

# WATER SCARCITY



*Kuwait's Most Serious Environmental Crisis*

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# KUWAIT'S ENVIRONMENTAL CONTEXT



**Environment**  
flat, arid desert



**Summer temperatures:**  
up to 45°C



**Rainfall**  
112 millimeters/ year



**Population**  
4.8 million (growing)



Kuwaits

# Water Stress Level

Water stress, according to the European Environment Agency (1999), is when demand for water is more than the available amount.

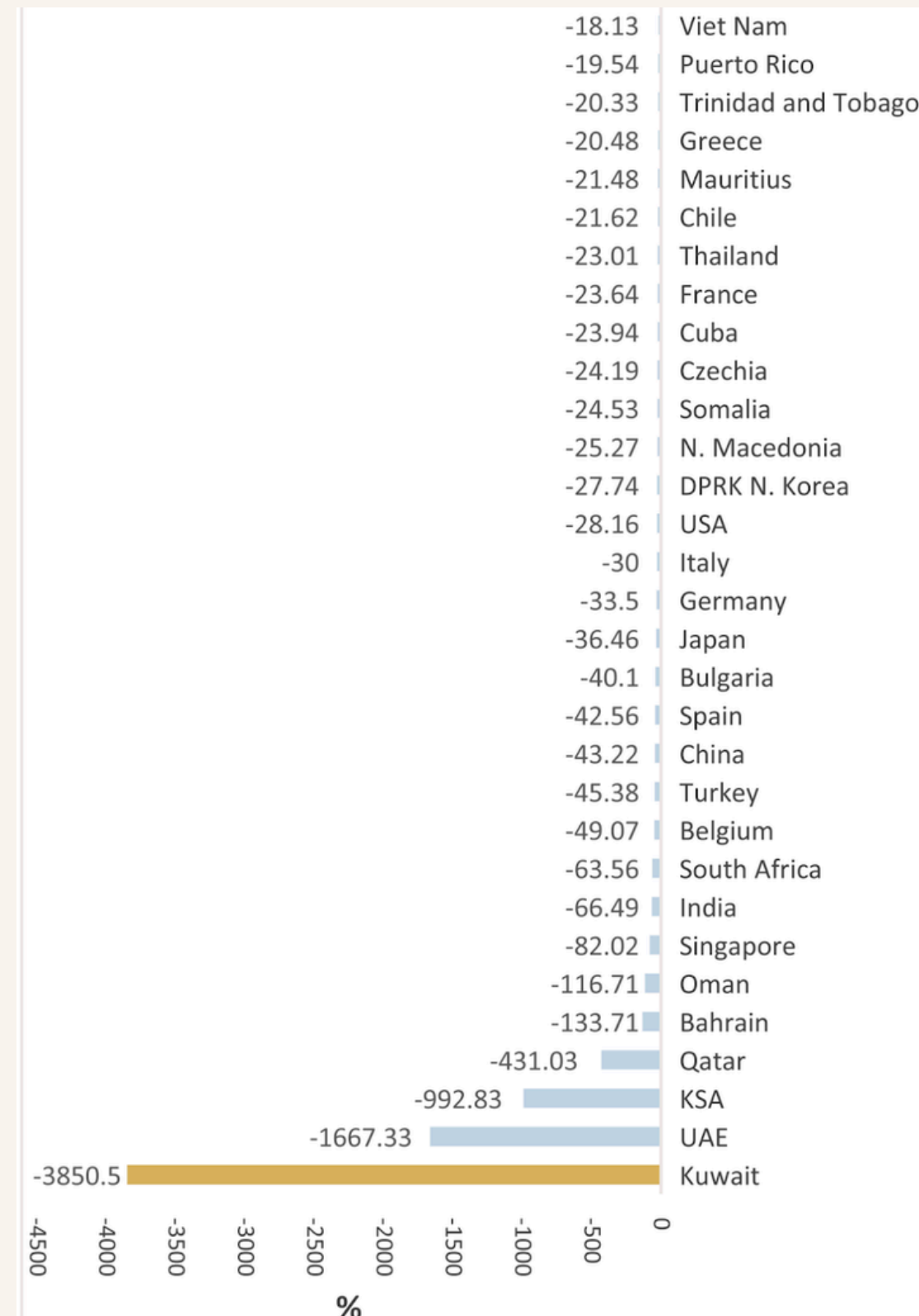


Fig 1. Shows water stress in 2018 compared to the most water-stressed countries (Esra Aleisa, 2024).

# -3,850%

## Kuwait's Water Stress Level

### #1 Most Water-Stressed Nation in the World

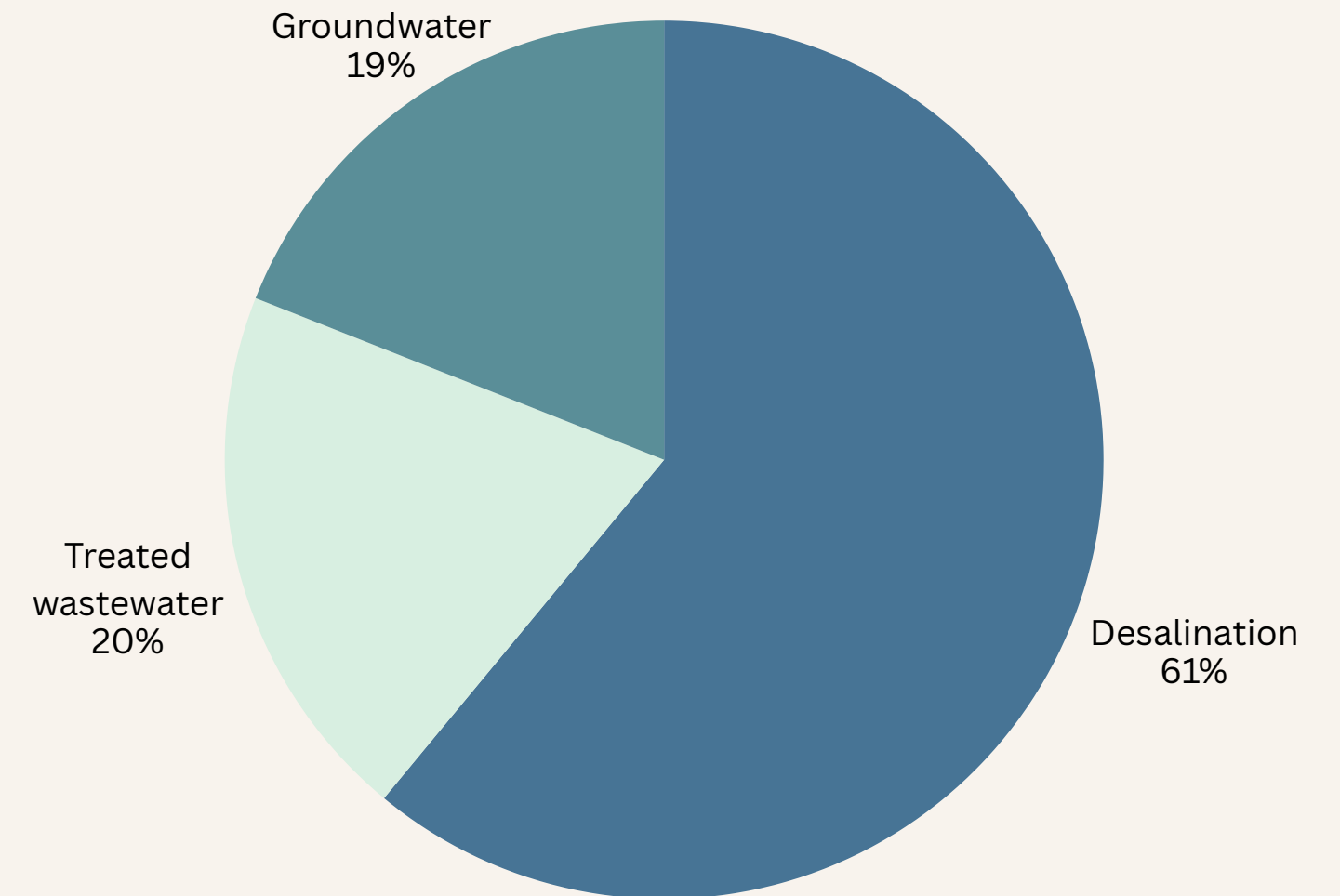
Researchers have warned that there is an “increasing demand for water supply but no clear plan for water management” (Al-Damkhi et al., 2009, p. 619).

# KUWAIT'S WATER SOURCES

Type of water resource(s)	Distribution in percentages (%)
Desalination	61
Treated wastewater	20
Groundwater	19

Fig. 2 depicts the water resource distribution in Kuwait (World Bank, 2022)

Groundwater reserves are limited and increasingly depleted, while treated wastewater remains underutilized for industrial and agricultural purposes.  
→ SO desalination is Kuwait's primary source of drinking water.



# Desalination Dependence

- Kuwait among first countries to scale desalination
- 8 desalination plants (red triangles)
- Located along coast
- Main source of drinking water
- Energy-intensive process



Fig. 3 shows the location of desalination plants in Kuwait (Fanack Water, 2020a).

# Costs of Desalination

## PROS

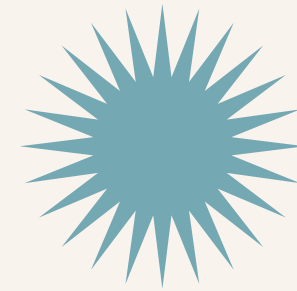
- Enabled Kuwait's development & population growth
- Reliable output regardless of rainfall



## CONS

- Kuwait heavily relies on multi-stage flash desalination (MSF) (Tariq et al., 2022)
- MSF is highly energy- and fossil fuel-intensive (Darwish, 2008)
- Desalination contributes to high greenhouse gas emissions (Al-Shayji & Aleisa, 2018)
- Water production costs continue to rise over time (Aleisa, 2024)
- Dependence on desalination creates long-term sustainability concerns (Al-Otaibi & Mukhopadhyay, 2005)

# RISING CONSUMPTION



## HIGH DEMAND AND OVERCONSUMPTION

**447-600 L**

Per capita/day in Kuwait  
*(Tariq et al.; Darwish, 2008)*

**560 L**

Gulf region average/day  
*(Alzankawi et al., 2023)*

**180 L**

World average/day  
*(Alzankawi et al., 2023)*

- Kuwait among highest per-capita consumers
- 560 L/day vs global average 180 L/day
- Water production and consumption rising since 1999

Period	Total production in million m <sup>3</sup> /year	Gross consumption in million m <sup>3</sup> /year
1999	387.40	382.19
2005	510.89	506.92
2010	682.60	609.87
2015	682.60	682.48
2019	729.33	730.39

Fig. 4 Shows the total production and gross consumption of fresh water in Kuwait between 1999 to 2019 (Tariq et al. 2022)

# THE SUBSIDY PROBLEM



- Water prices for consumers **NOT CHANGED** since 1966 despite rising incomes (Al-Otaibi & Mukhopadhyay, 2005)
- around 90% of water costs are government subsidized (Aleisa, 2024)
- Low prices → no incentive to conserve
- negative externalities
- high income + low price --> water not “valued” (Darwish 2008)

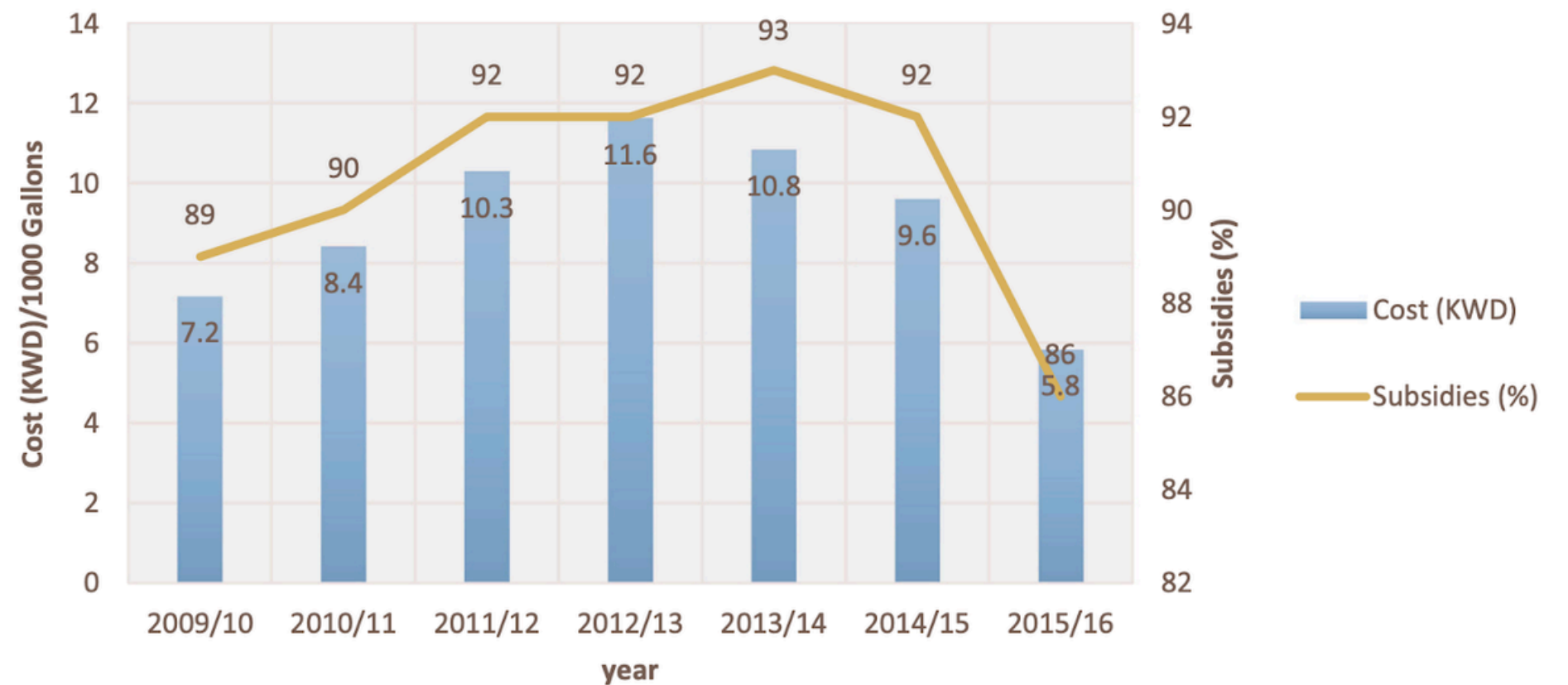


Fig. 13. Percentage of water subsidized compared to cost of water per 1000 gal, data source: Al-Ojayan, et al. [138].

# Solutions & Policies

*What is Kuwait doing?*



Efforts remain limited...the most active initiative is public education

- Idea that if consumers recognize the true value of water, they voluntarily reduce waste... (addressing the demand side)

## ***Public Education & Awareness***

### ***Ministry of Education Campaign (2025)***

Kuwait's Ministry of Education launched a campaign aimed at reducing electricity and water consumption in schools and public institutions. The campaign also aims to spread awareness about the necessity of conservation in order to build “a conscious and responsible generation” (Kuwait Times, 2025)

### ***National Awareness Committee***

Formed by Ministry of Electricity, Water & Renewable Energy. Organizes workshops and community lectures promoting responsible water use, especially during summer months when consumption peaks. (Smart Water Magazine, 2025)



# Conclusion

## *Water Scarcity*



- Water scarcity is Kuwait's most serious environmental concern
- Kuwait's current water system is environmentally and economically unsustainable
- Heavy dependence on desalination creates long-term risks
- Rising consumption continues to intensify pressure on water resources
- -->Water must be treated as a scarce resource, not an unlimited one..

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