

Executive Council Resolution No. (182) of 2022
Concerning the General Policy for the Management,
Regulation and Protection of Groundwater in the
Emirate of Abu Dhabi

The Executive Council has decided the following:

The General Policy for the Management, Regulation and Protection of Groundwater in the Emirate of Abu Dhabi shall be approved in accordance with the (attached form).

Saif Saeed Ghobash
Secretary-General

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Corresponding to: 19 Jumada Al Owla 1444 Hijri



General Policy for the Management, Regulation and Protection of Groundwater in the Emirate of Abu Dhabi

Environment Agency - Abu Dhabi.

2022.

1. Introduction

This Policy reviews the existing state of groundwater in the Emirate of Abu Dhabi and the challenges and implications of its depletion.

One of the major challenges facing groundwater is the depletion of the reservoir as that the extraction rates exceed the natural recharge

It also defines its underlying principles and the relevant legal framework.

Groundwater is one of the main natural resources, and the ratio of the total use of freshwater (which includes both surface water and fossil groundwater) out of the total renewable water resources available is one of the indicators by which water scarcity is measured, taking into account that the results are equalised through a weight that is determined to reflect the use of desalinated water and treated wastewater.

In this context, although the water scarcity index in the Emirate is one of the lowest in the world, the Emirate records one of the highest rates of per capita water consumption.

Most groundwater resources are surface aquifers, which are the most common reservoirs in terms of use and productivity. Most of the groundwater reservoirs in the Emirate are non-renewable.

Groundwater constitutes 60% of the total water resources consumed in the Emirate and is mainly used to irrigate crops in the agricultural sector and to a lesser extent to irrigate crops in forests and parks.

The Policy is drawn up in implementation of the provisions of Law No. (5) of 2016 concerning the Regulation of Groundwater in the Emirate of Abu Dhabi.

This depletion caused a decrease in groundwater levels and a deterioration of its quality in many areas, where 79% of it has become highly saline, 18% medium brackish water, while only 3% of it is considered fresh water.

The deterioration of groundwater quality affects its use, especially in the agricultural sector, which plays an important role in achieving food security and stimulating related economic activities. It also has economic consequences manifested in resorting to other water sources such as desalinated water and recycled water that requires investments for transportation and distribution. In addition, the increase of groundwater salinity leads to the need to maintain and replace irrigation networks, which increases costs for farmers.

From the environmental point of view, the deterioration of the quality of groundwater and its lower levels causes the agricultural sector to depend on small desalination plants, which in turn cause various environmental impacts, such as high greenhouse gas emissions.

In response to the foregoing, the Emirate of Abu Dhabi adopts, through this Policy, the necessary measures to ensure the integrated and effective use of the various water resources, through sustainable management, as well as through the regulation, management and monitoring of groundwater.

2. Scope of Application

This Policy is implemented in the Emirate of Abu Dhabi, and is supervised by the Environment Agency - Abu Dhabi, through consultation, coordination and cooperation with the concerned entities, whether within the governmental or the private sector,

well as through analysing the economic, social, environmental, technical, health and organisational impacts, based on systematic and organised procedures that contribute to achieving the objectives sought.

3. Main Principles Underlying the Policy

This Policy is based on several main principles related to groundwater issues:

The Issue	Main Principles
Groundwater alternatives	Encourage consumers to use alternative water sources for groundwater such as recycled water; taking into account economic, environmental, technical, organisational, social and health considerations.
Conservation and efficient use of groundwater	Ensure that all current and future users maintain and rationalise groundwater use as efficiently as possible, using Water Demand Management policies.
Allocation of agricultural lands	Allocate lands for agricultural purposes only in non-restricted areas with long-term sustainable water resources.
Economic value of groundwater	Educate consumers about the economic value of groundwater and the importance of preserving it and rationalising its use.
Research and development	Direct research and development as a base for future foreseeing and promoting innovative technical solutions in terms of optimal use and preservation of groundwater.
Emergencies	Groundwater is used in emergencies as an alternative source of water in such cases.

4. Legal Framework

Article (3) of Law No. (5) of 2016 concerning the regulation of Groundwater in the Emirate of Abu Dhabi stipulates that the Environment Agency - Abu Dhabi shall have the competence to:

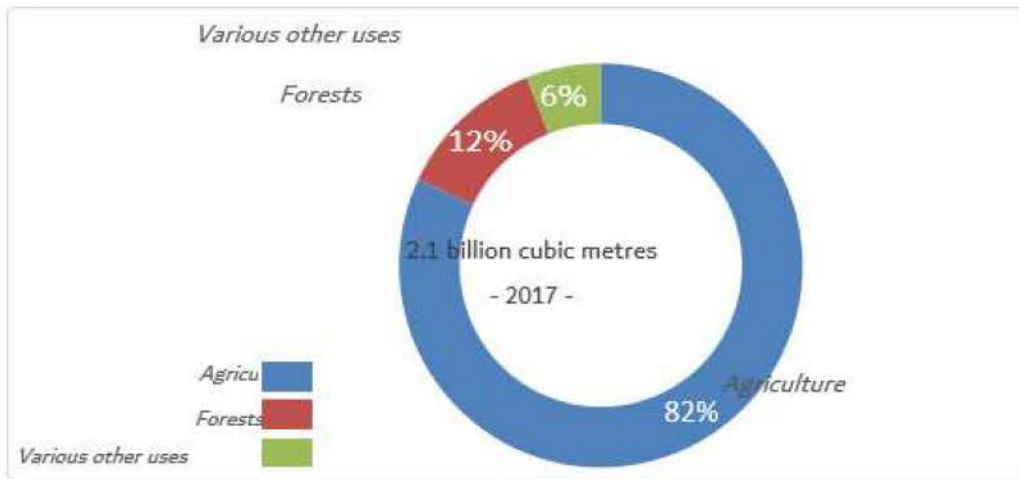
“Draw up the General Policy related to the management, regulation and protection of groundwater, in coordination with the entity concerned with energy in the Emirate, and submit it to the Executive Council for approval.”

5. Analysis

The existing state of groundwater in the Emirate of Abu Dhabi

The existing state of groundwater in the Emirate of Abu Dhabi can be summarised as follows:

- Groundwater constitutes 60% of the total water consumed in the Emirate (Groundwater Atlas of Abu Dhabi Emirate, 2018).
- Groundwater is mainly used to irrigate crops in the agricultural sector and to a lesser extent to irrigate crops in forests and parks.
- Groundwater extraction rates in the Emirate are about 24 times the rates of natural recharge.
- The state of the groundwater is constantly deteriorating as the levels of deterioration in some areas have led to their classification as restricted areas.
- The increasing demand for groundwater requires joint or coordinated initiatives with various stakeholders and actors involved.



Groundwater Extraction and Consumption in the Emirate of Abu Dhabi (Groundwater Atlas of Abu Dhabi Emirate, 2018)

Groundwater resources in the Emirate of Abu Dhabi

Surface aquifers are the most common reservoirs in terms of use and productivity, and most groundwater reservoirs in the Emirate are non-renewable reservoirs. Because of the excessive pumping of water from these reservoirs, groundwater levels decreased and groundwater quality deteriorated in many areas, as 79% of it became highly saline water, 18% medium brackish water, while only 3% of it is considered fresh water, according to the classification of water quality depending on salinity, which was developed by the Environment Agency - Abu Dhabi.

Pressures

the food sufficiency rate, greening the desert, and expanding parks and gardens also contributed to an increase of demand for irrigation water, despite the existing effort among the concerned entities on the importance and necessity of preserving groundwater and the shift in policies and legislation to focus on groundwater preservation. The low rate of water renewal, the lack of efficient irrigation techniques and the selection of crop quality contribute to increasing pressures, and cause excessive consumption of groundwater in the Emirate, as the demand for groundwater has reached unsustainable levels, leading to its depletion and to the deterioration of its quality. The results of the Groundwater Well Inventory project in the Emirate of Abu Dhabi indicate that the use of groundwater in the Emirate reached 2,100 million cubic meters in

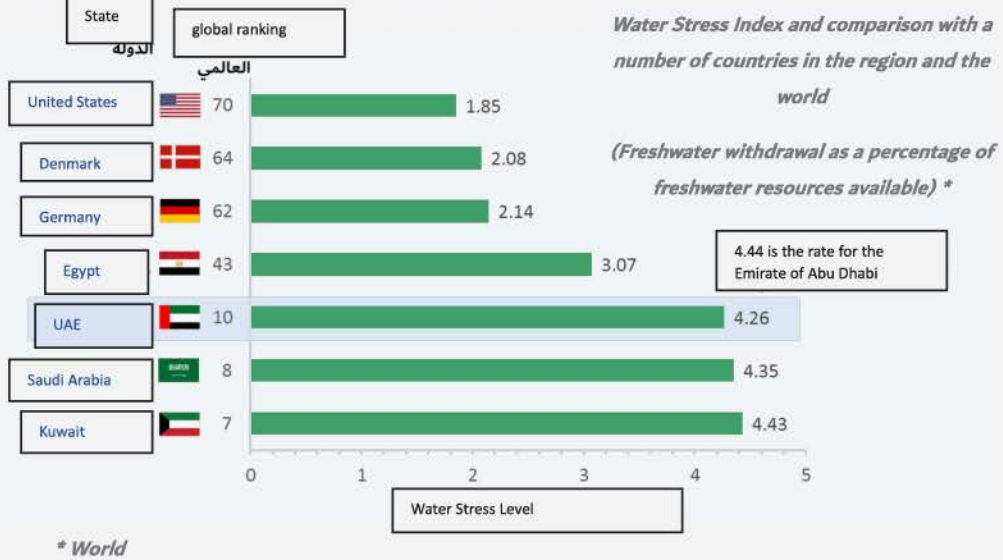
Irrigation of crops and irrigation of forests increases the demand for groundwater. The number of agricultural holdings in Abu Dhabi increased by 38 times during the period from 1971 to 2019. The policies of expanding the agricultural sector, striving to achieve food security, raising

2017. (Groundwater Atlas of Abu Dhabi Emirate, 2018).

Water Stress Index in the Emirate of Abu Dhabi, the United Arab Emirates and a number of other countries

International reports show that the United Arab Emirates ranked tenth in the world in the list of countries with the highest levels of Water Stress, which is an indicator that measures the withdrawal of fresh water as a percentage of the fresh water resources available.

According to the World Resources Institute, the level of Water Stress in the State reached 4.26, while the average for the Emirate of Abu Dhabi was slightly higher, as it reached 4.44 in 2019.



In comparison with countries in the region, the rate of water withdrawal in the Emirate of Abu Dhabi is 24 times the rate of natural recharge, while the rate in the Kingdom of Saudi Arabia is 6 times higher, and 2.5 times in the Sultanate of Oman (National Water Strategy 2030, Saudi Arabia, 2018 and the Report on the State of Groundwater in the Sultanate of Oman 2019).

Economic and social effects

The increase in the demand for groundwater results in a deterioration of its quality which affects its use, especially in the agricultural sector. Preserving groundwater contributes to sustainable agricultural development, and thus to an increase in gross domestic product.

Agriculture plays a crucial role in achieving food security and stimulating other related economic activities. During the past decades, the number of agricultural holdings has increased 38 times, from 634 holdings in 1971 to 24,018 holdings in 2019, while the area of agricultural lands has increased 33 times

from around 22 thousand dunams to around 750 thousand dunams during the same period.

Agriculture currently contributes to less than 1% of the Emirate's GDP. The government provides an integrated support system for the agricultural sector, such as vital security programmes that include the Palm Pest Control Programme, the Invasive Insects and Pest Control Programme, and technical programmes such as agricultural extension and training of farm workers to raise their efficiency and enhance their expertise. In this context, the Abu Dhabi Authority for Agriculture and Food Safety provided during the first quarter of the year 2020 more than AED 271.4 million to farmers benefiting from the Programme to Improve Farmers' Incomes

implemented by the Authority, and more than 13 thousand farmers have benefited from it since the year 2000. Agricultural support policies have witnessed a change from focusing on production quantities to maintaining the quality of farms and encouraging self-sufficiency for their owners.

Due to the deterioration of groundwater quality, alternatives of desalinated water and treated wastewater that require capital and operational investments for transportation and distribution are currently being resorted to. The salinity of groundwater also affects the irrigation networks and the need to rehabilitate and replace them over short periods of time.

Groundwater depletion affects the abundance of groundwater reserves, which are considered strategic reserves for future generations. This will have negative effects on agricultural products, thus affecting the income and returns of farmers and farm owners. It also leads to the need to provide alternatives of fresh water as a strategic reserve.

In addition, the extraction and use of groundwater takes place without placing any direct cost on the users, as the Study on the Economic Assessment of

Expected results of applying the Policy on the economic and social levels

The use of alternative water will lead to the continuation of agricultural activities in areas where the quantity and quality of groundwater is deteriorating.

A shift will be made to higher economic value crops with efficient water consumption, which will lead to an expected gradual improvement in the value of agricultural products.

The development of programmes and services for the agricultural sector will lead to a better alignment with the needs of farmers in the context of water use

its quality and to lower agricultural production. Because of the lack of alternatives, reliance is placed on small desalination plants in farms, which

Groundwater in the Emirate of Abu Dhabi, conducted by the Environment Agency - Abu Dhabi, indicates that the estimated economic value of each cubic meter of groundwater ranges between AED 7.7 and AED 9, and the economic value is the estimated total groundwater in Abu Dhabi ranges between AED 15.5 and AED 18 billion annually.

Environmental effects

The decrease of usable groundwater reserves leads to its depletion and to deterioration of its quality. This results in the accumulation of salinity in the surface agricultural soil, the deterioration of

lead to negative environmental effects on the ecosystem in general, such as the discharge of waste water from desalination plants into unsealed ponds, which leads to groundwater and soil pollution, in addition to the high carbon dioxide emissions from the water desalination process, which exacerbates the phenomenon of climate change. Given the dependence of the forest sector on groundwater for irrigation, there are environmental impacts on biodiversity (plants and animals) as a result of the deterioration of the quality and quantity of groundwater used in this sector.

The methods of disposing of the return water resulting from the desalination of groundwater in farms and the use of pesticides and fertilisers also affect the quality of groundwater and soil.

Expected results of applying the Policy on the environmental level

The Policy is expected to achieve positive environmental impacts as follows:

1. Decrease of groundwater extraction by 650 million cubic meters by 2030.
2. Improvement of the groundwater quality index (locally and federally).
3. Decrease of the rate of water extraction versus the rate of recharge from 24 to 16 times by 2030.
4. The use of recycled water will enhance the recharge of the aquifer in the areas that are used for irrigation (in terms of quality and quantity).

6. Policy Objectives

The General Policy for the Management, Regulation and Protection of groundwater in the Emirate of Abu Dhabi aims to ensure the sustainability of groundwater reserves that are suitable for use in the future to secure water supplies and promote sustainability in water uses, and work to reach this end through the following objectives:

1. Ensure the optimal use of groundwater and limit its wastage;
2. Ensure that a comprehensive knowledge of groundwater resources is achieved;
3. Promote the use of good irrigation techniques, methods and practices that reduce groundwater consumption.

7. Implementation

The Policy is implemented through a set of regulatory and non-regulatory tools linked to each of the objectives set. The Environment Agency - Abu Dhabi, in coordination with the Department of Energy and Abu Dhabi Authority for Agriculture and Food Safety, and in consultation with the authorities concerned with groundwater in the Emirate, determines the ways to include these tools in its various plans. There is a list of these tools that have been agreed upon by the concerned entities to implement in order to achieve the Policy objectives. Each entity will be responsible for implementing the agreed-upon tools in accordance with the mechanisms it has in place.