanie.prost-boucle@irstea.fr</a>
26	Puig Joëlle	APIEU CPIE	Consultante, Géographe, Responsable projet CPIE APIEU	<a href="mailto:joellepuig@free.fr">joellepuig@free.fr</a>
27	Rémont Bruno	Corail	Secrétaire	<a href="mailto:bruno.remont@numericable.com">bruno.remont@numericable.com</a>
28	Rizk Rizk Gerges	Etablissement des Eaux de la Bekaa	Directeur	<a href="mailto:bekaawaterestablishment@gmail.com">bekaawaterestablishment@gmail.com</a>
29	Sanchez Ana	pS-Eau	Chargée de mission / antenne Lyon /réseau pays Sénégal	<a href="mailto:ana.sanchez@pseau.org">ana.sanchez@pseau.org</a>
30	Senta-Loys Lila	RESACOOOP	Stagiaire	<a href="mailto:lsenta-loys@resacoop.org">lsenta-loys@resacoop.org</a>
31	Seropian Jean-Claude	Fondation Suez	Consultant Senior	<a href="mailto:jean-claude.seropian@suez.com">jean-claude.seropian@suez.com</a>
32	Théodose Léa	ENGESS	Etudiante	<a href="mailto:lea.theodose@gmail.com">lea.theodose@gmail.com</a>
33	Touron Rémi	AERMC	Chargé de mission programme et coopération internationale	<a href="mailto:remi.touron@eurmc.fr">remi.touron@eurmc.fr</a>
34	Triboulet Jean-Pierre		Retraité / Précédemment conseiller technique OMM/PNUD	<a href="mailto:jeanpierrettriboulet@hotmail.fr">jeanpierrettriboulet@hotmail.fr</a>