

Summary report of the workshop

# Can Water Diplomacy Enable a New Future for the Urmia Lake?

*July 02-03, 2015*

*Tufts University and MIT*

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**Workshop Organizers**



**Scientific Sponsors (alphabetically)**

Geological Survey of Iran



MIT Water Club



United Nations Development Programme



University of Tabriz



Urmia Lake Restoration Program



Water Research Engineering Institute of Tarbiat Modares University



Water Research Engineering Institute  
(Tarbiat Modares University)

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This is a summary report; more detailed information about the workshop can be found at: <http://environment.tufts.edu/blog/2015/05/11/urmialake/>

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## Summary

On July 02 and 03, 2015 around 40 academics, students, government officials and concerned individuals gathered at Tufts University and then at MIT, under the auspices of the Tufts Institute of the Environment and its Water Diplomacy Program, and with the support of MIT and its Iranian Studies Group, along with a half dozen scientific sponsors, to apply an approach called the Water Diplomacy Framework (WDF) to the Urmia Lake. The goal of the convening was to address the proposition: *Can Water Diplomacy Enable a New Future for the Urmia Lake?*

This report sets out, along with a copy of the schedule and the attendees, the:

- Background and Aim of the Workshop
- Description of the Problem
- Workshop Discussions
- Concluding Remarks and Suggested List of Policies

## Background and Aim of the Workshop

Urmia Lake is the largest inland saline lake in Iran and is one of the most valuable aquatic ecosystems in the region. The lake has faced extreme water loss in recent years due to overuse and mismanagement. Over the last thirty years the population in the lake basin has been doubled and the agricultural area fed by water resources of the lake basin has tripled. The mean annual water level is currently more than four meters below the critical level (1274 m above sea level) needed to sustain ecosystems (Fig. 1). A wide range of users continue to extract water from the basin that feeds the lake. Moreover, inflows to the lake have decreased drastically and the situation has been exacerbated by continuous droughts, resulting in reduction of renewable water resources and the lake's water levels at an alarming rate.

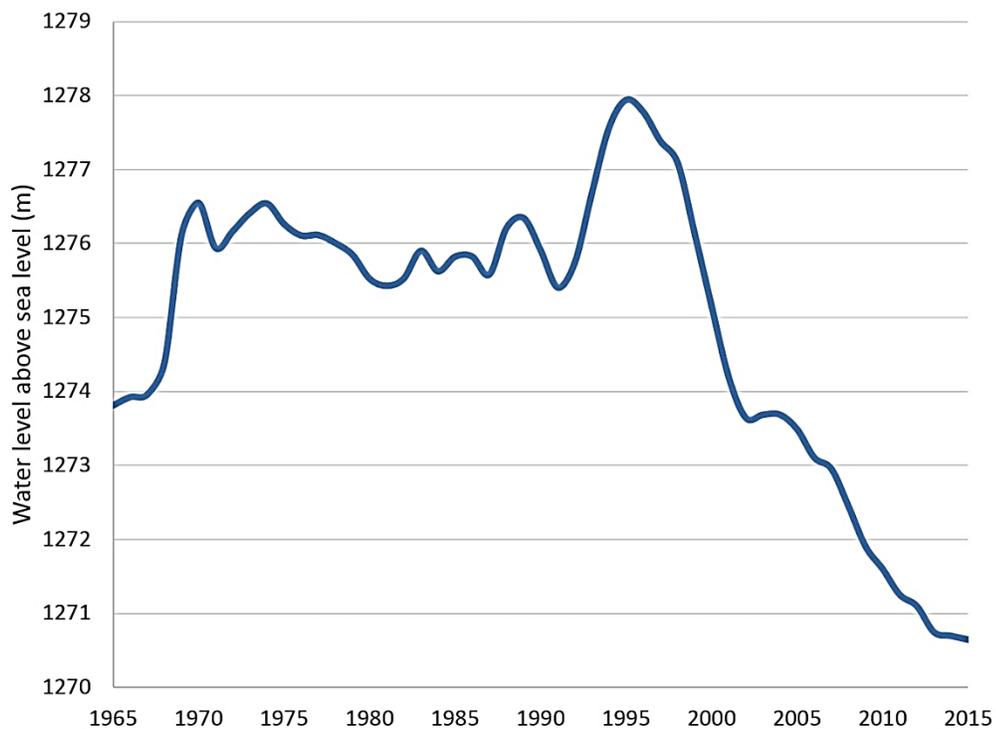


Fig. 1. Mean annual water level in Urmia Lake (data source: Iran Water Resources Management Company)

Presently, several local, national and international organizations including multiple government and non-governmental groups are working to restore the lake. Like many other complex development issues, the problem of allocating water to address multiple competing and often conflicting goals for the Urmia Lake Basin is not likely to yield a simple solution. An effective resolution of the water crisis for the lake calls for a major reframing of water allocation conflict (from a zero-sum game to a non-zero-sum cooperation) and reshaping of existing institutions and governance system. However, reaching to solutions for such a

complex situation with having consensus among the stockholders is not an easy task- not only in case of the Urmia Lake basin but also for any other environmental crises and challenges.

The root cause of many complex water problems lies at the intersection of multiple causal forces buried in observational signatures with often conflicting views and values related to: *Who decides, who gets water and how?* In such situations, neither numbers nor narratives will resolve the dilemma alone. One way to address these types of complex water allocation problems is to reframe them as joint multi-stakeholder decision-making problems - from identifying and defining the problem to innovating and implementing mutual gains options for resolutions that can generate politically legitimate policies and projects based on science with active participation of all involved parties. The WDF provides an alternative to traditional technologically- or values-focused approach to water management. It offers guidance for obtaining mutual gains solutions through a multi-stakeholder decision process. The WDF diagnoses water problems, identifies intervention points, and proposes sustainable resolutions that are sensitive to diverse viewpoints and uncertainty as well as changing and competing demands. With this spirit and focus, Tufts University Water Diplomacy Program hosted a two-day workshop - with several invited Iranian and international experts and in partnership with MIT (including MIT Iranian Studies Group) – to provide a forum with the following questions as a starting point for an engaged conversation:

- What is the current framing of the Urmia Lake water allocation problem? Is this framing working? If not, what reframing is needed?
- What metrics (numbers, narratives, or both) are used to measure success?
- What are the “bottlenecks” in water allocation for the Urmia Lake Basin?
- How to reallocate water to meet competing and conflicting needs and demands of multiple sectors?

Understanding and managing water challenges in the Urmia Lake basin need to be reframed within a network of variables, process, actors, and institutions. Characterizing this network and identifying key links and nodes is an essential step to identifying possible strategies for pragmatic and actionable interventions. Mismatches between values (who decides, who gets water? Is water a right or property?), choice of tools (is efficient irrigation technology better than changing crop pattern to conserve water?), and disparity in scales (spatial, temporal, jurisdiction, management, knowledge) was discussed with a focus on finding actionable resolution.

## The Description of the Problem

The Urmia Lake started to change from a water body with a depth of 7-12 meters to be a saline playa<sup>1</sup> in recent years. Figure 2 shows a recent satellite image of the lake.



Fig. 2. A recent satellite image of the Urmia Lake, captured on July 26, 2015 showing the extent of dried regions (white) in the Southern part (source: NASA Earth Data, Terra/MODIS mission)

The Urmia Lake is of great importance to the region from hydrological, ecological, economical and societal points of view. The dry out of the lake can cause severe health problems. The lake has been home to many migrating birds in different seasons of the year, and it is home to shrimp *Artemia* that is the food source for migratory birds. Urmia Lake has been significantly diminished in the recent past by a confluence of changes, to the detriment of the Lake. Physical changes include the many dams built on the rivers feeding the Lake, which dramatically reduced the normal flow (to provide fresh water for irrigation, domestic and industrial uses) and the causeway which bisected the Lake (built to decrease travel time across the Lake). The number of farmers and then agricultural areas increased along with their subsequent usage of groundwater as a source of irrigation, sometimes through unauthorized wells. Population increases caused additional demands on water resources in this arid region, especially during times of drought. While climate change appears to have had some impact, it does not appear to be a determining factor.

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<sup>1</sup> Playa: a desert basin with no outlet which periodically fills with water to form a temporary lake (Wikipedia)

For many years, different experts and research groups have studied the basin and investigated the causes of the dry-out. However, there has been no consensus among them on the causes and solutions to restore the lake. Moreover, the solution(s) to restore this lake needs the integrated cooperation of the all the stakeholders, the government and local authorities. Therefore, the Iranian government established the Urmia Lake Restoration Program (ULRP) to consolidate all the efforts among different ministries (including Energy and Jihad-e-Agriculture) and the Department of Environment. The ULRP has several technical and professional sub-committees as well as task forces focused on different aspects of the problem.

In this 2-day workshop, four faculty members from Iran presented an overview of the Urmia Lake Basin and the current problems of the restoration program to the panel of experts attending the meeting. The following sections of this report present a conclusive summary of the discussions and recommendations provided by the attendees.

Preceding to this workshop, the Iranian delegation had visited four lakes in western part of US (including Owens Lake, Mono Lake and the Salton Sea in California and the Great Salt Lake in Utah) that have faced or were facing the same problem as the Urmia Lake. The group reported that even with extensive resources and planning, the problems of those lakes were not resolved. One observation was that the water saved through various management strategies did not result in return of the water to the lake, demonstrating that more complex management issues exist. Another key observation was the absence of active involvement of the agricultural sector (farmers and others who irrigated lands) in the groups considering and effectuating alternative solutions. Therefore, it was suggested that farmers in the Urmia basin, especially those withdrawing groundwater, be included in the consideration of alternatives for the Urmia Lake. In particular, the following tasks that are carried out in these lakes were highlighted by the panel, emphasizing they are not enough to guarantee the survival of the lake: extensive monitoring (qualitative and quantitative); financial support to restore the lake (from the government, surrounding industries, people living around the lake); active participation of the NGOs, and high public attention.

## Workshop Discussions

To Understand and manage the water challenges in the Urmia Lake basin, the workshop participants discussed and agreed to work on reframing the water governance in the Urmia Lake as a complex problem within a network of variables, processes, actors, and institutions. In this reframing, there are uncertainty of information, actions, and perceptions.

The WDF is recommended to be used in tackling the Urmia Lake restoration. WDF emphasizes the importance of a neutral mediator to engage stakeholders with competing and conflicting needs in solving the problem. The mediator raises important questions to reframe the problem: Water for whom? At what scale? At what price? Who should pay for it? Who should look at its long-term surveillance/monitoring? In general, this mediation should be used as a tool to facilitate mutually beneficial and nearly self-enforcing agreements. In this context, it is needed to distinguish among

- Values, Interests, and Tools;
- Scales, Domains, and Levels;
- Watersheds, Problemsheds and Policysheds;
- Simple, Complicated, and Complex Systems.

Comparing this framework with the current managerial approaches in the Urmia lake basin, it is evident that an “*institutional analysis*” is needed. In this analysis, stakeholders should be brought to decide what is best for them. Then, new institutions should be built based on collective choices that include social and environmental criteria rather than rational choice models guided by criteria such as maximizing economic efficiency. To develop these institutions, we need new generations of water experts familiar with water diplomacy and able to explore and find mutual-gains solutions through shared-vision planning. As a first actionable step, this workshop suggested to organize a meeting in Iran with relevant stakeholders, with the help of a neutral mediator, to prioritize a list of short- and long-term policies discussed in the meeting and summarized in the next section.

Strategies for water allocation, defining water rights and setting the water price were among the topics raised and discussed by the panel. It was suggested to shift the mindset about water as a *fixed resource* toward a *flexible resource*. Moreover, we should encourage joint fact finding, and *adaptive non-zero-sum approaches* to promote sustainability and equity. To reach this approach, we need water networks in which links and nodes connect natural, social and political variables, processes, actors, and institutions with crossing boundaries and feedbacks. However, it is beneficial to try to look at the problem in a way that makes it simpler as well. For example, it might be better to look at the hydrologic cycle (natural cycle) alone, and then overlap it with social and political cycles to see where are the problems? Where are the mismatches? What can be moved in any of the cycles to resolve a conflict?

It was emphasized that this problem does not involve only the lake restoration. This is about revitalizing the whole Urmia ecosystem including some 800 species in the basin. Furthermore, we need to define the value of lake and the ecosystem as a whole before we can find the solutions. The values can be financial or non-financial. However, it should include the values from the stakeholders' perspective, in particular farmers, and from the administration's perspective.

The solutions to complex problems are not simple and evident. We should not look for existing solutions to apply them to this restoration problem. The Urmia Lake restoration problem needs an innovative and new solution that might have not been used in any similar case study. While keeping in mind that the value of the lake is global, we should think about enabling factors specific to the Urmia Lake.

There are large uncertainties on the role of climate change and climate variability in the dry-out of the Urmia Lake. Different studies have conflicting results on the contribution of any changes in the climate on the dry out of the Urmia Lake. However, there was consensus among the participants that the role of climate change can't be significant at this time, and the main focus of the restoration program should not be on this. It was also emphasized that the outputs from different General Circulation Models (GCMs) do not agree on the direction and percentage of future changes in precipitation over the Urmia basin.

From the economical point of view, it was emphasized that although this problem looks very complex, it might be possible to simplify it by using proper modeling of the behavior of each of the agents involved. Urmia ecosystem has many factors that strengthen its value for the society and highlight the importance of its restoration. These factors include, but are not limited to: Cultural heritage and landscape, Ecotourism, Health tourism, Artemia, Salt mining, Salt storm prevention of the lake, Biodiversity, and Swimming.

One of the (pilot) projects outlined by ULRP is to limit the agricultural water use in the basin. There can be many ways to reach this goal, and it was discussed that based on the socio-economic conditions different approaches can be considered. These approaches include:

- Increasing irrigation efficiency
- Changing crops
- Water use management
- Land Conversion

It is well known in the hydrologic community that all models are wrong but some are useful. Therefore, we need to ask the right question on top of the model outcomes and do not simply rely on the outcomes. This is the case about decision-making models as well. The Urmia Lake problem cannot be solved by using rational choice models; we need to bring in all the stakeholders to decide what is best for them. A policy won't work unless all the stakeholders have been involved in defining that policy.

The role of education and public awareness in solving this problem is of great importance. NGOs and local authorities need to get involved and educate the stakeholders (in particular farmers) on the impact of their water use on the Lake and the basin's ecosystem. Meanwhile, they should learn from the stakeholders about their needs and common practices. Education in this case is a two-way street and needs mutual effort of both sides. At the end, there should be a mutual understanding of the needs and constraints of both stakeholders and the administration. If this happens, then one can hope that they can reach a win-win solution.

Organizational set-ups and local communities shall be involved more actively in decision-making processes. This is the case in many parts of the world in which locals know better than the administrative representatives that which institutional arrangements work more effectively. It is recommended that social organizational arrangements be given a high priority for research in the basin. This also highlights the importance of social studies in the basin. As it was discussed here, there has not been an in depth social study on different aspects of this problem. This is necessary for the mediation to work. We need to know about the regional dimensions or groups. Or for example, how to resolve a conflict in this region? What kind of mediation and at what level is needed? NGOs shall become more active and link the central government to the local stakeholders.

At the end, it is important to learn from successful and failed experiences around the world; however, we shall reflect on the experiences inside Iran as well. There are many successful examples that local authorities in close collaboration with the stakeholders have resolved complex problems in Iran. Those practices can help the administration to appropriately involve the stakeholders in this case as well.

## **Concluding Remarks and Suggested List of Policies**

Some of the possible approaches, policies and solutions that were discussed during the workshop are listed in the following, categorized based on their possible implementation time horizons. These are not intended to provide a list of projects or action items to implement. However, they are recommended to help ULRP reframe the problem and work with all the stakeholders to achieve a sustainable and innovative solution for the Urmia Lake.

### **0-12 months**

- ULRP should assess management interventions in terms of the tradeoffs between lake level restoration and the costs and benefits for different stakeholder groups, including the environment. For instance, what are the economic, social, environmental costs and benefits of raising the mean annual lake level by an additional meter? And then indicate how much the willingness to pay for that is.
- The lake stakeholders should be encouraged to think and explore options and changes that create mutually beneficial outcomes. These options are most probably innovative, new and not explored in similar case studies.
- The ULRP should enhance the agricultural cooperative institutions (farmers' co-op) and allocate land rental money through them and not directly to farmers. The farmers also want to know what they will gain (short and long term) if they collaborate.
- The lake needs extensive monitoring (with local gauges and satellite imagery) and the data to be shared and distributed with all involved parties and stakeholders. This issue is emphasized by ULRP in recent budgeting; however online access to the data is preferred.

### **1-3 years**

- ULRP should create farmer collaborative institutions and seek mutual gain options by that when negotiating with the cities and other users. This institutional growth empowers them to reach their aims and also facilitate the collaborations with other parties.
- The sociology should be given higher value and multiple social scientists should be engaged to work/study on the plans and to explore the social externalities of the restoration plan and subsequently recommend mitigation and adaptation strategies.
- Usually farmers need to know the principal rules of ecology. Rather than using sophisticated figures and tables, we need to use layman's language to communicate with the farmers so that they can better understand the ideas like the "tragedy of the commons".
- The prospect of international cooperation should be explored further. Beyond providing financial aid for awareness programs, or perhaps for infrastructure subsidies, international markets can prove to be valuable destinations for the new

agricultural crops. Should foreign or domestic markets need to express a willingness – or even guarantee - to buy the new crops that are less water efficient and have a higher market value. This would help to dispel local uncertainty and fears concerning economic viability.

### **3-5 years**

- A comprehensive study needs to be carried out to show the benefits/consequences of implementing a new tax system on all the parties using the water in the basin (industry, agriculture, domestic) to finance the restoration activities.
- Model outputs are highly uncertain, and they cannot be relied upon in particular for climate change studies. Therefore, it is necessary to prioritize more robust restoration programs.
- Focusing on the ecotourism sector could provide local authorities with the funds necessary both to conduct local public awareness programs and fund water subsidies – with the added positive externality of inducing a shift in local employment away from agriculture and towards the service sector.
- In restoring the lake, people should not wait for the national government. There are social entities, and they can initiate and propose practical actions (e.g. Mirabs, Hey'ats, and student-run organizations).

This workshop is viewed as a first step to develop a more collaborative partnership among US and European institutions and Iranian ones through bilateral visits, jointly defined research projects, and new official arrangements such as MIT MISTI-Iran.

## Appendices

### Schedule

<b>DAY ONE, July 02 – TUFTS UNIVERSITY</b> Tisch Library-Austin Room		
<b>08:30</b>	<b>REGISTRATION</b>	
<b>09:00</b>	<b>WELCOME AND INTRODUCTORY REMARKS:</b> Shafiqul Islam, Director, Water Diplomacy Program, Tufts University Antje Danielson, Administrative Director, Tufts Institute of the Environment	
<b>URMIA LAKE: CONTEXT, HISTORY AND CHALLENGES</b>		
<b>09:20</b>	Past, present and future of Urmia Lake	<b>Saeid Morid</b>
	Sedimentology, hydrogeochemistry and brine evolution of Urmia Lake	<b>Razyeh Lak</b>
	Travel to US West: Experiences for Iran lake management	<b>Saeid Morid</b>
	Video/ Q&A	
<b>10:30</b>	Break	
<b>11:00</b>	Traveling to Urmia Lake: Comparative research ideas and methods	<b>James Wescoat</b>
<b>11:20</b>	Practical Problems and Challenges for the Urmia Lake: Identification to Effective Intervention with Innovative Solutions (A Roundtable Discussion).  <b>Soroosh Sorooshian</b> (UC Irvine) participated via webinar.	<b>Soroosh Sorooshian</b>
<b>12:50</b>	Break	
<b>CAN WATER DIPLOMACY ENABLE A NEW FUTURE FOR THE URMIA LAKE?</b>		
<b>14:00</b>	<b>Kaveh Madani</b> (Imperial College London) participated via webinar.	<b>Kaveh Madani</b>
<b>14:15</b>	Can water diplomacy framework facilitate reframing of complex water allocation problems for the Urmia Lake?	<b>Shafiqul Islam</b>
<b>14:45</b>	Roundtable discussion with a focus on identifying “bottlenecks” and exploring creative options for competing water allocation challenges.	
<b>16~16:30</b>	<b>Concluding the panel</b>	

<b>DAY TWO, July 03 – MIT</b> Stata Center, 32-144		
<b>08:30</b>	Registration	
<b>SOCIO-ECONOMIC IMPACTS AND CHALLENGES OF URMIA LAKE RESTORATION PLANS</b>		
<b>09:00</b>	<b>WELCOME AND INTRODUCTORY REMARKS:</b> Seyed Hamed Alemohammad, MIT James Wescoat, MIT	
<b>09:20</b>	Urmia Lake Crisis (Challenges and Solutions)	<b>Kamran Zeinalzadeh</b>
	Impact of groundwater abstractions on Urmia Lake and challenges of illegal wells	<b>Asghar Asghari Moghaddam</b>
	Q&A	
<b>10:30</b>	Break	
<b>10:50</b>	Roundtable discussion  <b>Hamed Ghoddusi</b> (Stevens Institute of Technology) participated via webinar.	<b>James Wescoat/ Michael Fisher/ Hamed Ghoddusi</b>
<b>13:00</b> Break		

## Participants

First Name	Last Name	Position	Institute
Seyed Hamed	Alemohammad	Postdoctoral Associate	MIT
Asghar	Asghari Moghadam Heris	Dean of Natural Sciences Faculty	University of Tabriz
Hamed	Ashouri	Scientist	AIR Worldwide
Agustin	Botteron	Master Student	Tufts University
Amin	Dezfuli	Assistant Research Scientist	Johns Hopkins University
Claudine	Ellyin	Environmental Engineer	Columbia University
Noriko	Endo	Student	MIT
David	Fairman	Managing Director	Consensus Building Institute
John	Fallon		MIT
Michael	Fischer	Faculty Member	MIT
Fathali	Ghahremani	President	Neurodynamics, Inc
Hamed	Ghoddusi	Faculty Member	Stevens Institute of Technology
Hanieh	Hassanzadeh	Postdoctoral Associate	ETH - Zurich
Jory	Hecht	PhD Candidate	Tufts University
Poorya	Hosseini	PhD Candidate	MIT
Shafiqul	Islam	Director of Water Diplomacy Program	Tufts University
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Jaleh	Jalili	PhD Candidate	Brandeis University
Papatya	Kaner	Graduate Student	Tufts University
Mehar	Kaur	Student	Tufts University
Razyeh	Lak	Faculty Member	Research Institute for Earth Sciences, Geological Survey of Iran
Kaveh	Madani	Faculty Member	Imperial College London
Babak	Manouchehrifar	PhD Candidate	MIT
Jeff	Meller	CEO	Methane Harvest
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Hojjat	Mianabadi	Research Scholar	Tufts University /TU Delft
Leonard	Miller	Advanced Leadership Fellow	Harvard University
Susan	Miller	Advanced Leadership Fellow	Harvard University

Hamed	Mohammadnejad	PhD Student	Tufts University
Saeid	Morid	Faculty Member	Tarbiat Modares University
Nolan	Nicaise	Administrator	Tufts University
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Allison	Platt	Student	Tufts University
Mahboubeh	Rahmati Rostami	Student	Tufts University
Masoud	Sanayei	Faculty Member	Tufts University
Bishwapriya	Sanyal	Faculty Member and director of CITE	MIT
Mohamad	Shah	Student	ITC
Jake	Serago	Student	Tufts University
Afreen	Siddiqi	Research Scientist	MIT
Soroosh	Sorooshian	Faculty Member and director of CHRS	University of California Irvine
Ashok	Swain	Faculty Member	Tufts University – Uppsala University
James	Wescoat	Faculty Member	MIT
Mahdi	Zarghami	Faculty Member	University of Tabriz /Tufts University /MIT
Kamran	Zeinalzadeh	Director of Urmia Lake Research Institute	Urmia University