

Open and collaborative science (OCS); a tool for the conservation and development of local ecosystems



Reporting Period: February 2015 - February 2016

Report Published: Apr. 8, 2016

Report Prepared by:

Dr. Najat A. Saliba

Dr. Mahmoud Al Hindi

Dr. Salma Talhouk

Rima Baalbaki

Suggested Citation: Saliba, Najat A., Mahmoud Al Hindi, Salma Talhouk and Rima Baalbaki. "Open and collaborative science (OCS); a tool for the conservation and development of local ecosystems." Midterm Progress Report for Open and Collaborative Science in Development Network (OCSDNet), April 2016.

1. Executive Summary

- *Re-state initial research objectives*

Our goal is to study the process by which knowledge generation and scientific evidence is shared with communities so that people may be enabled to take local action in order to effect changes most suited to their needs.

The specific aims are:

- Form a partnership between academia, the private sector and the community to study and address community-based environmental concerns through a collaborative and empowering action-oriented process.
- Involve community members, organizational representatives and scientists in all aspects of the process, methods, results and interpretation. This requires true collaboration where knowledge is shared horizontally.
- Build local capacity to combine knowledge with taking actions to ensure development of sustainable remedial environmental solutions as suggested by the whole community.
- Identify barriers and obstacles faced by actors practicing OCS coming from all stakeholders including government institutions and other scientific organizations, to understand whether and how they undermine open science practices' legitimization, and to identify and analyze tools to overcoming those obstacles and barriers.

- *Describe substantial shifts (if any) from your original proposal and why the shifts occurred*

There are no substantial shifts from the original proposal. Scientific measurements are currently focusing on water pollution. Some delays in the deliverables are due to a shift in the initial starting date, long delivery time of procured equipment and consumables and slow process of IRB approval.

- *Briefly outline key observations and emerging findings*

Citizens identified the water contamination problem in their village and are eager to learn and adopt the scientific approach in order to reach a solution that will reduce their spending to buy water for their daily use. Citizens learnt the experimental procedures, conducted field water tests, and discussed their findings with the AUB scientific team in an interactive workshop. During the workshop, citizens took an active role and discussed possible solutions. As a result of that, they are following up with legal authorities to re-test the contaminated public well and re-open it in case no major contamination is found. In all these steps, officials from the municipality sought the help of Rima Baalbaki; the senior coordinator of the project. She has assisted them in complying with legal procedures including filling out the necessary documents, contacting the public officials, and supervising the water sample collection in order to have the water retested. She is

also communicating with the laboratory designated by the government to have a copy of the results so she can share it with the community.

2. Research Problem

- *State research question*

Can local communities participate in taking actions towards remedial environmental solutions after generating the necessary scientific evidence/ information?

- *Describe research approach and methods*

The participatory approach was adopted during the selection of water testing locations and water quality testing and the quantitative approach was used to evaluate water quality data collected by participants. Water quality tests were further repeated in the laboratory and a comparison between the two sets of data (generated by participants and laboratory technicians) was made to evaluate accuracy of data generated and equipment used. Also participants' perception of water pollution problems and the ability to develop remedial environmental solutions was evaluated qualitatively.

- *If your research problem has changed since project inception, please explain why/how.*

3. Research Objectives and Emerging Findings

- *Describe specific research objectives*

People at Der Al Zehrani wanted to know why one of the main public water wells was completely shut down. It is said that the wells tested positive for the presence of coliforms, and thence was closed by the ministry of health. This created a shortage in the water supply and almost half of the village was forced to buy water from private well owners. The specific objectives of this project are then to:

- Educate the community about water quality and train them to conduct the tests to assess contamination
 - Build local capacity to test for the main water contaminants
 - Identify water pollution problems in Deir Al Zehrani
 - Suggest remedial solutions that are financially adequate and sustainable.
- *To what extent is the project achieving its objectives? Describe challenges or barriers, if any.*

Objective goals are being achieved gradually. Community members were very active and keen to learn about water quality and the tests that can be used to assess its contamination. People who attended the 1st workshop took charge of explaining the testing procedures to new community members who showed up on the 2nd and 3rd workshops. They also pointed out the need to repeat some tests just because they doubted some of their results. All participants showed interest in participating in the

summer campaign, which will take place in July.

One of the challenges was related to convincing participants for the need to conduct blind tests. This is a routine procedure adopted by many analytical laboratories to ensure high objectivity in the tests and the analyzed results. In this particular case, samples from the seven wells were given a code so that participants concentrate on the experiment without any prior or post judgment of the quality of the private and public water sources.

A second challenge was our inability (lack of preparedness) to perform biological testing (fecal coliforms and E. coli) with village participants because the experimental procedure requires complete sterilization of the equipment. For this particular test, water samples were transported to the University-laboratory for analysis. This is one of the important tests that define the quality of water. Citizens were very eager to learn this particular tests and the AUB team worked hard to put together transportable and disposable sterile kits that will be used in the second phase.

Sharing the results of the winter tests was also a challenging task. The bacteriological tests for two of the wells, one private and the other public, did not fall within the range recommended by the Lebanese potable water standards. Results of the private contaminated well were shared with the owner and corrective measures will be implemented. Mitigating the problems associated with the public well is not straight forward as this well is tested and managed by the South Lebanon Water Governmental Authority and the Ministry of Health. As such, any corrective action on this well has to be done in coordination with the government. A follow up on this issue has been initiated by the local municipality and with the help of the AUB team.

Due to the aforementioned changes and need to buy more consumables, we are subsidizing some of the cost from other grants and are requesting the reallocation of some of the funds within the defined tasks.

- *Describe your project's emerging findings*
 - After receiving the adequate training, local community can contribute to monitoring local water pollution.
 - Citizens are rigorous and enthusiastic learners
 - Data generated by citizens on one hand and the laboratory on the other were comparable for some tests and different for some others. This raised questions about the accuracy of field measurement tools.
 - Two of the tested wells showed consistent contamination in all three samples.

- *What do your findings suggest about the nature/context of open science in development?*

The community at Der Al Zehrani has suffered from the closure of Al Salam well for a

long time. Local officials and community members did not have the courage to contact the authorities responsible for the closure of the well to inquire about the reasons that led to this decision. As proposed solutions, more private wells were open and discussion about digging a new public well were undergoing. The AUB intervention based on the open science approach clarified to participants and the local municipality several issues. They are:

- Water should be tested on a regular basis. Relying on one test every two or more years is not sufficient
- Understanding the types of the different tests needed to determine water quality empowered people to request from the government a recheck.
- Ability to discuss possible solutions for the different scenarios will allow the local officials to negotiate with the government the option to treat and reopen the public well.
- Realizing the causes of contamination will deter the local officials of making new initiatives that will lead to similar consequences. It was clarified during our discussions that the major source of contamination is the infiltration of sewage water into ground water and as such any new well in the same area will be contaminated in the same way.

4. Project Implementation and Management:

- Briefly describe completed and pending activities in the table below.

Completed Activities (February 2015 - 2016)	
Type of Activity	Details
Review village map database and select target villages	The Baldati Biati database was reviewed for villages that have raised concerns about air and water pollution problems. Seven villages were identified belonging to five different districts. Two villages that met the below criteria were chosen to initiate the open and collaborative science project: 1) The village is big and has a school 2) The two villages have different pollution sources when compared to each other 3) The village is not too far and reachable by car within a reasonable time
Prepare and submit IRB application	All documents (brief proposal, consent forms, surveys, evaluation forms and presentations) were prepared and submitted for IRB approval. Also team members took the CITI certification exam.
Project introduction and call for participation	The project was introduced to the local committee already established by the municipality and interested people were

	asked to register their names and fill a perception questionnaire about water pollution
Identification of water sampling locations	A meeting with municipality members and water authority representative was made to identify water sources in the village. Municipality members chose seven different water wells, three of which are public while the others are private.
Winter water quality measurement campaign	Participants were trained on water sample collection and water quality testing. All equipment and consumables needed for the testing were transferred to the village and an empty room was transformed into a temporary lab. Three water sampling / water quality measurement campaign were made during the period from Nov 2015 until Feb 2016.
Summary of initial findings	A gathering was made on March 22 where initial findings were disseminated to a wider community and stakeholders.
Pending Activities (March 2016 - February 2017)	
<i>Type of Activity</i>	<i>Details</i>
Summer water quality measurement campaign	Anticipated during the month of June and July 2016

5. Project Outputs and Dissemination

- Describe project outputs and dissemination strategies:

Workshops held: February 2015 - 2016

Name of workshop	Outcome(s) of workshop	Number of participants present	Any relevant links to event information
Nov 28, 2015 water quality measurements workshop	Seven water samples were tested for 10 parameters	13	http://www.aub.edu.lb/units/natureconservation/programs/Pages/ocs.aspx
Dec 9, 2015 water quality measurements workshop	Seven water samples were tested for 10 parameters	8	http://www.aub.edu.lb/units/natureconservation/programs/Pages/ocs.aspx
Feb 20, 2016 water	Seven water samples	8	http://www.aub.edu.lb/

quality measurements workshop	were tested for 10 parameters		units/natureconservation/programs/Pages/ocs.aspx
Mar 22, 2016 Dissemination of results	Plan for the next phase	25	http://www.aub.edu.lb/units/natureconservation/programs/Pages/ocs.aspx

Conferences Attended (to discuss Open Science)

Name of Conference	Your contribution to the event	Outcomes of the conference? (collaborations, contributions, etc.)	Any relevant links to event information
--------------------	--------------------------------	--	---

Partnerships Formed to date:

Name of Partner	Type of stakeholder (policy maker, research organisation, community group, etc.)	Briefly describe your collaboration with this partner
Municipality of Der Al Zehrani	Local administrative body	The municipality agreed to take part of the project. It invited local community members to participate, facilitated water sampling from different wells and secured a regular meeting venue for the project.
South Lebanon Water Authority	Policy maker	The authority was informed about the project and they provided us with technical information about the villages' public wells
Local representatives of the Ministry of Health (MoH)	Policy maker	The treatment following the reopening of the Al Salam well will be implemented under the supervision of MoH
Housewives and Women's Affairs NGO	Community	They are the working force responsible of all water quality measurements at the village.
Industrial Research	Governmental Lab	Subcontracted to conduct the water tests

Institute (IRI)		on the public well
-----------------	--	--------------------

List of relevant publications (February 2015-2016):

Name of Publication	Type (book, journal article, newspaper, blog, etc.)	Link
Citizen's Water quality Fact sheets	Ten fact sheets about specific water quality parameters and their measurement procedures	
The scientific approach to citizen science	Manuscript (in preparation)	

Any Other outputs:

6. Impact

- *In what ways does your research project contribute to the development objectives of your partner community?*
- *How does your work contribute towards building the field of Open Science?*
- *How are you measuring and evaluating the impact of your project?*
- *In what ways could the network better support your project in terms of short and long-term impact?*

The Open and Collaborative Science for Development project answered a local call for help in assessing and mitigating a local water pollution problem. The approach was well focused and has attended directly to the needs of the community in question. This was accomplished via a citizen science approach that involved the use of water chemistry tests, which were simplified and adapted to the local situations. This experience allows us to investigate and evaluate the applicability of some rigorous tests in an “outside or moving lab” setting. Results will form the basis for open science water testing in different environments and conditions. Furthermore, this project will help in addressing the willingness of participants to follow standard operating procedures during the experimental phase so that scientific results are trusted and used for proposing solutions. We are eager to share our results with the network and the open science community and hope to learn from the other projects about the different scientific applications and implications.

8. Reflective Learning:

- *How are you capturing your team's learnings from participating in the network?*
- *To what extent are these lessons shaping your practice?*
- *Has feedback from the network had an impact on your research to date? (consider insight from the coordination team, advisors and peers in the network). What further*

support could the network provide towards achieving your team's project goals?

The network was an eye opening on the democratization of science with all its wide applicability. While some people in the network consider open science a tool to lead the change, we at AUB consider developing the tools that can be used in citizen science a great challenge. The cost, maintenance and operation of scientific instruments have always been a major obstacle in the progress of science in the developing world but with the advancement of citizen science, more affordable tools are being developed. This will make science more approachable and available. I hope that new technologies move as fast as open science to provide the proper means for implementation.

9. Recommendations (for OCSDNet):

- *In your experience, Is OCSDNet fostering a culture of shared learning in the network?*
- *Do you have any other advice/feedback that you would like to provide to OCSDNet or IDRC? (consider modes of communication, evaluation, etc.)*

The team has adopted an open communication strategy since its conception. I was really pleased to see at the Bangkok meeting that team members were even more open to discuss challenges than success stories. This is just to confirm that open science is an honest attitude that will be presented and shared by the manifesto.

10. Additional Comments (optional)

- Please provide any additional comments.