



## A Blip on Iran's Water Sector

Iran covers a total area of about 165 million hectares. The average annual rainfall is 230 mm, while rate of evaporation exceed 2000 mm annually. Approximately 90 percent of the country is arid or semi-arid and located in the interior and far south which is characterized by long, warm and dry periods, lasting sometimes over seven months. About 23 percent of the rain falls in spring, 4 percent in summer, 23 percent in autumn and 50 percent in winter as snowfall. Of the average annual rainfall volume of 417 billion cubic meters (bcm) an estimated 70 percent evaporates before reaching the rivers. Furthermore, the total long-term total renewable water resources are estimated at 130 bcm of which about 13 bcm are external water resources. Internal renewable water resources are estimated at 117 bcm. Surface runoff represents a total of 92 bcm, of which 5.4 bcm come from drainage of the aquifers, and groundwater recharge is estimated at about 49.3 bcm, of which 12.7 bcm are obtained from infiltration in the river bed, giving an overlap of 18.1 bcm.



### Iranian water reserves

Dams have always played an important role in harnessing precious Iranian water reserves and the long-term objective of Iran's water resources development plan is based on the control and regulation of water resources through dams. Furthermore, groundwater depletion is estimated at 4.8 bcm/year. Most of the overexploitation happens in the central basins where less surface water is available. Land subsidence, salt intrusion, and lowering of the water table are among the most prominent effects. Estimates suggest the water levels in Iranian aquifers have declined by an average of nearly half a meter every year over the last 15 years. Total surface water and groundwater withdrawal represents almost 70 percent of the total actual renewable water resources. Use of non-conventional sources of water is minimal. The treated wastewater is said to be indirectly used in agriculture. In some towns, although in a limited form, raw wastewater is used directly for irrigation resulting in some health-related problems.

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### Ground water resources

Groundwater discharge (through wells, qanats and springs) varied from less than 20 bcm/year in the early 1970s to over 74 bcm/year at the beginning of the present millennium. The number of wells during that period increased fivefold, from just over 9,000 to almost 45,000. The cultivable area is estimated at about 37 million ha, of which 20 million ha are irrigated and 17 million ha are dryland. Of this irrigated area, 6.5 million ha consisted of annual crops, 2 million ha are under horticultural crops and about 6.2 million ha are under annual dry land crops, while the remaining are fallow. Agriculture is the main water withdrawal sector. About 54 percent of water utilization in this sector is from groundwater resources and the remaining amount is from surface waters. Agricultural land availability is not a major constraint. The major constraint is the availability of water for the development of these lands. Crop yields on irrigated land, although generally 2–3 times higher than on rain fed land, are still on the low side by interna-



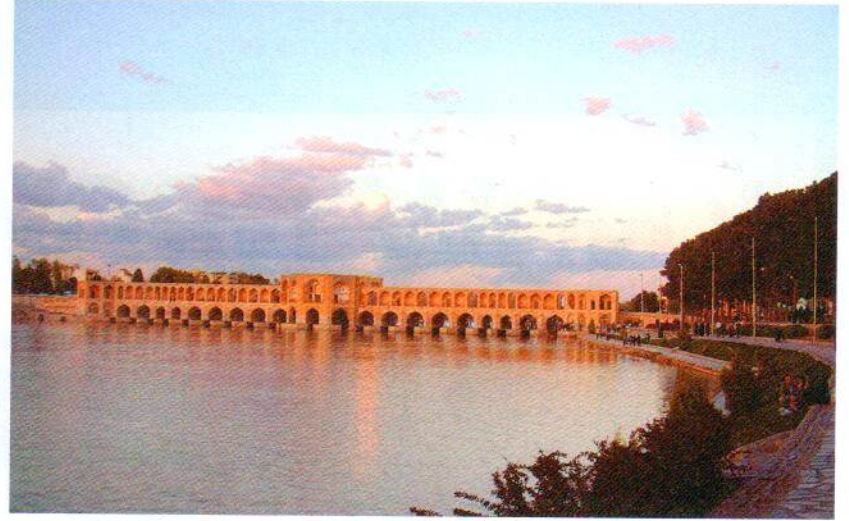
tional standards. Water shortage and soil salinity are mentioned among the main causes of this yield gap.

### The root of the problem

Water pollution is caused by industrial and municipal wastewater, as well as by agriculture. Concerning municipal wastewater, the bulk of collected sewage is discharged untreated and constitutes a major source of pollution to groundwater and a risk to public health. In a number of cities without sanitary sewerage, households discharge their sewage through open rainwater drains. There are also many problems in dealing with industrial wastes. Major problems are lack of information about the true amount of these wastes, lack of treatment and disposal technologies, illegal dumping. Annual level of industrial wastewater is about 1.5 billion cubic meters and less than 30 percent of these wastewaters have efficient WWTP's. Except a few cases, there is no kind of mixed wastewater treatment plant in Iran to combine industrial wastewaters with domestic ones.

### Efficient wastewater treatment

Less than 40 percent of the total populations have complete and efficient wastewater treatment plants (WWTP's). The population served by the management of these plants is about 30 million, less than 40 percent of the total domestic sludge is being treated completely. This means that; of more than 200,000 cubic meters of daily sludge (2000 tons/day dry solids) of total fecal, septic and waste excrements sledges, only about 80,000 cubic meters (800 tons) is being digested and/or stabilized daily by different treatment methods. Moreover, the most common method for treating sludge is digestion (aerobically and anaerobically). Lagooning, composting and land-filling are the next methods of treatment. Mechanical dewatering is usually implemented as final treatment to reduce the volume of the stabilized sludge. In a few WWTP's these methods would be applied on the raw untreated sludge. The stabilized sludge has been used in many agricultural activities from the past to present. Usually the regional wastewater companies who are responsible for the operation of these WWTP's deliver these treated wastes to the local farmers.



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### Challenges linger

However, a number of challenges remain. According to the **World Bank**, the sector is affected by "low water use efficiency in urban and rural uses; limited participation by stakeholders in development planning and management; large needs for rehabilitation and development of hydraulic infrastructure for sustainable water usage; problems of pollution caused by the discharge of untreated wastewater into public waterways and aquifers; and weak institutions involved in the sector and limited coordination among stakeholders. It is also characterized by "poor performance of water supply and on-site wastewater disposal facilities, causing increasing risk for ground and surface water pollution and health and environmental risks resulting from the discharge and re-use of untreated effluent for irrigation; limited technical, institutional and financial capacity of water and wastewater companies; a lack of clarity of institutional responsibilities of sector entities; and non-transparent and inadequate tariff structures and levels. ■

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تبلغ مساحة إيران حوالي ١٦٥ مليون هكتار. ويسجل متوسط هطول الأمطار السنوي ٢٣٠ ملمتر في حين يتجاوز معدل التبخر ألفي ملمتر سنوياً. تسيطر الأراضي القاحلة وشبه القاحلة على حوالي تسعين في المئة من مساحة البلاد. تقع هذه الأراضي في الداخل وفي أقصى الجنوب الذي تتميز بفترات طويلة دافئة وجافة تستمر أحياناً أكثر من سبعة أشهر. يتساقط حوالي ٢٣ في المئة من المطر في فصل الربيع و٤ في المئة في فصل الصيف و٢٣ في المئة في فصل الخريف و٥٠ في المئة في فصل الشتاء من تساقط الثلوج. وعلاوة على ذلك، يُقدّر إجمالي مجموع الموارد المائية المتجددة على المدى الطويل بـ ١٣٠ مليار متر مكعب منها حوالي ١٣ مليار متر مكعب تنبع من موارد مائية خارجية. وتقدر الموارد المائية الداخلية المتجددة بـ ١١٧ مليار متر مكعب ويمثل الجريان السطحي مجموع ٩٢ مليار متر مكعب منها ٥,٤ مليار متر مكعب تأتي من تصريف المياه الجوفية. وتقدر تغذية المياه الجوفية بحوالي ٤٩,٣ مليار متر مكعب منها ١٢,٧ مليار متر مكعب تأتي من الترشيح في قاع النهر.