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A Brief Overview of Water Resources and Land Management in Iran

H. Ghamarnia

The Islamic Republic of Iran, with a total land area of 165 million hectares, lies between 25° 00' and 39° 47' N and 44° 02' and 63° 20' E. Therefore, the southern half of the country is in the subtropical zone and the northern half is in the temperate zone and with a desert zone in the middle around 30° N. The country has on the north east side, the desert and steppe of Turkmenistan and on the south and south west side, the hot and arid Saudi Arabian peninsula. It borders with Iraq and Turkey in the west; Pakistan and Afghanistan in the east; Turkmenistan in the northeast; Azerbaijan and Armenia in the northwest.

The Iran's population has increased about 7 times during the last 90 years and it has risen from 10 million in 1920 to more than 75 million in 2013. At present Iran is the 17th most populated countries in the world and based on the data presented by the UN it will be classified as one of the 10 most populated regions in the world by the end of 2025. Approximately 50% of Iran's population is living in the northern and western parts of country which have over 70% of all the water resources.

Almost 65% of Iran's area is arid, 20% is semi arid and only 15% of landscape is considered as wet and semi-wet. The average annual rainfall is 250 mm, while the average rate of evaporation is about 2556 mm. The long period study shows that in Iran totally, 23 percent of the rainfalls comes in spring, 4 percent in summer, 23 percent in autumn and 50 percent in winter.

Six major water basins of Iran are Central Plateau, Persian Gulf and Oman sea, Caspian Sea, Hamoun Lake, Orumie Lake and Serakhs totally with total volume of 400 billion cubic meters (bcm) rainfall.

The total long-term renewable water resources in country are estimated as 130 bcm. Average annual evaporation & transpiration are estimated 270 bcm, Surface currents 92 bcm and finally, Seepage to alluvial aquifers 38 bcm and return water from consumption is 29 bcm respectively. Therefore, the total available water in country is around 159 bcm. The total available groundwater resources from (springs, Qanat and wells) also is around 80 bcm. The saline and brackish water resources in Iran reach as an amount between 10 and 11 bcm in surface water resources and about 1.7 bcm in groundwater resources. The volume of collected, treated and reuse wastewater across of country is about 1162,820 and 328 mcm.

The evidence suggest that the water levels in Iranian aquifers have declined by an average of nearly half a meter every year over the last 15 years.

Around 50 years ago, the available fresh water per capita in Iran was $\frac{1}{2}$ of the world average in the early years of 1960. But, 15 years ago (1990), the available fresh water per capital in Iran was $\frac{1}{3}$ (one third) of the worlds related average. Finally, in year 2025, the available fresh water in Iran would be $\frac{1}{4}$ (one fourth) of the world's related average.

The annual renewable water availability during 1956, 2007 and 2025 were estimated as 7000, 1900 and 816 (cubic meter/capita) respectively. Based on anticipation made by united nation in the future Iran will be in crisis water stress condition.

Moreover, Irrigated area in all of the country is around 8 Mha. Rain-fed land area is 6 Mha, fallow land area is 4.5 Mha , the area under surface irrigation is 7.6 Mha (95%) and under the pressurized irrigation is 0.4 Mha (5%).

About 92.4% of accessible fresh water is used in agricultural activities which is quite far more than the world average of 69-70% use in agricultural activities. Domestic sector use 6.5 % and industries use only 1.5 % of accessible freshwater.

Based on estimation and regarding to the population growth, increasing agricultural land for more food production, industrial and domestic improvement, the country need 30 bcm more water in 2025. Therefore, the following issues in the future need to be considered:

- Water efficiency improvement
- Storage capacity increasing
- Modern water harvesting methods using
- Wastewater recycling and treatment
- Water desalination
- Water losing prevention in agricultural and urban water sectors
- Consumption patterns changing
- Water supply networks renovation
- Water resources pollution prevention
- Water aquifer depletion prevention
- Artificial groundwater recharges operations
- Water delivery from far resources to drought region
- Regulated plans for drought condition
- Modernized pressurized irrigation improvement

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