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Iran has been one of the states with the highest rate of dam construction worldwide in the recent years. The construction of hundreds of dams on rivers combined with a non-participative and non-democratic approach has led to numerous ecological, social, cultural and political problems and conflicts in the past years. There is much public criticism over the intense dam building policy and its impacts. In particular, the case of the Lake Urmia has led to hot debates and many protests within the Iranian society regarding the destructive dams in the country.

Introduction

The first dam constructions started in Iran in the 1950s. Before the Islamic Revolution of 1979, only fourteen large dams had been built, usually with the dominant involvement of foreign banks and companies. After the establishment of the new political system, particularly after the end of the Iran-Iraq war in 1988, the dam building activities have intensified significantly. Today, Iran has achieved the capacity to build small, middle and large size dams without any foreign participation. The objectives of dam building in Iran are mainly the hydroelectricity, irrigation and drinking water supply at which the two latter reasons are less dominant than the first one. Untill now the construction of 541

small and large dams[1] have been completed[2]. While in 2007 totally large and small 88 dams were under construction in Iran[3], this number increased in 2011 up to 135 dams and 546 dams were in the planning phase[4]. On average, close to two billion m³ of water are added to the country's water reserves annually. In end of 2011 the storage of dam reservoirs has reached the capacity of 65 billion m³. These figures show that there are plans to impound almost all rivers in Iran which carry regular water.

Rivers in Iran

The most and the largest rivers in Iran are situated in the north and west. It is so because the highest precipitation occurs here where long and high mountain chains lie parallel to the country's borders. Almost all emerging rivers flow out of the borders, either to neighbouring countries or to the sea and not into the centre which is a high plain. The centre, the south and the east of the country is semi-arid or arid with very low precipitation.

The most well-known and largest rivers in Iran are the Aras and the Karun. The Aras comes from Turkey in the very northwest and composes a border river with Azerbaijan for the most stretch. That is why it could not be "used" entirely by the Iranian State. But the Karun River, which is the most affluent (at the end 575 m³/sec, 950 km long) and the only navigable one, flows from the Zagros mountains in the southern province Khuzestan into the Persian Gulf and has been utilized almost fully. On the Karun River within the Iran are the biggest dams which are built for hydro-energy production, and water is diverted in the lower parts for the irrigation of large areas (280,000 hectares).

On the northern side of the north mountain chain along the Caspian Sea with high precipitation originate many rivers. There are several bigger rivers which spring from the Zagros Mountains on the west of the state, namely in the provinces Kurdistan, Kermanshah and Elam, and flow towards Iraq where they join the Tigris River. Many rivers are born in the southern part of the Zagros Mountains and flow into the Persian Gulf, such as the Karun River. Some bigger rivers originate from the mountain chains of the north and the west, and flow towards the arid central plain where they dry out. The second inner basin of Iran is the Lake Urmia basin in the northwest of the country. Several small, middle and big size rivers flow into the biggest lake of Iran. Some small and middle size rivers are shared in the east with Afghanistan and Pakistan.

The history of water infrastructures in Iran

As a semi-arid country (except its green coastal areas at the Caspian Sea which does not cover more than 10% of the entire land) Iran, throughout its history, has developed a particular water culture which has been a crucial element in developing human settlements and civilizations. Scarce water resources resulted in specialization in building water infrastructures. With this knowledge, even in semi-desert regions with very limited water resources, towns and cities were built. Among the most representative of these infrastructures were water canals, and, in particular, qanats. Qanats are horizontal water tunnels which bring ground water from mountains to settlements to arid areas at the border. Even though qanats are also found in other countries in the Middle East, the most developed ones are in Iran.

The Iranian Ministry for Energy is the responsible body for the management of water resources in the country. Decisions about the construction of water infrastructures, such as dams, are taken within this body. At end of 1980's the Iranian state started to plan the systematic construction of water infrastructures such as dams, hydro-electric power plants (HEPP) and water diversions. The state planned these water infrastructures entirely based on a technical and profit centred approach without taking into account the issues of cultural and natural heritage, and human settlements. The continuous increase in electricity consumption and the growing need for food and drinking water in the cities were the strong arguments behind "developing" water resources.

The plans for the construction of dams are made by the central government, often in cooperation with the provincial governments which are dependent on the central government. There is no public consultation about the government's policies regarding dam, electricity, irrigation, water supply and development. As governments in Iran are not elected in a truly democratic way and there is no opposition party, the discrepancy between people and governing institutions is huge. This leads to a disconnection between the real needs of people and the actions of the government.

Destruction of the Lake Urmia (Southern Azerbaijan – Iran)

A growing and diversifying social debate has been going on over the issue of Iran's dam policy and, in particular, the impacts of dams constructed on the 13 rivers that feed the Lake Urmia. This endorheic lake has a basin that totals a land of 51,876 km² and covers 3 provinces which are the West, the East Azerbaijan and the Kurdistan provinces. It extends to a length of some 140 km and a width of 85 km[5]. The average surface of the lake area used to be 5100 km². However, now a large portion of it is lost. The Urmia Lake, in its original size, is considered as the largest hyper saline lake in the Middle East. The basin has a population of around 6.4 million people and an estimated 76 million live within a radius of 500 km[6].

There are 39 dams either constructed or planned over the rivers flowing into the Lake Urmia, mainly for the purpose of irrigation. As water became more available, many farmers switched from subsistence to intensive agriculture. This shift in agricultural production created increasing pressure on not only surface water, but also underground water resources, over which the Iranian Government has almost no control. 94% of water demand is allocated to agriculture[7]. Farmers in Sulduz, a traditional town by the lake, indicate that only a decade ago they could extract water from wells of 30–40 meter deep. Now even at 70 meters deep, they cannot reach any water[8]. Furthermore, the use of inappropriate irrigation practices drops water use efficiency down to 30%[9] which is very low and results in skyrocketing levels of agricultural water consumption. In addition, droughts since 1990s did not help the situation. However, the first signs of the problem started about four decades ago as the surface of the lake started to decrease. Once a surface of 5278 km² of lake (1976) shrank to 3108 km² (2009) [10]. In beginning of 2012 the lake lost more than 65% of its surface area[11]. Within the last decade, the maximum depth of the lake fell from 12 to 6 metres[12]. Another significant negative impact was due to a bridge built over the lake in 2008. This infrastructure cuts the lake almost in two equal parts and lets no water flow from one to another, which is crucial for the functions of the lake ecosystem. As water circulation in the lake is impeded, there has been a dramatic increase in water salinity[13]. In terms of other parameters of water quality, the situation is no better. Due to lack of water treatment facilities and municipal control, the lake is used entirely as the common sink of urban, agricultural and industrial entities around.

Naturally, these circumstances pose a great danger towards not only humans, but also biodiversity within the Urmia Basin. The basin is the habitat of some 212 species of birds such as flamingo and

pelican, 41 reptiles, 7 amphibians and 27 mammals such as the Iranian yellow deer. The lake is also known for its medical effects, especially for curing Rheumatism and Arthritis. Because of many other reasons, as well as these, the Urmia is listed as a wetland of international importance under the Ramsar Convention[14] since 1971 and UNESCO Biosphere Reserve[15] since 1976. However, neither of these has yet saved this great natural heritage of humanity from perishing. Recent studies foresee that the shrivelling of the Urmia will continue and that the survival probability within the next ten years is only around 64%[16].

Greater concerns are at stake for the Middle East

It is estimated that 8 billion tons of salt is concentrated at the bottom of the Lake Urmia. With wind and storm such amount of salt can be carried away and create serious levels of wind-borne salt toxicity on both directly humans and agricultural production within the radius of 500 km around the lake. Many ecologists, activists and the Iranian officials warn that if the Lake Urmia dries up, an ecological catastrophe is inevitable not only for the settlements around the lake, but also in Armenia, Azerbaijan, Iraq and Turkey. The unforeseen consequences of such a large scale ecological disaster might trigger a colossal migration and trigger many conflicts among the states of the Middle East.

People protesting: "Let's go to Urmia and fill it up with our tears"

Even though the Lake Urmia started to shrivel in the 1970s, it could attract the attention of media only in 1990s. The deterioration of the lake was undeniable. The lake was not only shrinking, but also being heavily contaminated. The existence of many basin communities was at stake. Many had to migrate to large cities such as Tabriz. Some resisted to the increasing impoverishment. It was only in the 2000s when the social problems clustered around the issue of the lake were first pronounced. Guntay, a young Azeri man from Tabriz, indicates that the first time he and his friends brought the issue of Lake Urmia was about ten years ago in an exhibition. "We exposed the photos of dead flamingos in the lake to say that it was dying".

Within years, numerous symbolic protests went on with growing participation of both the inhabitants of the region and the environmentalists from different parts of Iran. One was in 2009 when people held an interesting protest which consisted of pouring a bottle of water into the lake that represents their tear drops for what has been happening to their lake. Around 150 people were arrested and some of them were put in prison for years. A year later another large protest action took place in Tabriz on the World Environment Day, at the end of which the Iranian Police arrested some 70 protesters. In another protest in 2011 thousands of people from Tabriz and Urmia were on the streets protesting the central government for not taking the necessary measures to save the lake. This peaceful action was confronted with repression by the Iranian security forces whose result was the death of two protestors and the detention of dozens of citizens. Afterwards, the Iranian State prohibited any news regarding the situation of the Lake Urmia.

Another recent action took place in the Cities of Urmia and Tabriz in May 2012. With a poster, the protesters were asking the President Mahmoud Ahmadinejad "Is the crisis of Urmia less important than the Nuclear Crisis of Iran?" The answer to that question was the detention of some hundred protesters, some of which are still in prison and some others free at the cost of heavy fines. On the World Environment Day, 5th of June 2012, the Iranian Government's reluctance to take necessary measures to save the Lake Urmia was protested by many all around the world. Baku, Calgary and Waterloo were among the many cities where such protests took place. After all, the Iranian Government has finally

been more open to accepting that there are problems with the Lake Urmia. The Iranian Government's insistence on explaining the current status of the Lake entirely with global climate change has been coming to an end. Now, a number of solutions are being discussed and formulated within academic and civil society circles. Some these suggest releasing more water from dam reservoirs, limiting irrigation, removing some dams on the rivers that feed the Lake Urmia[17] and some projects for taking water from other rivers like the Zab or Araz Rivers and even the Caspian Sea[18] to revive the lake. While the first two proposals make sense, the last proposal is highly discussed among the critics and would result in additional water mismanagement problems.

However, the words of the head of Iranian State General Inspection Organization Mr. Mohammadi's after the protests of the World Environment Day in Tabriz are significant[19]: "If the experts in the province believe that a crisis of Lake Urmia is so serious, then we should start from the province itself: province should stop mismanagement of the funds and dedicate some of the budget to solve Lake Urmia's problem". He also adds: "The province should not be waiting for the national budget and if there is any crisis they should assign some of the province's budget for this issue". The people of the Lake Urmia, once more, seem to be left alone to solve a regional scale problem that would affect many others.

End notes:

[1] Large dams are defined as being over 15m high. The definition also includes dams between 5 and 15m high with a reservoir exceeding 3 million m³ of volume.

[2] See website of Icold – International Commission of Large Dams:
http://www.icold-cigb.org/GB/World_register/general_synthesis.asp?IDA=206

[3] Iran Daily – Domestic Economy, 23 July 2007.

[4] See Ministry of Energy News Agency, 26 October 2011:
<http://news.moe.org.ir/vdcdf0s.yt0f56me2y.html>

[5] UNEP (2012). Thematic Focus: Climate Change, Resource Efficiency, Ecosystem Management, and Environmental Governance.
http://na.unep.net/geas/getUNEPPageWithArticleIDScript.php?article_id=79

[6] SEDAC (2010). Gridded Population of the World: Future Estimates. Socioeconomic Data and Applications Center (SEDAC) in collaboration with CIESIN, UN-FAO, CIAT.

[7] WWA/Yekom (2005). The Environmental Impact Assessment and study (quality and quantity) of the Development Projects in the Lake Uromiyeh Basin. The West Azerbaijan Water Authority (WWA), Ministry of Energy (MoE).

[8] Unstructured interviews held with the inhabitants of the town of Sulduz (24–25 May, 2012).

[9] Hashemi, M. (2008) An Independent Review: The Status of Water Resources in the Lake Uromiyeh Basin. A Synthesis Report for the GEF/UNDP Conservation of Iranian Wetlands Project, School of Civil Engineering and Geosciences, Newcastle University, England, UK.

[10] Reveshty, Mohsen Ahadnejad; Maruyama, Yoshihisa (2010): Study of Lake Urmia Level Fluctuations. Study of Lake Urmia Level Fluctuations and Predict Probable Changes using Multi-Temporal Satellite Images and Ground Truth Data Period (1976-2010). <http://lake-urmia.blogspot.com/2010/12/study-of-lake-urmia-level-fluctuations.html> (Accessed May 26, 2011)

[11] See website of the Lake Urmia Conservation Insitute
http://www.saveurmia.com/wp-content/uploads/2012/03/poster_2012.png

[12] See website of the Lake Urmia Conservation Insitute
http://www.saveurmia.com/wp-content/uploads/2012/03/poster_2012.png

[13] The water salinity in the Lake Urmia rose from 220 to 380 mg/lt.

[14] See website of the Lake Urmia Conservation Insitute
<http://www.saveurmia.com/take-action/campaign-statement/>

[15] See profile at website of Unesco Biosphere Reserve Directory:
<http://www.unesco.org/mabdb/br/brdir/directory/biores.asp?mode=gen&code=IRA+07> (Accessed May 25, 2011)

[16] Reveshty, M. A. & Maruyama, Y. (2010): Study of Lake Urmia Level Fluctuations. Study of Lake Urmia Level Fluctuations and Predict Probable Changes using Multi-Temporal Satellite Images and Ground Truth Data Period (1976-2010). <http://lake-urmia.blogspot.com/2010/12/study-of-lake-urmia-level-fluctuations.html> (Accessed May 26, 2011).

[17] Khosravifard, S. (2010): Campaigners Fear Lake Urmia Drying Up. Payvand Iran News, April 30, 2010. <http://www.payvand.com/news/10/apr/1297.html> (Accessed May 19, 2011).

[18]Djafarov, T. (2011). "Water transfer of Araz River to Lake Urmia is discussed between Iran and Azerbaijan" Trend News Agency 26 December 2011. at: <http://pda.trend.az/en/1973742.html> (Accessed February 8, 2012).

See website of the Lake Urmia Conservation Insitute[19]
[/http://www.saveurmia.com/2012/06/06/successful-events-on-june-5](http://www.saveurmia.com/2012/06/06/successful-events-on-june-5)