Plateforme des acteurs de l'eau et de l'assainissement au Liban

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Research and general public meeting

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Mountain Springs, a valuable resource to understand and preserve in a context of global climate change

Professeur Wajdi Najem, hydrologist, Honorary Dean of the Faculty of Engineering, Vice-rector, Saint Joseph University

Mme Janine Somma, Ph. D., Researcher in the Department of Geography, Saint Joseph University

Dr Charbel Abou Chakra, Geography, Topograhical Engineer, Associate researcher at USJ-CREEMO, Consultant of the Arab Union of Surveyors and Lecturer at the Lebanese Canadian University

M. Antoine Allam, Ph.D. student in Hydrology, Saint Joseph University and SupAgro Montpellier

M. Laurent Drapeau, Research Engineer specialized in the evolution of snow in Lebanon, Research Institute for Development

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MAIN POINTS DISCUSSED

- Need to have a **good understanding of water resources** to better preserve and ensure their quality.
- Importance of studying the **earth's geologial formations** which favors groundwater storage. In Lebanon, the majority of water resources are contained in the Cenomanian and Jurassic layers. Karst covers 70% of Lebanon's land area and contains the main water resources.
- Need of monitoring water resources **over a certain time period** in order to analyze the trends. In Lebanon, collection of data and monitoring of water resources was not conducted during the civil war (1975 &1990).
- Lebanon is richly endowed in water resources with **abundant rainfall**.
- Mountain springs are the main sources of water supply in Lebanon. These sources are **subject to changes that influence their use.** It is necessary to modify behaviors in order to adapt to these changes.
- Snow is a key element for water supply in Lebanon (15-20% of water resources). **The storage of this resource** allows the supply of water for **drinking and irrigation**.
- The monitoring of precipitation trends should be conducted over a period of at least a hundred years. Since 1970, the trend is almost constant with **no signs of observed desertification in Lebanon**.
- Precipitation patterns **fluctuates regularly** with peaks every twelve years or so.
- Since 1965 until today, changes in temperature trends **clearly reflect signs of global warming.**
- There is no change in the annual precipitation volume however the distributions have evolved. The snow is melting earlier than usual leading to **less water availability for irrigation practices in the summer.**
- This evolution will lead to shortages in water for irrigation ; these changes highlight the problems in water governance in terms of implementing **better management of the water sector.**
- In 2011, a snow observatory was set in place in order to **better understand the snow dynamics and groundwater recharge**. To monitor the land's topography, **autonomous on-site stations were installed and satellite imageries were collected**. In some cases, observation conditions were difficult leading to regular field work for data collection.
- The use of drones and satellites imagery allows the monitoring of the **evolution of sinkholes and the calculation of their storage capacity**. During snow melting, crests are thinning however the sinkholes remain filled. Sinkholes are closed depressions where **meltwater is forced to infiltrate the groundwater**.
- **Excessive urbanization and quarry installation** should be avoided in the highlands as they increase risks of runoff
- There is a great interannual variability in the amount of precipitation and their forms. In order to estimate the water quantities from melted snow, a model was developed ; it is a powerful planning tool that should help water resources managers in their work.

SUPPORTING PRESENTATIONS

Presentation of Professeur Wajdi Najem

Presentation of Laurent Drapeau

Presentation of Ph.D Janine Somma and Dr. Charbel Abou Chakra

Presentation of Antoine Allam

AUDIENCE PARTICIPATION : QUESTIONS AND ANSWERS

Was the collapse time of sinkholes measured?

We did not measure the collapse time of sinkholes but we were interested in the depressions where the water infiltrates by very thin cracks. The time in the soil depends on the melting of snow and the flow time in the soil ; hence it depends on the geology of the area. Flow studies showed that the time in the soil variates between a few days to three years as on the Orontes.

How to ensure the sustainability of the studies once the team is no longer in place? It is essential that donors consider this issue and unlock long-term funding

The main problem is the lack of data. Data has been collected since late 1990 through field work ; these studies are very specific but localized. Monitoring stations are as problematic as ensuring sustainability. Without continuous data collection, this work is useless ; there is a need of implementing a public policy to monitor the evolution of snow.

What are the tools used for these measures, the resolutions?

Since the year 2000, there has been several satellite imageries collected with different resolutions ; the most used is MODIS which provides a satellite image of the planet every day at 500m2. Eighteen years ago, Europe launched SENTINELLE a satellite having a resolution of 10m with a continuous follow-up every five days making it possible to cover all topographic issues. Lack of daily data is risky because it consists on losing important events.

Are sublimation processes tracked?

For sublimation, a follow-up was carried out during one year in Bcharreh. This monitoring is very complex and expensive. It allowed to collect a lot of information on the humidity in the air, the radiation and the atmospheric wind. Data analysis is underway but the importance of sublimation should not be overestimated.

Would it be possible to mobilize snow professionals working in ski resorts to facilitate measurements?

Yes, in other countries these professionals participate in the monitoring process. This allows them to obtain information on the evolution of water resources.

LISTE DES PARTICIPANTS

Name of Participant	Organisation	Position	Phone Number	Email
Christiane Zoghbi	USJ - ESIB	Maitre de Conference	70/525484	christiane.zoghbi@usj.edu.lb
Reine Bou Ghosn Salameh	Lebanese University	Etudiante M1 Biodiversity	03/638415	reine_salameh97@hotmail.com
Michel Samaha	AICS - Italian Coop	Liaison Officer - Project engineer	70/863278	michelxsamaha@gmail.com
Jean Akar	Club CVS	Ancien President	03/336490	janus.360@hotmail.com
Jessy Saliba	Le Liban a petits pas	Membre	76/771423	jessylaurentsaliba@gmail.com
Therese Farra	Le Liban a petits pas	Membre	03/658356	t.farra@gmail.com
Georges Farra	Le Liban a petits pas	Membre	03/658356	t.farra@gmail.com
Nada Chauf	Ordre des avocats	Avocate	03/375500	abouchouf.m@gmail.com
Vicky Salame Ghosn	Mer-Terre	Presidente	03/921484	sg_vicky@hotmail.com
Paul Abi Rached	Lebanon eco-movement	President	03/327975	paulabirashed@gmail.com
Gladys Nader	APSAD	Membre	70/896487	gladysnader9@gmail.com
Karim Kanaan	ODDD	Ingenieur	71/404590	kanaank@live.com
Bassam Jaber	DAI-LWP	Senior Advisor	03/748744	bjaber.motg@gmail.com
Jamal Krayem	Presidence du conseil des ministres	Rattache au president	03/565708	ja.krayem@gmail.com
Farid Karam	ELARD	Directeur	03/643155	fkaram@elard-group.com
Desiree Azzi	USEK	Enseignante/Chercheur	78/883439	desireeelazzi@usek.edu.lb
Annie Doucetzouki	LU	prof (retraite)	03/666432	annie.doucetzouki@gmail.com
Robert Daoud	ESFD	Senior project engineer	03/426926	robertsdaoud@hotmail.com
Joseph Fayad		chercheur en histoire	76/618996	bellenature13@hotmail.com
Remie Matta	AUB	student	71/332118	remie-matta@hotmail.fr
Ghassan Moussa		Medecin	03/804287	egmoussa@inco.com.lb
Edith Moussa		Medecin	03/662506	egmoussa@inco.com.lb
Wael Itani		Mechanical Engineer	71/110528	waelitani@outlook.com
Fayssal Zein	RIHAN	Ingenieur	03/375129	faysal.zein@hotmail.com
Sania El Nakib	AUB/LYPW/Ecocentra	Senior Environmental Consultant	03/929296	sania.elnakib@ecocentra.me
Mohamad Abbas	AUB/LYPW	Civil Engineer - PhD Student	03/145040	mfa54@aub.edu.lb

Stephanie Cartier	CNRS PACTE	Chercheur		stephanie.cartier@univ-grenoble-alpes.fr
Frederick Berjaoui	LYPW	Student	70/651711	frederickberjaoui@gmail.com
Ziad Zoubien	ICRC	Engineer	71/911088	zzoubian@gmail.com
Haykal Khalil	CICR	Engineer	70/760278	haykalkhalil@gmail.com
Zeina Abi Aad	Dar Al Handasah	Water and Environment Engineer	70/461418	abiaadzeina@gmail.com
Hassana Ghanem	BAU	PhD Student	03/576076	hassanaghanem@hotmail.com
Louis Boisset	USJ - ESIB	Retraite	70/427259	louis.boisset@gmail.com
Iman Abdel Al	Fondation Abdel Al		01/644800	Abdelal@cyberia.net.lb
Marysa Khalil		Pharmacien		khalilmaryse@yahoo.com
Laurent Drapeau	IRD	Research Engineer	71/021095	laurent.drapeau@gmail.com
Janine Somma	USJ	Researcher in the geology department		janine.somma@usj.edu.lb
Charbel Abou Chakra	USJ	Associate researcher		charbel.abouchakra@gmail.com
Antoine Allam	USJ	PhD	70 /109407	antoine_allam@hotmail.com
Wajdi Najem	Saint Joseph University	Hydrologist		wajdi.najem@usj.edu.lb
Jasmine El Kareh	LEWAP	Coordinator	71/256791	kareh@lewap.org
Claire Papin-Stammose	MADAD PACT	Coordinator	+961 3 102 586	coordinator@madad-pact.org