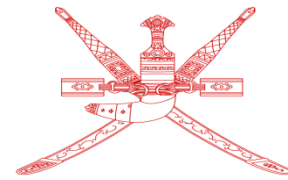




مؤتمر الخليج الحادي عشر للمياه  
المياه في دول مجلس التعاون .. نحو إدارة فاعلة  
The 11<sup>th</sup> Gulf Water Conference  
Water in GCC .. Towards Efficient

Sultanate Of Oman's Water Strategy



وزارة البلديات الإقليمية وموارد المياه  
Ministry of Regional Municipalities & Water Resources

# *Sultanate of Oman's Strategy for Securing Water Resources*

Eng. Salem Humaid Al Shibli  
Director General of Water Resources Management

Ministry of Regional Municipalities and Water Resources  
Sultanate of Oman



# Overview

Introduction

Water Authorities

Water Resources and Water Use

Water Balance

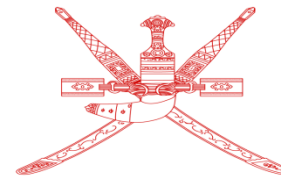
Challenging Facing Water Sector

Oman's Water Resources Strategy

Drinking Water Strategy

Waste Water Services and Re-use

Summary



## SULTANATE OF OMAN

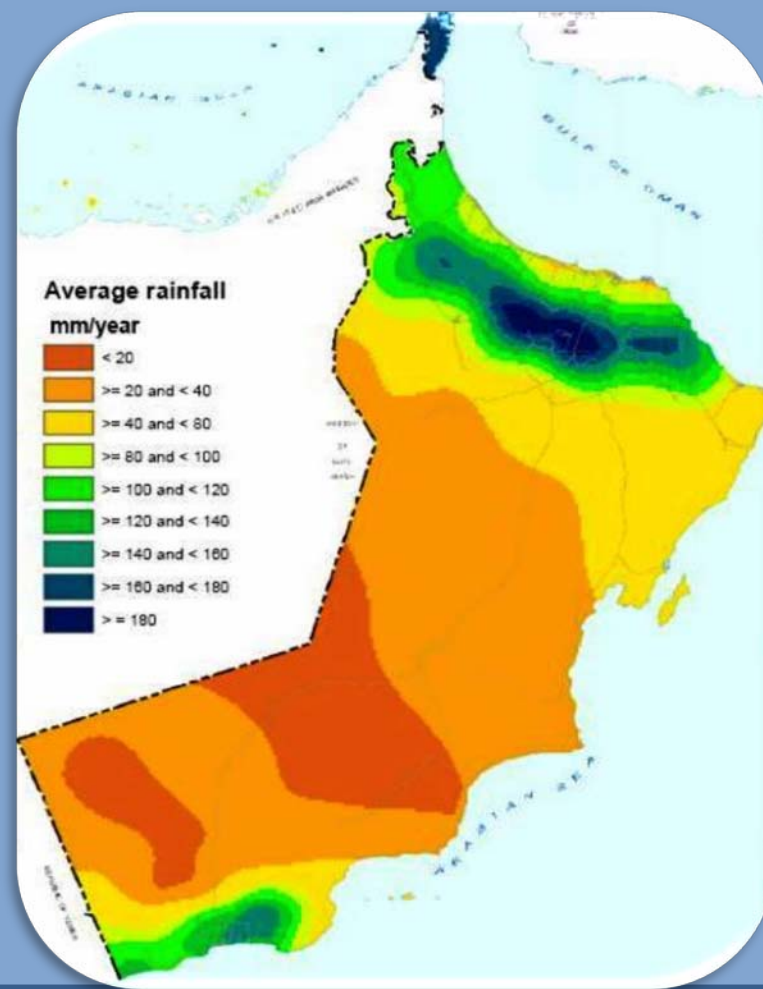
Desert 83 %, mountains 14% and 3% coastal area.

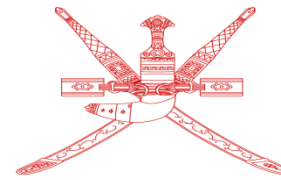
Location in the Arid and Semi-Arid region water resources are very scarce.

Day time temperature are high, generally above 30 °C and seasonally above 40 °C .

Rainfall highly variable, exceeding 350 mm in the mountains, average 100 mm in the foothills and to less than 50 mm in the desert.

Evaporation varies from 1660 mm/yr in the Batinah plain to 2200 mm/yr in the interior (79%)





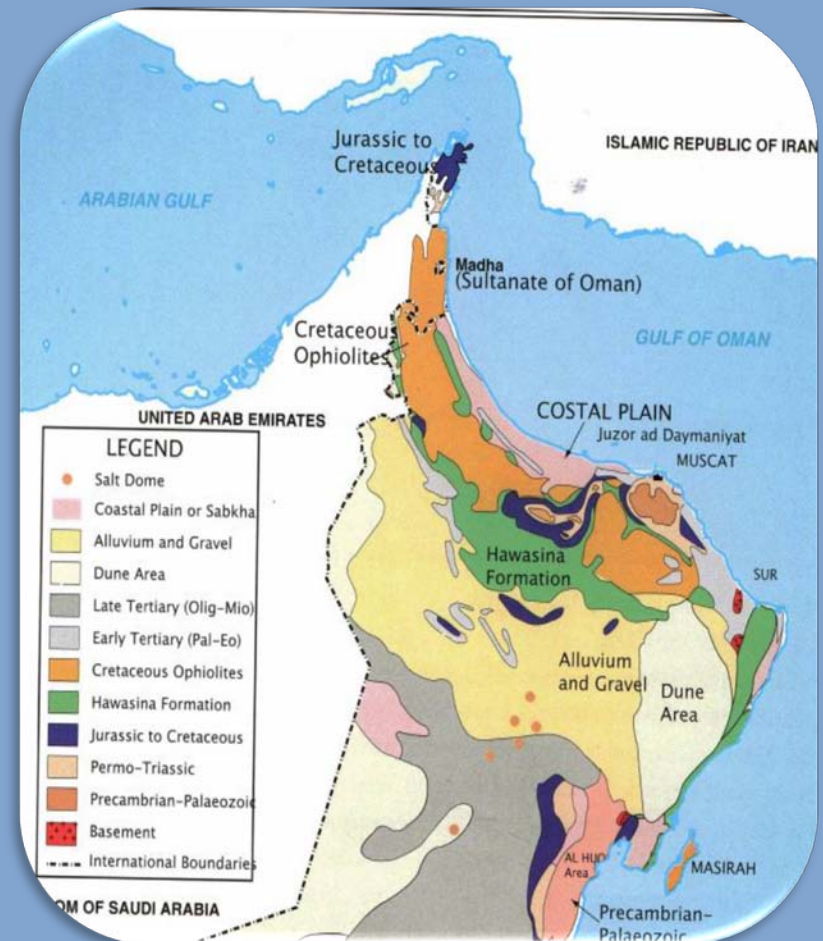
## Groundwater Aquifers

Alluvial deposits in wadi beds  
(main aquifer).

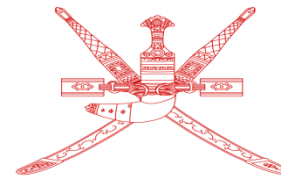
Samail Ophiolites, feeding many  
of aflaj and springs.

Limestone and dolomite in the  
Hajar Super Group.

Aquifers of the Hadhramaut  
Group and Fars Group aquifers.



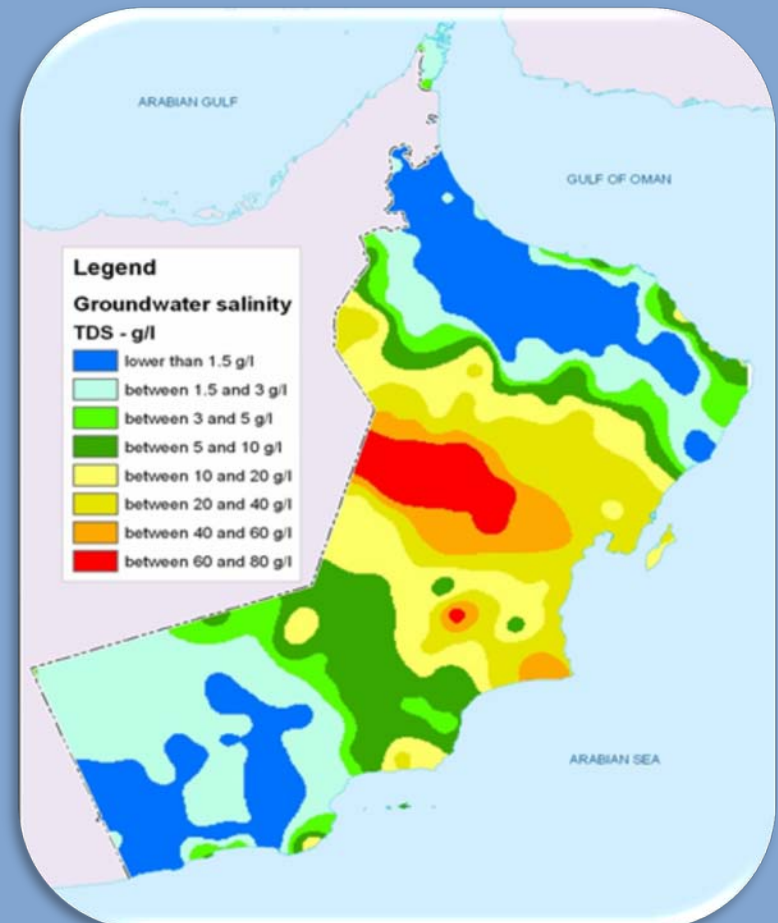


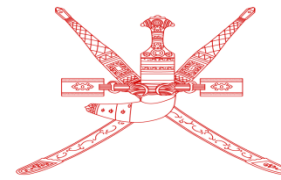


## Water Quality

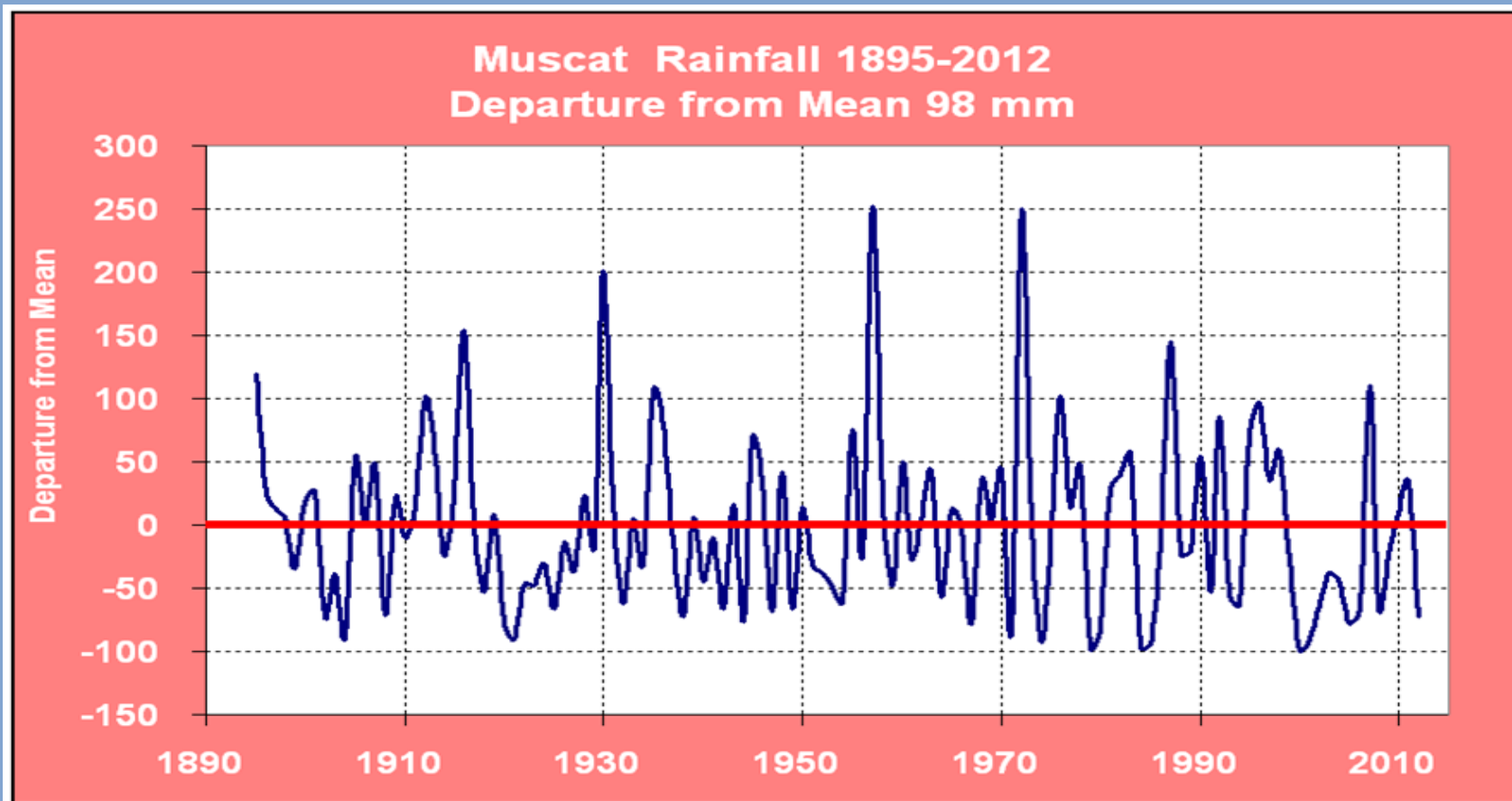
**Fresh water exist only in the  
Northern and Southern ends**

**The rest of the country water is  
brackish to saline**

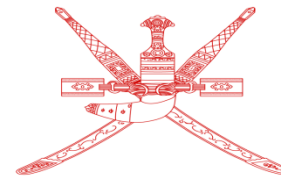




## Muscat 1-year rainfall 1895-2010 Departure from mean (98 mm)



**Rainfall Index (rainfall highly variable)**



# Water Authorities

## Ministry of Regional Municipalities and Water Resources

- Water resources assessment, management and Developments

## Public Authority of Water and Electricity

- Water Production and Water Supply

## Ministry of Agriculture and Fishers

- Water Irrigation Management

## Oman Waste Water Company and Salalah Waste Water Company

- Collection and Treatment & Reuse of Treated waste Water

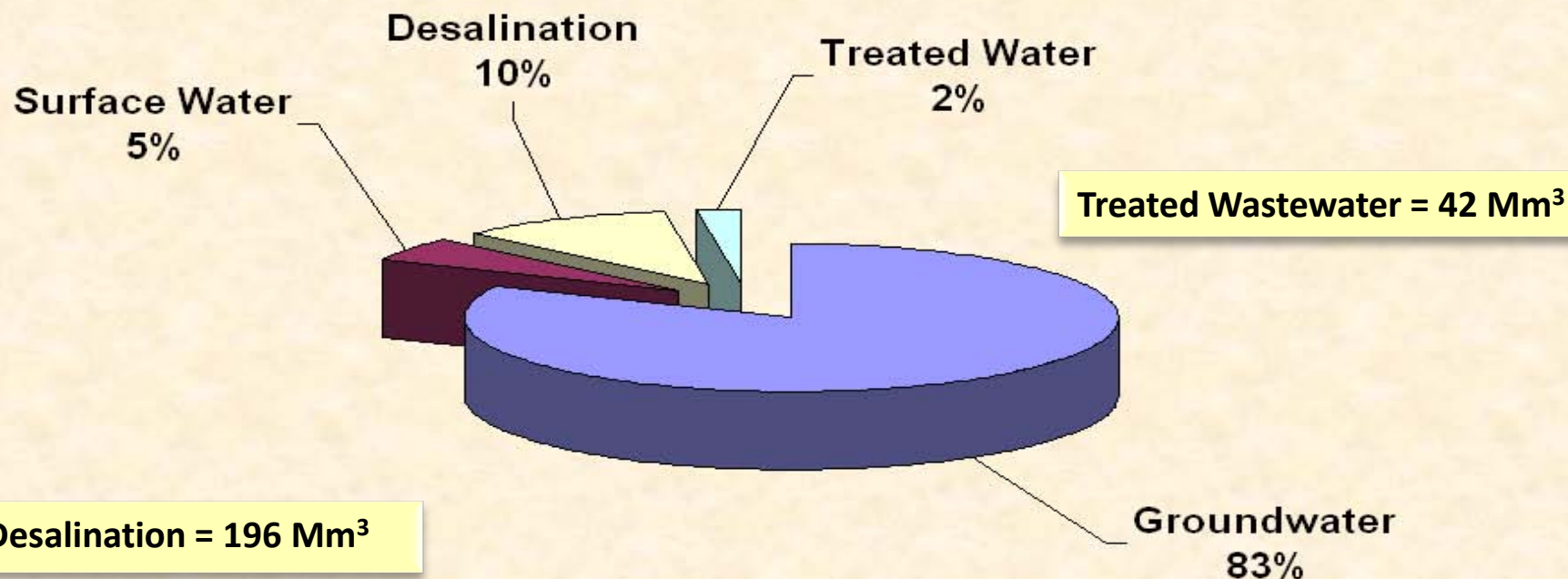
## Local Aflaj Authorities

- Aflaj protection and maintenance, water distribution and allocation



# Water Resources

## Conventional and Non-conventional Water Resources



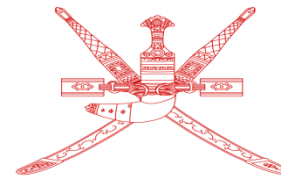
Desalination = 196 Mm<sup>3</sup>

Treated Wastewater = 42 Mm<sup>3</sup>

Renewable Water availability 488 m<sup>3</sup>/capita

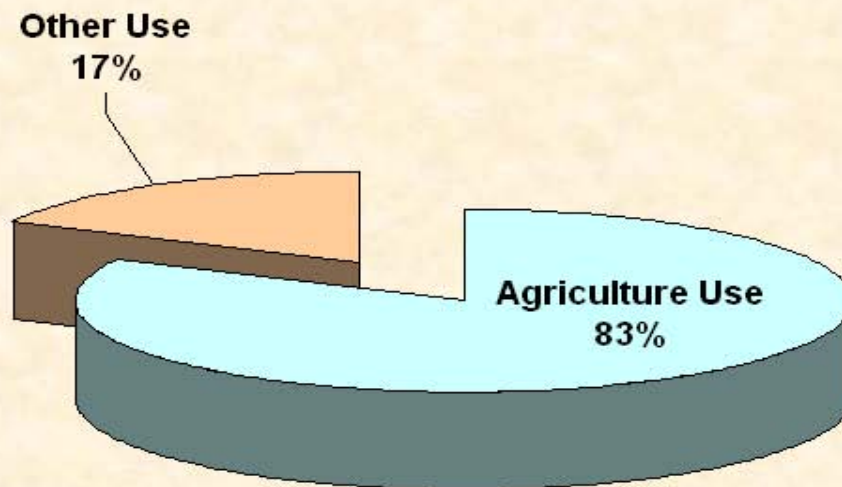
Groundwater is the main Resource (83%)





# Water Use

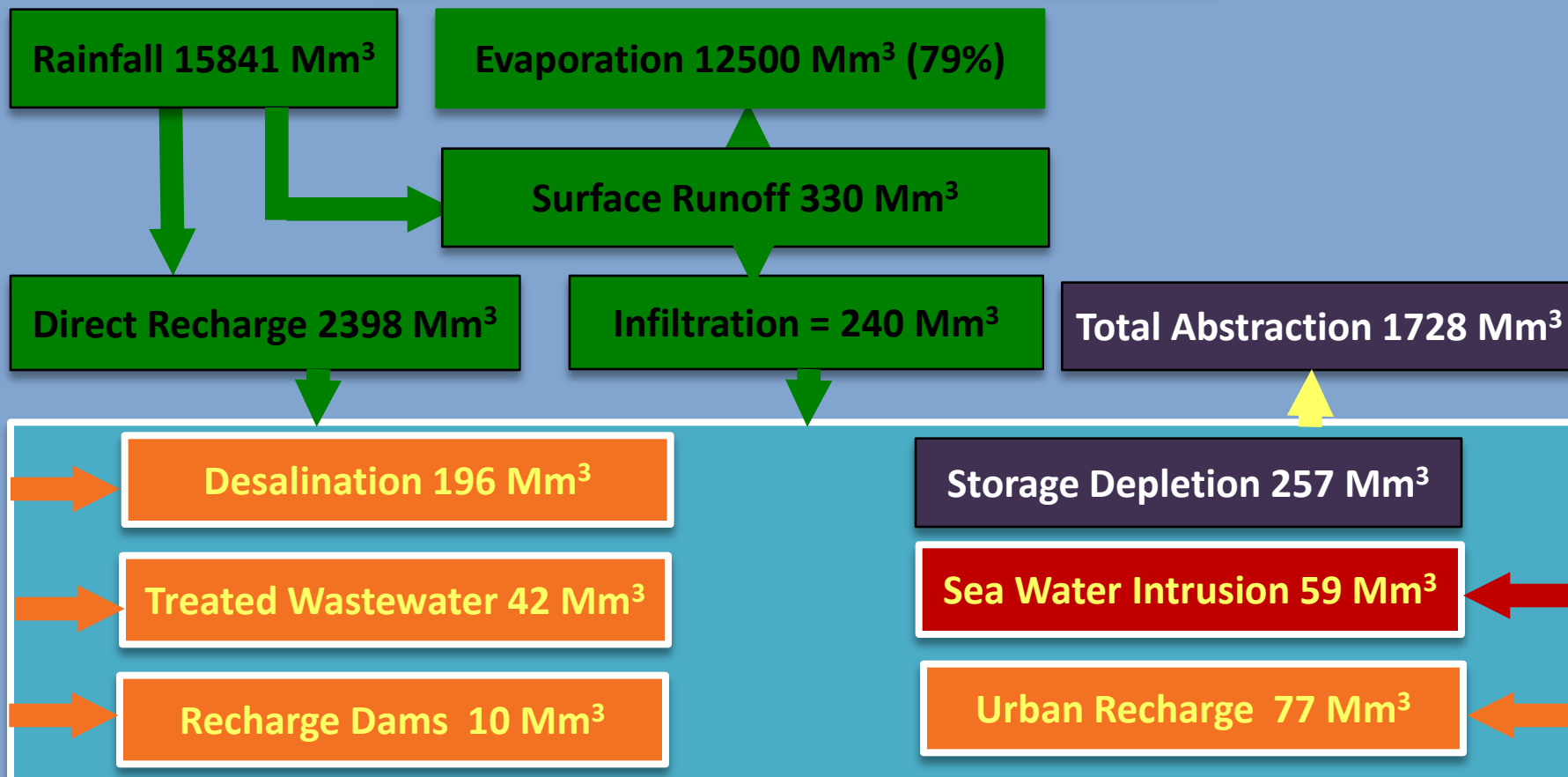
## Water Uses in Oman



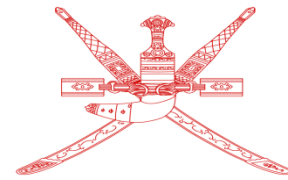
Ground Water 94%



## Water Balance



**Demand exceeds renewable resources by 31% (deficit 316 Mm<sup>3</sup>)**



## Impact of water deficit

**Declining water levels in lower catchment**

**Saline intrusion on coastal aquifers**

**Declining aflaj flow**

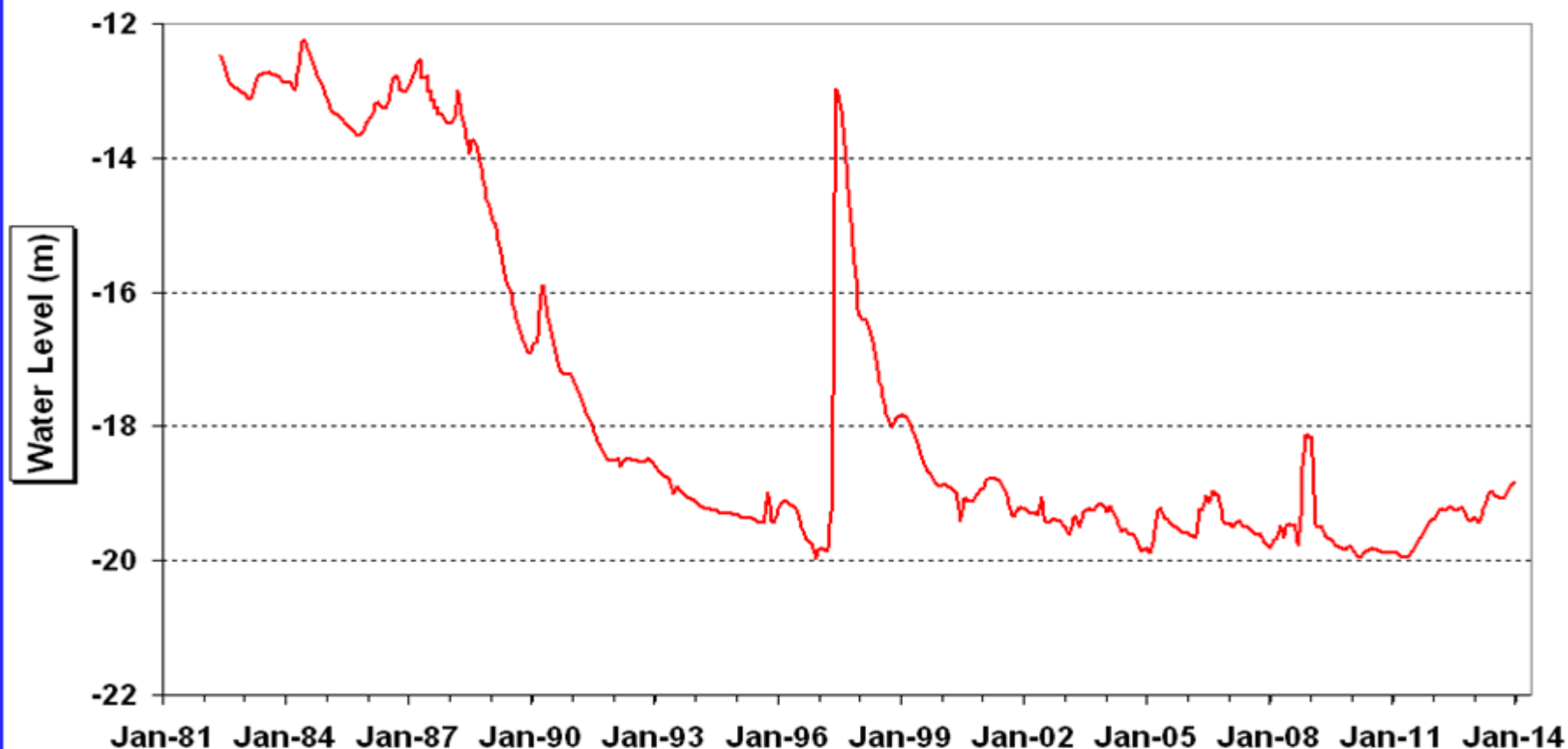
**Abandonment of wells, aflaj and farms in many areas**





## Impact of water deficit

Well at Wadi Sifam - Bahla (EH-20)





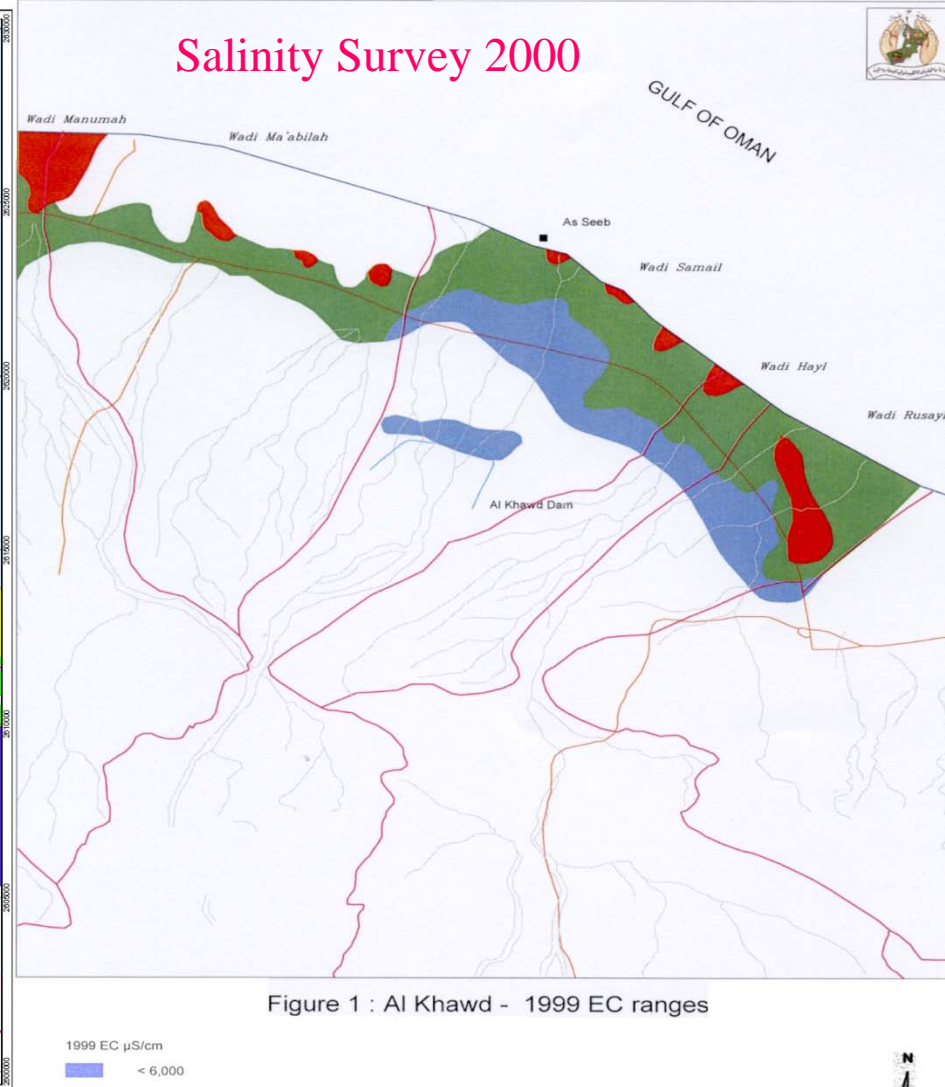
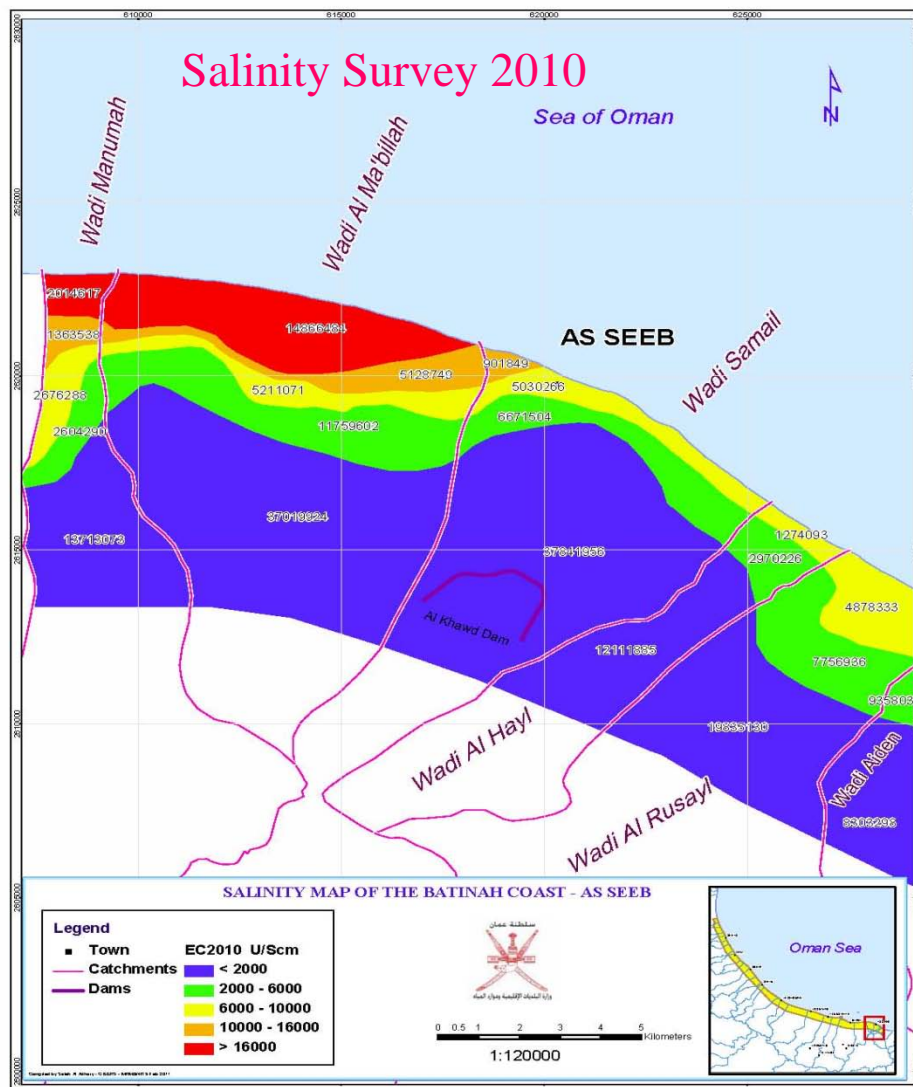
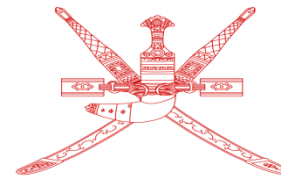
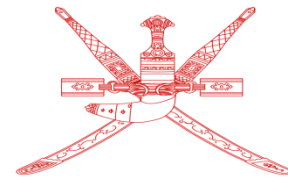


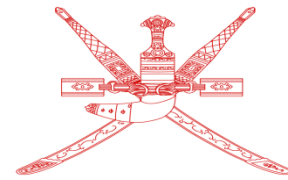
Figure 1 : Al Khawd - 1999 EC ranges

Survey wells = 1100 at Al Batinah and 400 wells at Salalah



## Challenges Facing Water Sector

- Balancing water uses to water availability
- Adopting improved irrigation techniques and selecting appropriate crops to reduce agricultural water use.
- Managing water resources effectively and efficiently (IWRM)
- Increasing the use of treated wastewater and desalinated water
- Minimizing water pollution, flood damages and drought consequences
- Provision of sufficient water to spur and sustain economic
- Provision of access to safe, adequate and affordable water supply and sanitation
- Protecting the groundwater resources in qualitative and quantitative terms
- Creating and cultivating conservation awareness.
- Establishing an integrated program for the conservation and management of the resources at basin level
- Controlling urban water losses
- Using Rainwater harvesting techniques for remote areas when ever possible



## Oman's water resources strategy

Water will remain the most valuable and vital resources of the nation

Secure Drinking  
Water

Increase non  
conventional water

Water demand  
management

Increase  
Natural Water  
Availability

Dams construction

Water Harvesting

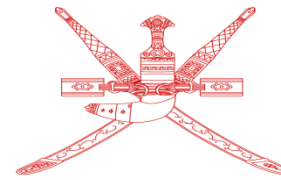
Exploration

Water demand  
management

Balance Water  
Budget

Sustainability

Increase reuse of  
wastewater



## Oman's water resources strategy

### Conserving Water Resources from Depletion and Pollution

#### Supply management

- Ensure security and sustainability of supply for priority use
- Conservation of water resources
- Increase use of non conventional water resources
- Well field protection zones

#### Demand management

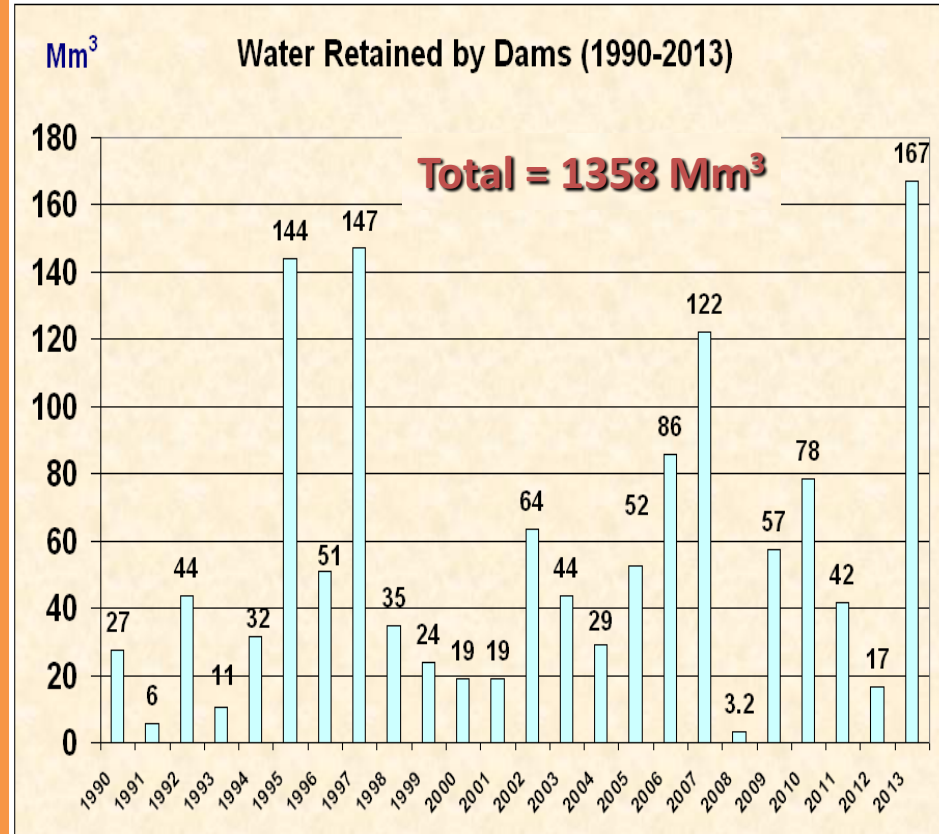
- Resource Augmentation – Dams
- Water harvesting
- Fog collection
- Cloud seeding
- Improve Aflaj systems - maintenance

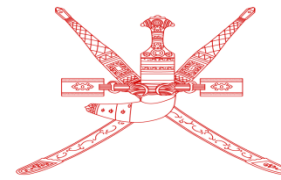




## Dams Construction

- Since 1985, Construction of:
  - (45) recharge dams
  - (89) storage dams
  - A mega storage dam at W. Dayqah with capacity of (100 Mm<sup>3</sup>)
- (14) protection dams.





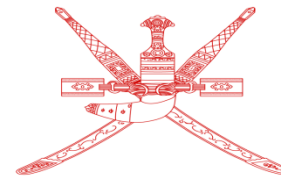
## Fog collection

**Fog collection methods:** are being experimented in the Salalah plain in order to assist the anti-desertification program initiated by the conservation department of Ministry of Environment and Climate affairs.

**Condensation of fog water onto mesh net and then conversion them into water in an artificial pond are the main steps of the criteria of the methods of fog harvesting.**

**Oman will become the first country in the region to tap into fog-harvesting technology to make stored water available 300 m3 for nearly 300 days. This would mainly be used for irrigation and also as drinking water for animals**





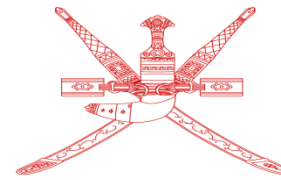
## Cloud Seeding

Cloud seeding, a form of weather modification, is the attempt to change the amount or of precipitation that falls from clouds, by dispersing substances into the air that serve as cloud seeding which alter the microphysical processes within the cloud.

The usual intent is to increase It has been approved by studies conducted that the cloud seeding could enhance the amount of precipitation.

Oman has recently started the use of this technique to enhance the availability of water.

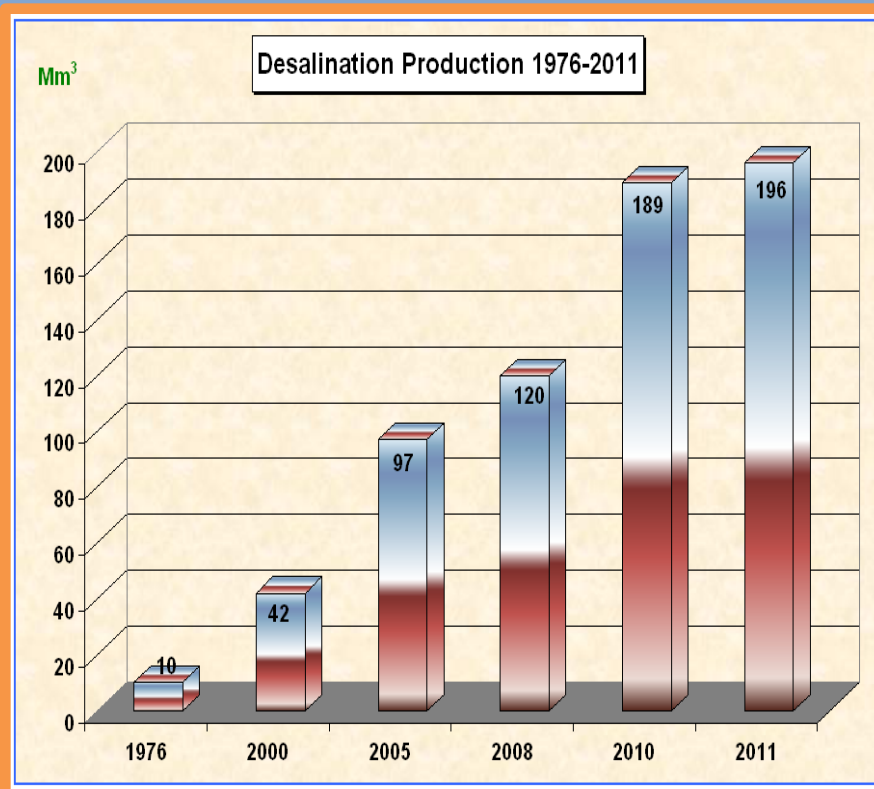




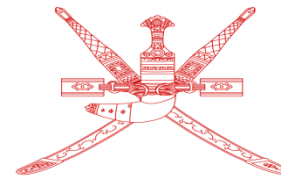
## Drinking water strategy

Serving all the people of the Sultanate of Oman

- Secure safe and clean water source
- Increase desalination production and reduce groundwater sources (represents 16% by 2012 and 20% by 2010).
- Increase service network (current service 50%)
- Reduction of non-revenue water (32%)
  - Leakage losses
  - Illegal connections
  - Non-working meters
  - Errors in readings

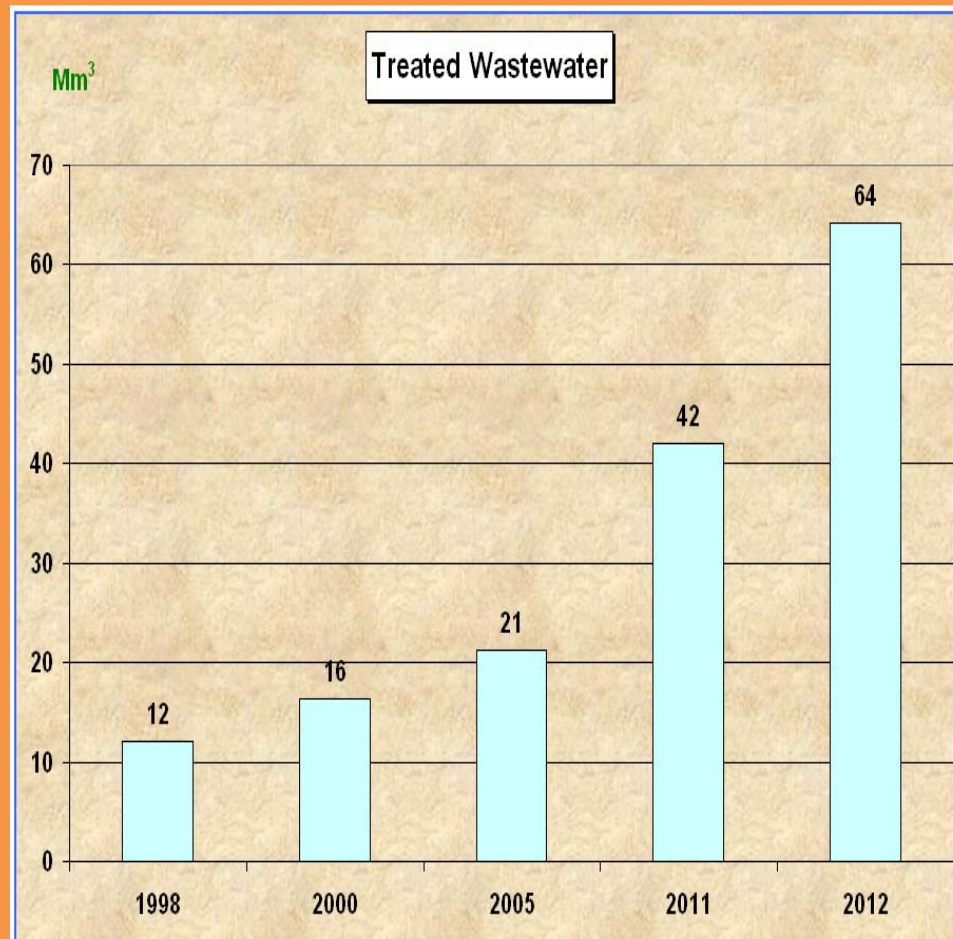


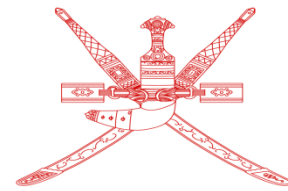




## Wastewater Services and Re-use

- 194 Treated Plant produce 76 mcm.
- Quantity used for Landscaping (24 mcm) and aquifer recharge (34 mcm).
- by the year 2030, production of STP at Muscat Gov. will reach 100 mcm (now 30 mcm) .
- By 2025 to provide all towns with population exceed 10.000 with piped water supply and associated wastewater.





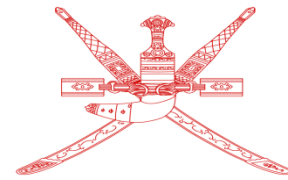
## Summary

- **Water is a vital resource for the Oman economics.**
- **Oman water strategy aims to apply the IWRM principles, highlighting the following issues:**
  - **Ensure security and sustainability of supply for priority use.**
  - **Maximize the use of natural water resources.**
  - **Matching water use to water availability.**
  - **Protecting water resources.**
- **Augmentation of water resources through:-**
  - 1. Increase artificial water resources.**
  - 2. Water conservation**
  - 3. Demand management**
- **Participation of private sector, stakeholders and public awareness campaigns.**
- **Human Resources Development.**
- **Develop Water User Associations.**



مؤتمر الخليج الحادي عشر للمياه  
المياه في دول مجلس التعاون .. نحو إدارة فاعلة  
The 11<sup>th</sup> Gulf Water Conference  
Water in GCC .. Towards Efficient

Sultanate Of Oman's Water Strategy



وزارة البلديات الإقليمية وموارد المياه  
Ministry of Regional Municipalities & Water Resources

**Thank you  
for your kind attention**