

Mediterranean water
monitoring working
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Jordan

Introduction

Jordan is a water scarce country with arid and semi-arid climate (Mediterranean climate) over 91 of Jordan is largely arid with less than 100 mm precipitation only 8% of the country receive 200 to 500 mm of rain and 1% over 500 mm the average annual rainfall for the whole country is estimated at 8.5 billion cubic meter most of which about 85% is lost through evaporation with the remainder following into wadis and partially infiltrating into deep aquifer .

The available renewable resources can not meet the ever-increasing demand for water especially for domestic purposes.

Rapid industrialization which has taken place during the last two decades added to the increase in agricultural schemes posed extra pressures on the water sector.

Population

- The estimated mid year population of Jordan in 2008 was 5850000 of these 3015000 were males and 2835000 were females (male: female ratio of 1.06: 1). (Department of Statistics Jordan, 2008).
- About 12.7 % of the population is under 5 years old, and 37.3 % under 15 years old. Only 3.3 % of the total population is above the age of 65 years old (sex ratio of 1.01 male per 1 female in this age group). Table (1) and figure (2) show age distribution of Jordan population, 2008 (Jordanian Population Pyramid).
- the population distribution of Jordanians by governorates and gender, which is used to calculate incidence rates for different regions. Jordan divided into three regions: each region consist of four governorates .The Central region (Amman, Balqa , Zarqa, and Madaba) constitute about 62.9% ofthe total population with population density of (249.7) person per Km²• North region (Irbid, Mafraq , Jarash , Ajlun) constitute about 27.8% of population with population density (55) person per Km² .South region (Karak , Tafiela , Ma'an , Aqaba) constitute 9.3% of the population and population density 11.7 per Km²

Drinking water supply

Jordan depends on ground water sources for domestic uses, which constitute 70% of the total annual consumption. The remaining 30% comes from surface sources. The ground water, which comes from wells and springs, receives chlorination only before being distributed to the public. The surface is utilized in one place only where it receives extensive treatment before distribution (per disinfection, coagulation, settling, sand filtration, and final chlorination).

Water Resources:

- The average annual renewable fresh water resources: (780) MCM

 - 275 MCM is GW

 - 505 MCM is SW

- Other sources of water are No conventional water resources:

 - Nonrenewable brackish & fossil water = 140 MCM

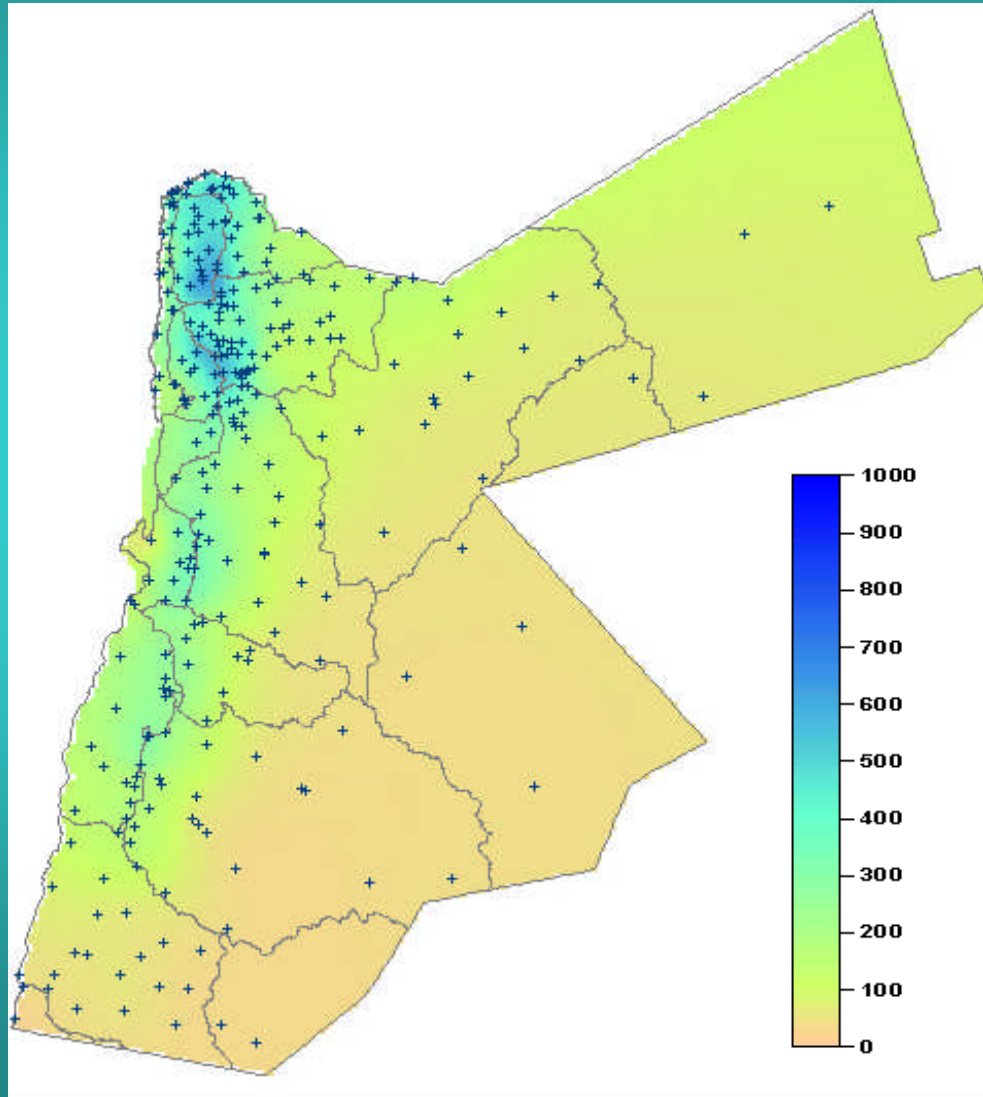
 - Treated WW = 90 MCM

(90% of treated effluent in Jordan currently reused in agriculture. This will reach some 200 MCM year 2020).

The availability of renewable water today is less than 90 liter per capita.

Water Resources:

Mean Annual Rainfall 1963 – 2008



Seasonal rainfall is the main source of water in the kingdom.

It is highly variable

It only occurs in the mountainous range in the north-west.

Its annual variability affects rain fed agriculture, ranges, livestock, groundwater recharge and surface water storage.

Drinking water monitoring

There are two main governmental agencies responsible for monitoring the quality of drinking water are Water Authority of Jordan (WAJ), and the Ministry of Health (MOH).

Water Authority of Jordan

WAJ is the owner and operator of the major water plants and network systems therefore; their monitoring programs are directed towards ensuring providing safe water to the public, which complies with the national standards. WAJ is responsible by law No. 18 for year 1988 to provide domestic water with sufficient quantity and quality to the people of Jordan. WAJ is responsible for water quality until the house water connection point. Supplied water quality should comply with the Jordanian Standards 286/2001.

The Ministry of Health (MOH)

MoH is responsible by law No. 54 for the year 2002 for conducting surveillance programs on quality of all types of drinking water to ensure its safety and compliance with national health standards and it is empowered with the authority to prevent distribution of unsafe water MOH conducts a more comprehensive monitoring program to ensure the quality of water. This program includes the following :

A-Sanitary inspection of all water sources, distribution reservoirs, networks.

B-Sanitary inspection of water-bottling factories.

C-Sampling and analysis of water from sources, networks, water purposes.

factories, households, institutions, industries. Water analysis include:

C-1 Testing for microbiological content of raw waters intended for drinking

C-2 Testing drinking water for:-

-Total coliforms

-Thermotolerant bacteria

-Pathogenic bacteria: cholera, salmonella and shigella

-Fungi, for bottled water only

-Residual chlorine

-Physical characteristics: color, odor, turbidity, taste, ph

-Chemical characteristics: TDS, total hardness, NH₄, Fe, Cu, Cl⁻, F⁻, NO₂, NO₃, etc

-Chemical analysis for heavy metals are applied for new sources and when pollution is suspected.

The major problems facing the water supply are:

- 1-Water shortage, as the available amount are shared for all uses.**
- 2-Degardation of the quality of the available sources due to over exploitation.**
- 3-Increasing demand on water supply resulting from changing life styles and a high rate of population increase (3.6%).**
- 4-Network leakage which is estimated at 35%.**
- 5-Intermittent water supply due to water shortage especially during summer (the dry season)**

However, the per capita per day quantity of water is estimated at 126 lit. while in fact the true amount is much less. 98% of the population have access to piped water. Due to intermittent pumping, people depend on storing water in their household tanks for several privately owned wells.