



جامعة بيروت العربية
BEIRUT ARAB UNIVERSITY



**Research Center for Environment
and Development**

**Annual Report
2013-2014**

I. INTRODUCTION

Reaching its third year of establishment, the Research Center of Environment and Development (RCED) has during the academic year 2013-2014 continued its efforts to advance its interdisciplinary research capacity in environmental and development studies and further its contributions to the understanding of Lebanon's natural systems and finding solutions for their challenges. Harnessing the collaborative expertise and ingenuity at Beirut Arab University and partner institutions, RCED has made a fundamental progress in each of its current research interests and projects encompassing water resources, flora biodiversity and climate change. It has also sat up a number of research relationships and links with some well known institutes or international organizations. This annual report focuses on the main contributions of RCED during 2013-2014 in terms of research, development projects and networking.

Subsequent to the University Council decision to merge RCED Steering Committee into its Managing Board and amendment of its membership, the board held its annual meeting on November 19th 2013. The meeting formed a diversified platform to review contributions and progress and discuss future perspectives. The meeting provided a set of recommendations and advices to guide RCED in continuing its efforts and progress towards the fulfillments of its mission.



Managing Board Meeting, Nov. 19th 2014



Presentation of Dr. Safaa Baydoun, Director of RCED, at Managing Board Meeting Nov. 19th 2014.

II. RESEARCH PROJECTS

- **Assessment of Macrophytic Community of Litani River and Qaroun Reservoir**

Principle Investigator: Safaa Baydown, Beirut Arab University

Co-Investigators: Hussein Abo Hamdan, Faculty of Sciences, Lebanese University

Lamis Chalak, Faculty of Agronomy, Lebanese University

Nabil Amacha, Litani River Authority, Ministry of Water & Energy

Funding Organization: 2012 Research Grant Program, National Council for Scientific Research (CNRS), Lebanon.

Project Duration: 2 Years

Focusing on the assessment of aquatic macrophytes, the project is considered among the national efforts to understand the ecological status of Lebanese aquatic environments. The project investigates the structure of macrophytic community in both Litani River and Qaraoun reservoir with relevance to the status of the quality of water habitats. In 2013-2014, the following progress and output has been achieved:

- Renewal of the CNRS research grant for the year 2013-2014.
- Oral presentation “ *Preliminary Assessment of Macrophytic Community in Qaraoun Reservoir, Lebanon*”, 20th International Conference of The Lebanese Association the Advancement of Science jointly organized by LAAS, EDST-LU and CNRS, March 27-29, 2014.
- The research article “*Preliminary Assessment of Macrophytic Community in Qaraoun Reservoir, Lebanon*”, The International Journal of Science and Research (IJSR), Vol. 3, Issue 6, June, 2014.
- Co-supervision and support of 2 MSc degrees at the Faculty of Sciences, Lebanese University.



Some macrophytes of Litani River & Qaroun Lake: a) *Epilobium sp.*, b) *Polygonum persicaria* and c) *Potamogeton crispus*

• **Hermon Mountain: Biodiversity Assessment Towards Conservation Action Plan**

Principle Investigator: Safaa Baydoun, Beirut Arab University

Co-Investigators: Nelly Arnold, Biodiversity Expert, BAU

Lamis Chalak, Faculty of Agronomy, Lebanese University

Munier Mhana, Rachaya Center for Social Services, Ministry of Social Affairs

Funding Organization: BAU Research Grant Program

As part of Anti-Lebanon range Hermon Mountain is globally recognized as a key biodiversity area. It is also considered among 20 others as an important plant area in Lebanon. Comprehensive studies of both Syrian and Palestinian sides of the mountain have revealed hundreds of precious plants and high endemism rate. However, only little knowledge about the Lebanese side is available. In this study the flora of the Lebanese side of Hermon Mountain is studied. In July 2014, the study completes its first year with the following progress and output:

- Final report submission.
- Poster presentation “**Preliminary Assessment of Flora Biodiversity of Hermon Mountain**”, at the 20th International Conference of The Lebanese Association the Advancement of Science jointly organized by LAAS, EDST-LU and CNRS, March 27-29, 2014.



Preliminary Assessment of Flora Biodiversity of Hermon Mountain, Lebanon

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INTRODUCTION

Lebanon is part of the Mediterranean Basin biodiversity hot spot which is the largest of the world's five Mediterranean-climate regions and the second largest hot spot in the world [1]. The country is blessed with a prosperous biodiversity encompassing a wealth of ancient indigenous Mediterranean vegetation components as well as some of the invading shrubs and trees. Numerous studies reported the richness of the country with a total of more than 2000 species of terrestrial plant and a high rate (12%) of endemism including 8.5% as broad endemic (endemic to Lebanon, Syria and Palestine) and 3.5% as endemic to Lebanon [2]. Mount Hermon is a mountain cluster in the Anti-Lebanon mountain range, a key biodiversity area in the Mediterranean Basin hotspot. Hermon Mountain is recently reported as an Important Plant Area among 20 others distributed throughout Lebanon [3]. With its rich biodiversity, Hermon mountain is considered as an important means of subsistence for the local community providing crops of various agricultural activities and related traditional foods and products. The mountain stood throughout the rich successive cultures in the Mesopotamian for its heliatic and cultural values. Although the mountain has been the subject of few studies to understand the various aspects of its ecological value and role in the sustainable development on the Syrian and occupied Palestine sides, the Lebanese side of the mountain has only been timidly studied.

OBJECTIVE

The overall objective of the current study is to develop a preliminary assessment of the flora biodiversity of Mount Hermon and contribute to a better understanding the Mount ecosystem and its role in sustaining the livelihood of surrounding community.

MATERIALS AND METHODS

A field survey of all flora along the elevational gradients of Hermon started during Summer 2013. The project area was stratified by geographic locations and accessibility to major mountain hills and valleys serving as the primary study sites. 12 elevational strata between Eshayeh at 1100m and Ain-Jerney 2420 m, each of an area of 100x100 m², were randomly covered. Plant specimens were collected at random during flowering or fruitification stage and were identified according to the specific sheets of the Nouvelle Flore du Liban et de la Syrie by Moutarde [4,5].

RESULTS AND DISCUSSION

The vegetation zones at the different elevational gradients observed were consistent with the main vegetation belts distinguished by Zohary [7]. The elevations below 1300 m seemed greatly affected by human settlements and agricultural activities (vines, legumes, fruit trees and wheat) dating back to the beginning of the last century. Richness of the herbaceous and grass associations of *Melilot*, *Eryngium*, *Prunella*, and *Trifolium* were noted. *Forbaceum stramineum*, *Oenopodium heteracanthum*, *Cestrum leptophyllum*, and *Echinos viscosus* were most dominant. Occasional presence of scattered trees *Prunus serotina*, *Crataegus azarolus* was characteristic of this vegetation zone. The elevations between 1300m, and 1900m were generally composed of aggregates of the evergreen *Quercus calliprinos* and high prevalence of the deciduous *Quercus* consisting of (*Q. brantii*), (*Q. cedronum*), and (*Q. infectoria*). Trees of *Acer hermonense*, *Prunus serotina*, *Prunus sibirica*, *Prunus dulcis* were observed. Between these trees some woody and small shrubs, particularly *Pistacia spicosa* and *Nesaea macrocarpa* were highly evident. The area above 1900 m was characterized by sparse xerophilic vegetation, such as *Astragalus colonicoides*, *Astragalus crassiflorus*, *Astragalus demarcandus*, and *Acantholimon ovalilobatum*. Some herbaceous species as *Ziziphora comosensis*, *Ferula frigida* and *Mentha microphylla* were also seen. More than 150 species of Hermon flora were collected and identified. The species identified were distributed over 36 families with *Asteraceae*, *Lamiaceae*, *Ericaceae*, *Fabaceae*, and *Rosaceae*, representing the major shares. Our preliminary findings are good indicators of the flora biodiversity richness of the Lebanese side of Mount Hermon. This will encourage more comprehensive investigations towards the development of an illustrated checklist of this Lebanese patrimony.

REFERENCES

[1] CEPF, Critical Ecosystem Partnership Fund, Ecosystem Profile, Mediterranean Basin Biodiversity Hotspot, 2010.
 [2] UNDP, GEF, and Ministry of Environment, 2009. Fourth National Report of Lebanon to the Convention on Biological Diversity, July 2009.
 [3] M. Yabok, N. Machaka-Hovari, M.S. Al-Zein, S. Safi, N. Sumo and S. Talhouk, "Important Plant Areas of the South and East Mediterranean Region: Priority Sites for Conservation", Eds. E.A. Radford, G. Canalis, and R. de Mornonville, Publication of IUCN, Planifide WWF, 2011.
 [4]-[5] P. Moutarde, "Nouvelle Flore du Liban et de la Syrie" El Makhres, Edition de L'Imprimerie Catholique-Beyrouth, Tome I, II, III, 1956, 1970, 1983.
 [7] M. Zohary, "Geobotanical Foundations of the Middle East", Gustav Fisher, Stuttgart, 1973.

Figure 1: Plant species identified in the field survey.

<i>Acer hermonense</i>	<i>Gnaphalium heteracanthum</i>	<i>Clematis flammula</i>	<i>Crataegus azarolus</i>	<i>Eryngium craticum</i>
<i>Cestrum leptophyllum</i>	<i>Astragalus colonicoides</i>	<i>Oenopodium heteracanthum</i>	<i>Sideritis libanotica</i>	<i>Teucrium pruinosum</i>

• **Impact of Agricultural Practices on Water and Soil Resources in Central Bekaa**

Principle Investigator: *Safaa Baydoun*, Beirut Arab University

Co- Investigators: *Joelle Puig*, Environment Consultant
François Molle/ Institut de Recherche pour le Développement, France
and International Water Management Institute,
Talal Darwich, Center of Remote Sensing, CNRS
Nabil Amacha, Litani River Authority
Therese Attalah, Faculty of Agriculture Lebanese University

Funding Organization: Environmental Observatory-O Life
USAID- Egypt

The project focuses on the development of a comprehensive understanding of agricultural practices affecting groundwater resources in Central Bekaa. Being a crucial prerequisites for sound water resources management a current status assessment and a monitoring program is being developed. Moreover, a participatory contribution of the farmer communities in the region will be considered through the various activities of the project. In 2013-2014, the project has witnessed the following progress;

- Combining the objectives of the project with those of “**Groundwater Governance in the Arab World Taking Stock and Addressing the Challenges**” by the International Water Management Institute (IWMI), a regional project that is funded by USAID- Egypt. The project is intended to address the challenges posed by the unsustainable use of groundwater in the MENA region(Jordan, Tunisia, Lebanon, UAE, Oman and Yemen) in a systematic way. It emphasizes the necessity to take stock of past experiences in groundwater governance at the world, regional, and local level, reviewing the laws, regulations, community-based actions, and institutional structures, as well as their efficacy in controlling access, abstraction and allocation of the resource under varying circumstances.
- Developing the first report of the key informant survey of water governance an agricultural practices in 15 towns and villages in Bekaa.
- Conducting 2 seasonal measurements (Winter and Spring, 2014) of water level and quality for 20 wells.



Water pumping projects on Upper Litani River

III. DEVELOPMENT PROJECTS

- *Cultivation of Oregano in Central Bekaa*

Cultivation of medicinal and aromatic plants (MAPs) is worldwide viewed as a means for meeting current and future demands for large-volume production of plant-based drugs and herbal remedies as well as developing the livelihood of rural communities in developing countries. Market analysis of MAP trades in Lebanon shows the domestic market is approximately worth US \$35 millions/year with the wild stock supplying approximately 98% of the market demand. The ministry of Agriculture, UNDP and other international organizations have taken some initiatives to promote the sustainable MAP harvesting and cultivation of *Origanum syriacum* as one of the most important herbs in the wild of Lebanon.

To date, the new attempted products, however, have not been able to contribute to the creation of added value chain and sustain the development of farming community of the region. Though well suited to the agro-climatic conditions of Bekaa, MAPs cultivation hasn't been yet well appreciated as source of revenue and economic development of agricultural and rural community of the region. Lack of adequate knowledge of cultivation and processing methods, unavailability of quality plant material and sound marketing plans present the main limiting factors impeding the development of this sectors.

This project seeks the introduction of important MAPs (mainly oregano and lavender) cultivation, production of dried herbal material and extracts to Bekaa region. The project presents an efficient approach to improve agricultural production and pharmaceutical industry as a resource-base for local livelihood and national development. It will play a vital role in the development of business opportunities and sustainable management of ecosystems. This year, the project achieved the following progress;

- Co-supervision and support of 1 MSc degrees at the Faculty of Agronomy, Lebanese University.
- Plantation of an area of 10 dunm with around 40,000 seedlings of oregano.



Oregano Cultivation Project- BAU Bekaa

IV. EDUCATIONAL ACTIVITIES

- *Academic Orientation Forum for the Association of Universities of Lebanon and Orientation School Visits*

Parallel to its scientific research activities RCED has hosted and organized some educational activities focusing mainly on the academic orientation of school students. An *Academic Orientation Forum* for the *Association of Universities of Lebanon* was held on October 31st, 2013 with participation of around 400 students from different secondary schools across Bekaa region. The representatives of several Lebanese universities provided students with all the necessary information about the educational programs admission requirements and tuitions.

Several Orientation school visits were also performed to provide more detailed guidance to students about BAU, accreditation, undergraduate degree programs, admission requirements and campus life.



V. Capacity Building and Networking Activity

- *Higher Education- Monitoring & Evaluation and Research Training Program, Expand Your Horizon, USAID*

RCED participated in the “*Monitoring & Evaluation and Research Training Program for Higher Education, Los Angeles- US*” offered by the USAID funded project “*Expand Your Horizon*” that aims to build the technical and professional capacity of Lebanese organizations and their employees to play a more effective role in their community. The training mainly aimed to:

- Provide the key principles on the development and implement monitoring and evaluation systems that align with the overall strategic plan and vision of the institution.
- Build skills and abilities to set overarching goals, design projects accordingly, and develop key performance indicators based on a result or logical framework
- Introduce techniques, tools, instruments, matrices, and methods for data collection, baseline data collection, and data analysis on both activity/service and financial aspects with a highlight on the need for strong IT infrastructure for M&E processes.

IUCN Red Listing Lebanese Plants: A Comprehensive Workshop and Plant Identification: Tools and Challenges

RCED participated in two workshops ***“IUCN Red Listing”*** (May 9-11, 2014), and ***“Plant Identification: tools and challenges”*** (May16-18,2014) within the framework of the project ***“Determination of Important Areas for Plants and Creation of Micro-Reserves to Conserve Rare or Endemic Species in Lebanon”*** organized by the Faculty of Sciences, Saint-Joseph University. The workshop was funded by the Critical Ecosystem Partnership Fund, IUCN certified assessors from the Center for Middle Eastern Plants of the Royal Botanic Garden of Edinburgh and experts in plant identification from France, Turkey and Spain conducted the workshops.



UCLA Academic Personnel Office



Faculty Center-University California Los Angeles



IUCN Red Listing Workshop



Plant Identification Workshop

VI. RCED VISITORS

With the aim to explore collaboration initiatives and potential for joint research projects, RCED received a number of visitors from well recognized international institutions and organizations such as;

- *Dr. Flavio Lovisolo*, Italian Cooperation Office, & *Mr. Dietmar Ueberbache*, Italian Embassy-Beirut.
- *Dr. Michael Mason*, Middle East Institute, London School for Economics and Political Sciences-UK



Italian Cooperation Office within a tour in RCED



Dr. Michael Mason visit to Hasbani River Basin
