



## Concept Note

### 6<sup>th</sup> Asian G-WADI and 1<sup>st</sup> IDI Expert Group Meeting

#### Groundwater Management in Arid and Semi-Arid regions of Asia: with a view to the groundwater situation in Iran

13 – 16 June 2015

Tehran, Iran

#### Introduction:

Groundwater is a reliable resource for drinking and production both in terms of quantity and quality. Many Asian countries depend on groundwater for sustenance and their economic activities depend highly on this resource. The rapid industrialization and urbanization taking place in Asia, however, has put severe stress on groundwater resources in many Asian countries causing large depletion of the groundwater tables, especially in arid and semi-arid countries of Asia. Problems such as decreasing water tables, reduced well yields, land subsidence, and salinity intrusion that have emerged from overexploitation of groundwater are hindering development and introducing socioeconomic losses. Aquifer contamination with various types of pollutants is also a serious concern that has led to nitrate concentration in many parts of Asia. These problems are either irreversible in nature or require extended periods to recover. Appropriate policy measures are urgently required to cope with the emerging problems and to manage groundwater in a sustainable manner while taking full benefit of it for the development of Asia.

A study carried out by the Institute for Global Environmental Strategies (IGES)<sup>1</sup> shows that groundwater management in Asia has gone through different phases and yet different

<sup>1</sup> [www.iges.or.jp/en/](http://www.iges.or.jp/en/)

countries of Asia are dealing with these phases. In the first phase, groundwater was initially used for food production or industrial uses as well as miscellaneous purposes within its natural recharging capacity. The resource then started to be exploited intensively in the course of industrialization starting in the 1920s. In this period, groundwater problems such as land subsidence and decreasing water tables began to be recognized (second phase: intensification of groundwater use beyond their recharging capacity and emergence of groundwater problems). To address these problems, groundwater control measures were introduced and abstraction volume began to decrease (third phase: reduction of abstraction with control measures). Through the control measures, groundwater is used within its recharging capacity and as a consequence the groundwater levels have stabilized in some countries. However, the strict restrictions on groundwater abstraction over half a century is now creating the problem of an excessive increase in groundwater which may damage the foundations of building infrastructures. To avoid this unexpected result of control measures, the strict control of abstraction should be reviewed with optimal use of groundwater resources. After the control measures succeeded in controlling excessive abstraction and groundwater problems abated, groundwater began to be used in a stable way under the controls (fourth phase: stable abstraction with proper controls).

In Iran, the overexploitation of groundwater has already created problems in most of the country's principal aquifers (which shows that it can be argued that Iran is in phase two and some parts of it in phase three). Exacerbated by recurrent spells of droughts, large parts of Iran are facing extreme water shortage which is growingly being considered as an issue of human security. Much of Iran is very dry, and only 10 percent of the country receives enough rainfall to meet its needs. The remainder of the country is heavily reliant on groundwater, with around 50 percent of Iran's water being supplied by aquifers. Population growth, combined with economic development and a boom in industry and farming, has caused a huge increase in demand for water in Iran. Groundwater levels are dropping at an alarming rate, since the slow-filling aquifers have not been able to keep up with the growing demands. Agriculture is the dominant water user of both surface and groundwater; leading to over-exploitation of groundwater and especially within the central basins of Iran where surface water resources are negligible.

Groundwater lowering in Iran has in some cases led to land subsidence which in turn causes reduced storage capacity and reduced potential for recharge. Land subsidence is causing problems with residential homes and industrial complexes, increased road maintenance, and affecting important oil and gas pipelines. Furthermore, over-exploitation of ground water is now beginning to impact water quality especially salt water intrusion in coastal aquifers. In addition to water salinity, increases in nitrate concentrations, up to 150 ppm in groundwater are reported in many of the country's principal aquifers in Mashhad, Isfahan, Qazvin, Tehran and along the coasts of the Caspian Sea<sup>2</sup>.

With the grow of population of Iran and introduction of modern pumping systems in 1960s-1970s, Iran gradually moved from a traditional groundwater management system run by the

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<sup>2</sup> Source: Synthesis Report: Groundwater Management in Iran, FAO, 2009

local community to a central nation-wide management system with ownership of the government. These policies together with the continued migration from rural areas to cities, has resulted in nearly entire eclipse of Iran's older and more sustainable system of harvesting groundwater, the Qanat systems. Today Qanats are found beneath cities which are mostly inactive leaving dried up tunnels underneath the ground causing cavities under buildings and some health threats to the urban population from water-borne diseases.

At present and in pursue of water security, the Government of Iran is considering alternate solutions to meet the growing water demand. Reforms in the water-resource management and efficient use of water in the agriculture sector, the biggest water consumer, are substantial to overcome the water crisis of Iran. Moreover, to meet the food security of the country's growing population, Iran has to rethink the water use from its groundwater resources which is providing over 50% of the water supply of the country.

In this connection and on the request of the Chair of Iran National IHP Committee, UNESCO Tehran in close consultation with the IHP secretariat and in partnership with the Regional Center on Urban Water Management in Tehran (RCUWM) has taken the initiative to hold a two days high-level expert meeting for senior policy-makers and decision-makers of the Asian region including the water sector of Iran to learn from the experience of other countries in management and restoration of groundwater resources. This high-level meeting is a contribution to the UNESCO-IHP VIII phase (2014-2021)<sup>3</sup> which focuses on achieving water security in response to local, regional and global challenges by building competences and developing institutional and human capacities for water security and sustainability. Using the opportunity of this meeting and to develop synergies between the two programmes of UNESCO, the expert meeting of the International Drought Initiative (IDI)<sup>4</sup> will also be held to discuss possible joint initiatives to help to mitigate the effects of droughts in the region and to identify measures to be taken and learn from international experience to reduce the impacts of droughts at national, local and regional levels.

In this connection, the experience of arid and semi-arid countries dealing with water scarcity and drought related challenges will be shared among the Asian G-WADI countries, and particularly with Iran, through the Asian G-WADI<sup>5</sup> Network Meeting. The meeting will also bring together experience from the region as well as UNESCO projects on groundwater management, especially in the MENA region, and also benefit from the experience of the IDI international expert group who are present in Iran during the dates of the meeting. Experts from the International Groundwater Resources Assessment Centre (IGRAC) will be invited to moderate

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<sup>3</sup> IHP-VIII Water Security: <http://www.unesco.org/new/en/natural-sciences/environment/water/ihp-viii-water-security/>

<sup>4</sup> The International Drought Initiative (IDI) was established in 2010 under the UNESCO IHP Programme and the secretariat of the initiative is with the Regional Centre on Urban Water Management under the auspices of UNESCO in Tehran, Iran

<sup>5</sup> UNESCO IHP Programme on Water and Development Information for Arid Lands – A Global Network ([www.gwadi.org/](http://www.gwadi.org/))

sessions and provide expert advice on the specific case of Iran. The members of the Asian G-WADI network will also meet alongside the high level expert meeting.

## **Expected Outcomes:**

The ultimate goal of this meeting is to improve the national policies for groundwater management in the region as well as Iran towards water security for the growing population in present and future. The other expected outcomes include:

1. Sharing national/regional experiences in groundwater management and finding solutions for sustainable groundwater harvest/extraction;
2. Risk reduction in finding appropriate solutions for the challenge of water scarcity in arid and semi-arid countries, particularly Iran; leading to reduced monetary losses and social impacts;
3. Providing information on current UNESCO-IHP programmes in relation to groundwater management and water management in arid zones (G-WADI);
4. Networking among the groundwater institutions and specialists with regional water policy making authorities;
5. Developing activities within the framework of the IHP VIII (2014-2021) 'Water Security: Responses to Local, Regional and Global Challenges'

## **Participants:**

The principal target participants of the workshop are senior decision makers at the Ministry of Water of the regional countries and the I.R of Iran. The participants should be directly involved in groundwater management schemes at the national and/or provincial level with sound insight about the water situation of their respective country. Since the meeting is going to have simultaneous translation for English-Persian, policy makers from Afghanistan will be also invited to the meeting to benefit from experiences of the region. Interested experts/decision-makers from countries outside UNESCO Tehran Cluster countries are welcome to participate.

In consultation with the G-WADI secretariat, IGRAC and UNESCO Offices in the Asia-Pacific region (Almaty, Bangkok, Beijing, Indonesia and Jakarta), speakers will be identified to share experience of other countries as well as UNESCO projects on sustainable groundwater management. All travel expenses of invited speakers will be co-shared by the Ministry of Energy of Iran and UNESCO. The Ministry of Energy of Iran will cover local expenses of interested participants from other countries whom wish to participate; self-bearing their international travel expenses.

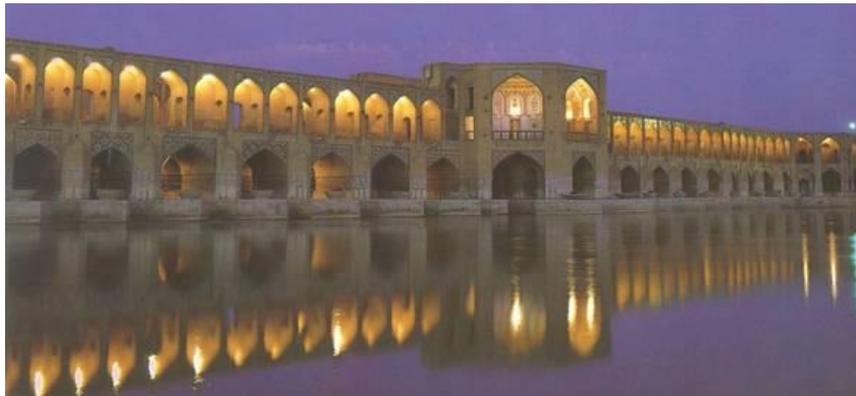
## Language:

The working language will be English with simultaneous translation to Persian. It is encouraged, workshop participants to have a good command of the English language in order to benefit from discussions to the most.

## Technical tour to Zayandehroud River:

The Zayandeh started in the Zagros Mountains and flowed 400 kilometers (200 mi) eastward before ending in the Gavkhouni swamp, a seasonal salt lake, southeast of Isfahan city. The Zayandeh had significant flow all year long, unlike many of Iran's rivers which are seasonal. The Zayandeh river bed is spanned by many historical Safavid era bridges, and the river used to flow through many parks. In the early 2010s, the river dried out completely after several years of seasonal dry-outs. In 2014 and with return of flows from diversion plans built along the river, water came back to the river bringing hope and life back to the city of Isfahan and the entire central plateau of Iran.

The Zayandeh River basin has an area of 41,500 square kilometers (16,000 sq mi), altitude from 3,974 meters (13,038 ft) to 1,466 meters (4,810 ft), an average rain fall of 130 millimeters (5 in) and a monthly average temperature of 3 °C (37 °F) to 29 °C (84 °F). Zayandeh River water gave life to the people of central Iran mainly in Isfahan and Yazd provinces and it was the largest river in the central plateau of Iran. Before the drying-out, water diverted per person was 240 liters (63 US gallons/53 imp gallons) per day in urban and 150 liters (40US glallons/33 imp gallons) per day in villages. In the 1970s, the flow of the river was estimated at 1.2 cubic kilometers (0.29 cu mi) per annum, or 38 cubic meters (1,340 cu ft) per second.



## Tentative Workshop Plan:

<b>6<sup>th</sup> Asian G-WADI and IDI expert group meeting</b>					
Groundwater Management in Arid and Semi-Arid regions of Asia					
Time	Day 1	Day 2	Day 3	Day 4	Day 5
09:00 -12:30	<p style="text-align: center;"><b>Opening ceremony</b></p> <p><b>Keynote Lecture (Groundwater sustainability in the modern society)</b></p> <ul style="list-style-type: none"> <li>— Introduction to UNESCO IHP and IDI</li> <li>— Introduction to UNESCO G-WADI Programme</li> <li>— Iran’s water situation and management</li> </ul>	<p style="text-align: center;"><b>Session 1: Groundwater Governance: information and assessment</b></p> <ul style="list-style-type: none"> <li>— Presentation by IGRAC</li> <li>— Ecosystems and groundwater</li> <li>— Groundwater economics</li> <li>— Groundwater pollution</li> <li>— Saline groundwater</li> <li>— groundwater management for industrial use</li> <li>— Groundwater and climate change adaptation</li> </ul>	<p style="text-align: center;"><b>Session 3: Artificial Recharge and groundwater harvesting</b></p> <ul style="list-style-type: none"> <li>— Flood harvesting for artificial recharge (prof Kowsar)</li> <li>— Presentation by IGRAC</li> <li>— Presentation by PCRWR on groundwater harvest</li> <li>— Use of tracers in groundwater management</li> <li>— Use of traditional groundwater management systems in the modern era (by ICQHS)</li> </ul>	<p><b>Post Workshop Technical Tour to Zayandehroud in Isfahan</b></p>	<p><b>Coming back to Tehran</b></p>
12:30 - 14:00	<i>Lunch Break</i>				
14:00 -18:00	<p style="text-align: center;"><b>Breakout to IDI Expert Meeting and Asian G-WADI Network Meeting</b></p> <p><b>IDI Expert Group Meeting</b></p>	<p style="text-align: center;"><b>Asian G-WADI Network Meeting</b></p> <ul style="list-style-type: none"> <li>— Report by Asian G-WADI secretariat</li> <li>— G-WADI data and products and scientific co-operation: lessons from Africa, Asia and Americas</li> <li>— Recent Developments at UNESCO-IHP and IHP VIII</li> <li>— Country presentations</li> </ul>	<p style="text-align: center;"><b>Session 2: Sharing of experience of other countries</b></p> <ul style="list-style-type: none"> <li>— Kazakhstan</li> <li>— China</li> <li>— Australia</li> <li>— Pakistan</li> <li>— Trans-boundary Aquifers</li> <li>— Groundwater in emergency situations</li> <li>— advances in tools and strategy for coping droughts</li> </ul>	<p style="text-align: center;"><b>Heading to Isfahan</b></p>	<p><b>Flying back to home countries</b></p>
17:00 -20:00	Dinner	Dinner			