

Civil Defence National Risk Assessment – Peer Review

“Cyprus Water Sector”

November 2018

*Agathi Hadjipanteli
Senior Executive Engineer*



WATER DEVELOPMENT DEPARTMENT

**Ministry of Agriculture, Rural Development
and Environment**

Republic of Cyprus

Cyprus Water Sector

- **Brief overview**
- **Institutional and legal framework**
- **Water uses**
- **Water resources**
 - **Natural water resources**
 - **Non conventional water resources**
- **Demand management**
- **Overview - Challenges**



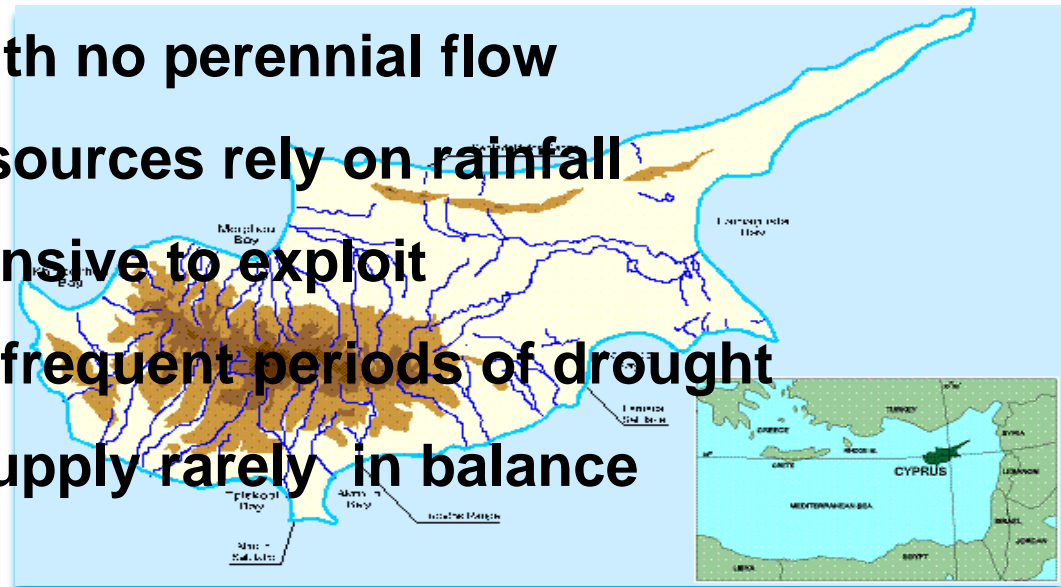
Eastern Mediterranean, semi-arid region

Ranks as the most water-stressed nation across Europe

(with the highest water exploitation index)

Area: 9250 sq. Km² (5800 Km² under Government control)

- **Small catchments**
- **Watercourses with no perennial flow**
- **Natural water resources rely on rainfall**
- **Scarce and expensive to exploit**
- **Continuous and frequent periods of drought**
- **Water demand/supply rarely in balance**



During the last 50 years rainfall reveals a stepped drop of 20%, resulting in more than 40% surface runoff reduction. Today, the average annual rainfall amounts to 460 mm, with a yearly declining tendency

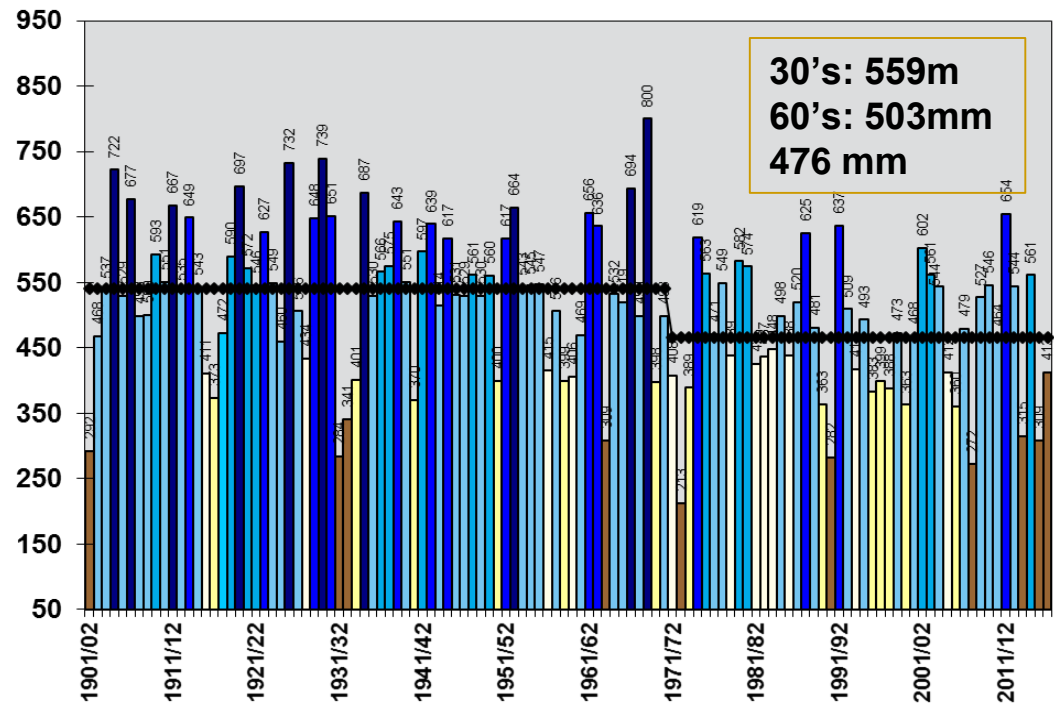
■ **Population increase:**

- 1984: 512.000
- 1995: 747.000
- 2013: 858.000

■ **3 million tourists increase: 8%/yr**

■ **Agricultural land**

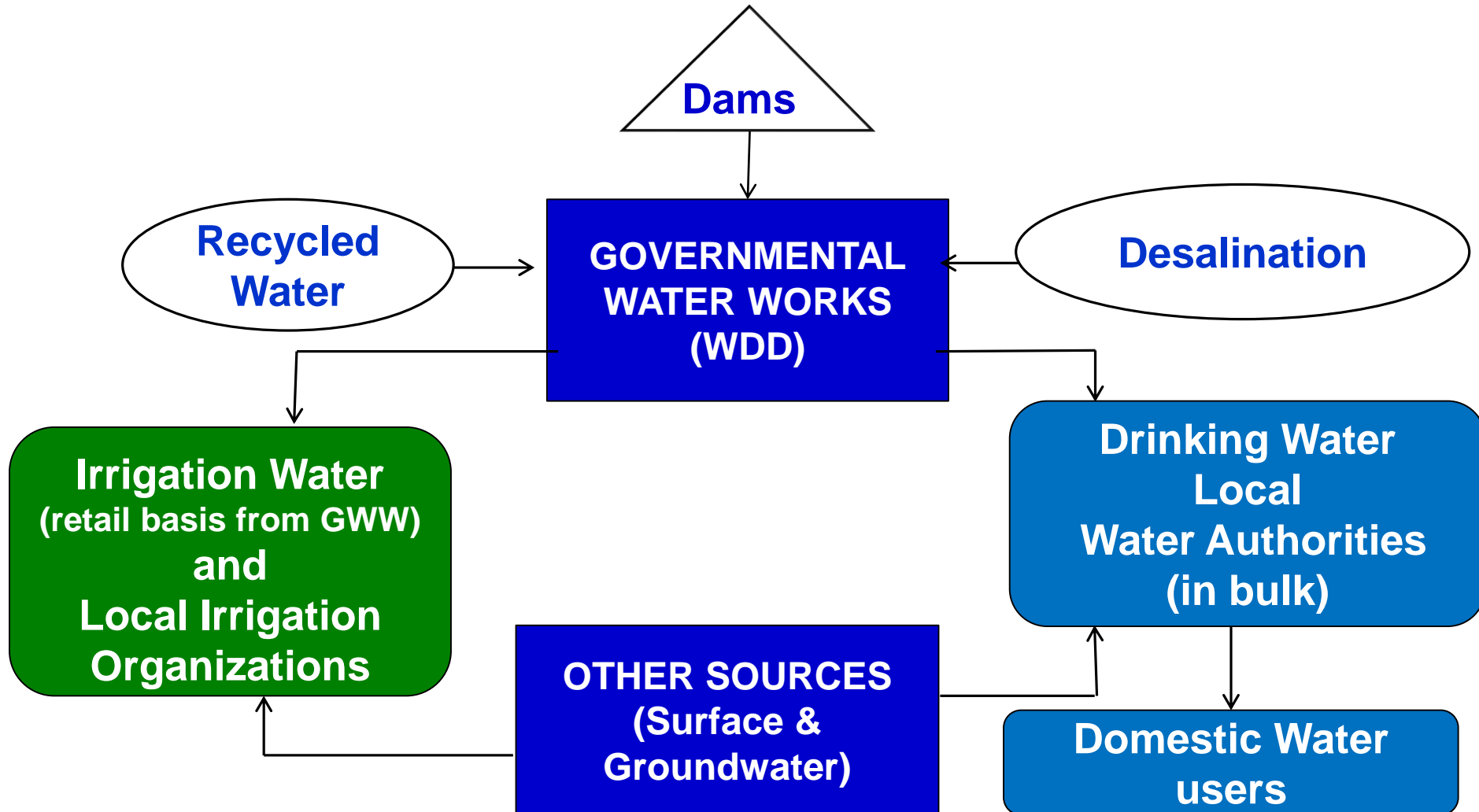
- 2008: 145.300 ha
- 2013: 122.800 ha (19% irrig. agric.)



Water is a public good. The management of water resources is the responsibility of the Government.

- ❑ **Water Development Department, Ministry of ARDE:**
 - Development management and protection of the water resources. Develops and applies the water policy, after the approval of the Council of Ministers.
 - Management, O&M of the Gov. Water Works
- ❑ **Local Water Authorities (Water Boards, Communities and Municipalities:** Distribution of domestic water to the end users
- ❑ **Irrigation Organizations:** small local irrigation networks
- ❑ **Sewage Boards:** collection and treatment of wastewater

Institutional and Legal framework ⁽²⁾ Water Services and Providers



□ **European Directives**

- **The Water Framework Directive**
- **The Urban Waste Water Directive**
- **The Floods Directive**
- **The GW Directive**
- **The Drinking Water Directive**

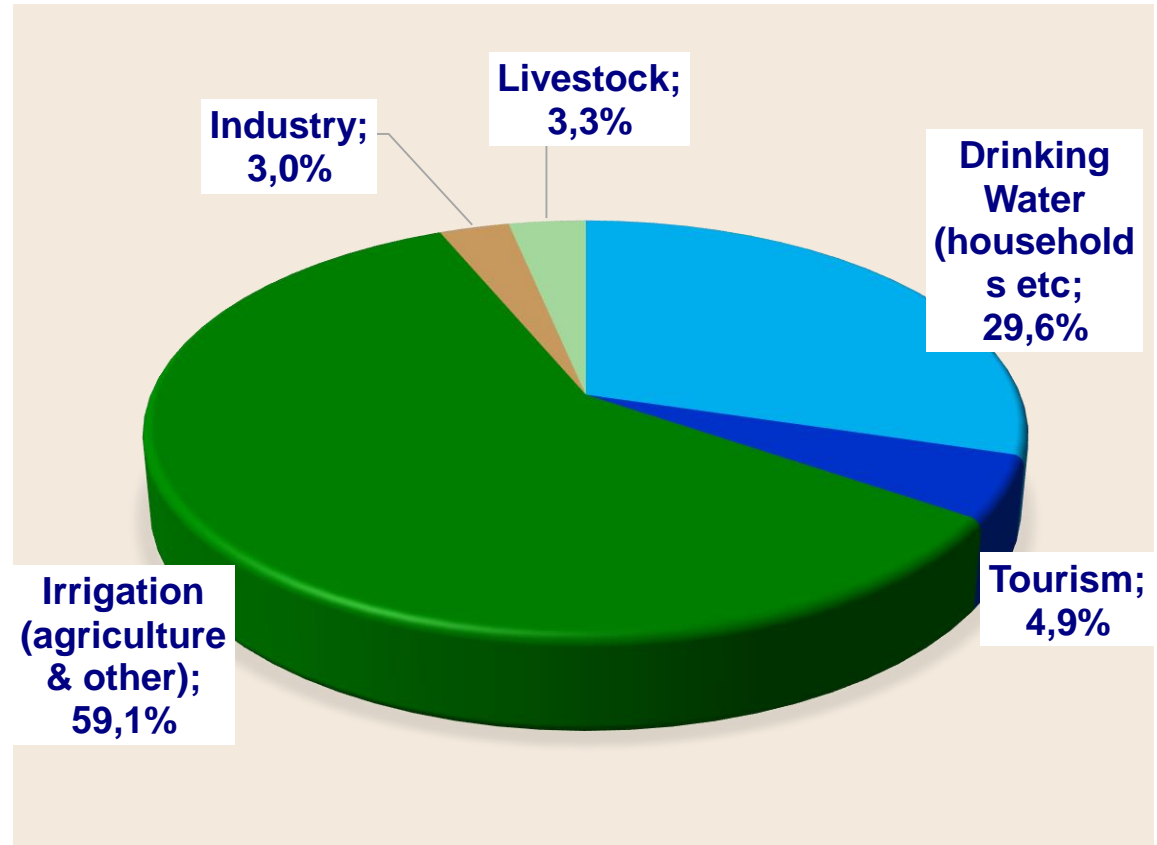
□ **National Law**

The Integrated Water Management Law and other related laws.

- **The Council of the Ministers (after the proposal by the Ministry of Agriculture, Rural Development & Environment)**
- **The Water Management Advisory Committee advice the CoM. Members from the governmental departments, the local water & sewage authorities, the users and other stakeholders.**
- **Policy implementation by the WDD**

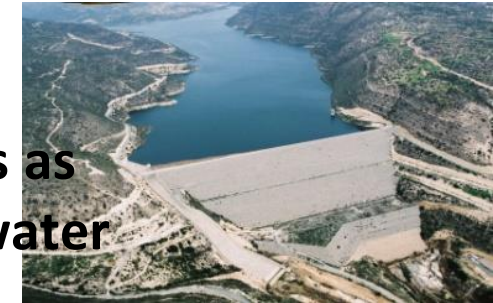
Water Uses (supply side)

- **Domestic water demand is satisfied by 100%**
- **Irrigation water supply depends on availability and it is rarely satisfied.**



Governmental Water Works (1960-2010)

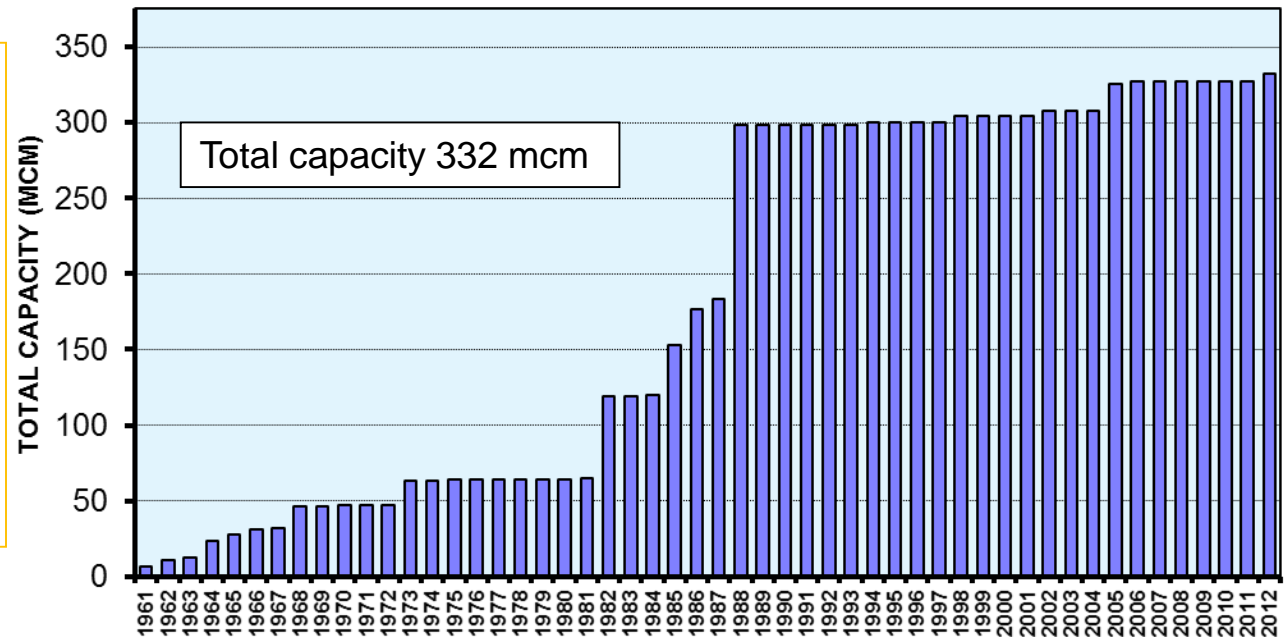
Dams were constructed on almost all watercourses as well as conveyors & other related infrastructure (water treatment plants, pumping stations, distribution networks)



Construction of Dams

GWW serve;

- 85% - 90% of the total DWS
- Up to 40% of irrigation use (varies - rarely satisfied)

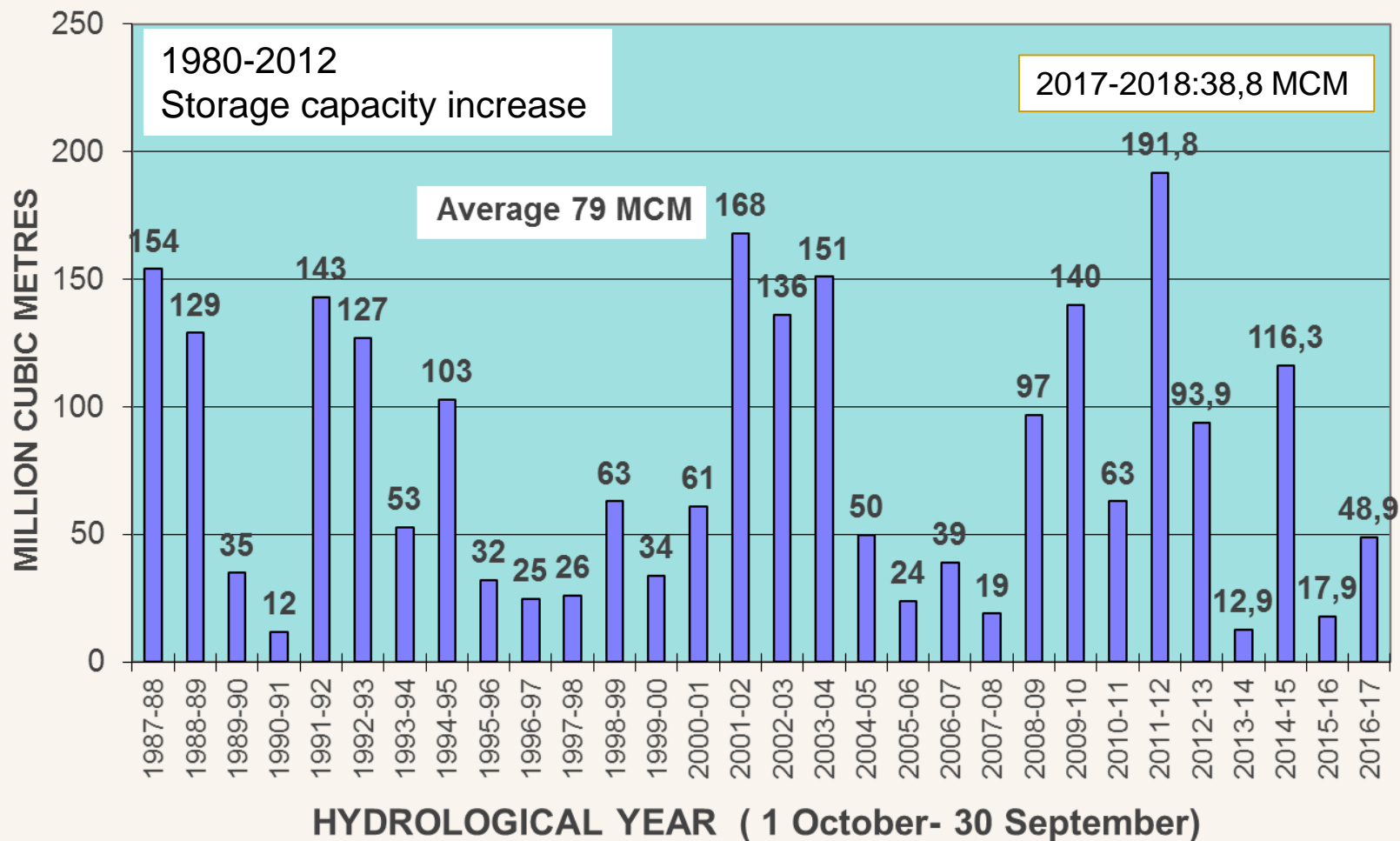


Natural Water Resources Governmental Water Works

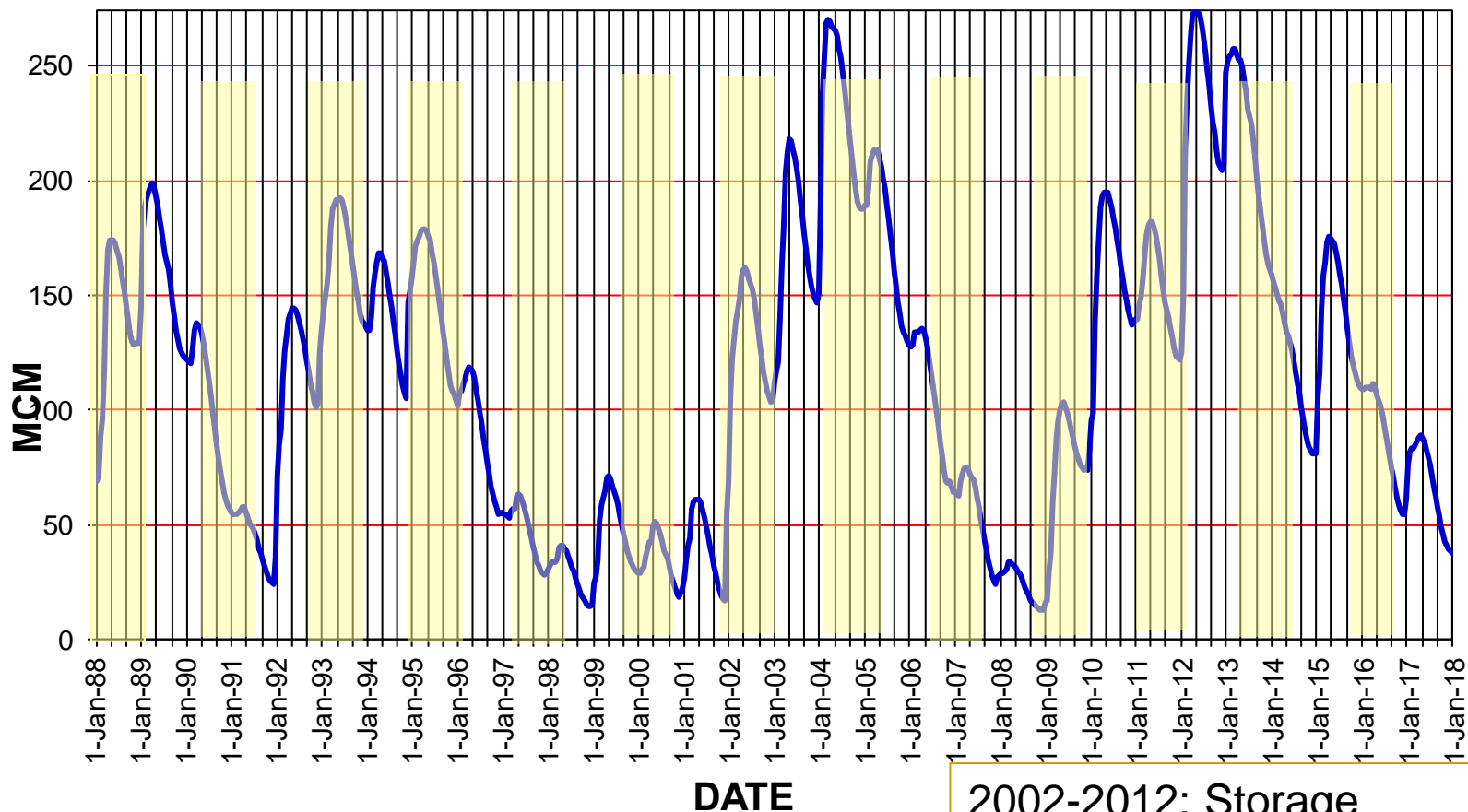
ΚΥΒΕΡΝΗΤΙΚΑ ΥΔΑΤΙΚΑ ΕΡΓΑ



Governmental Water Works Inflow of Water to the Dams



Governmental Water Works Dams Storage



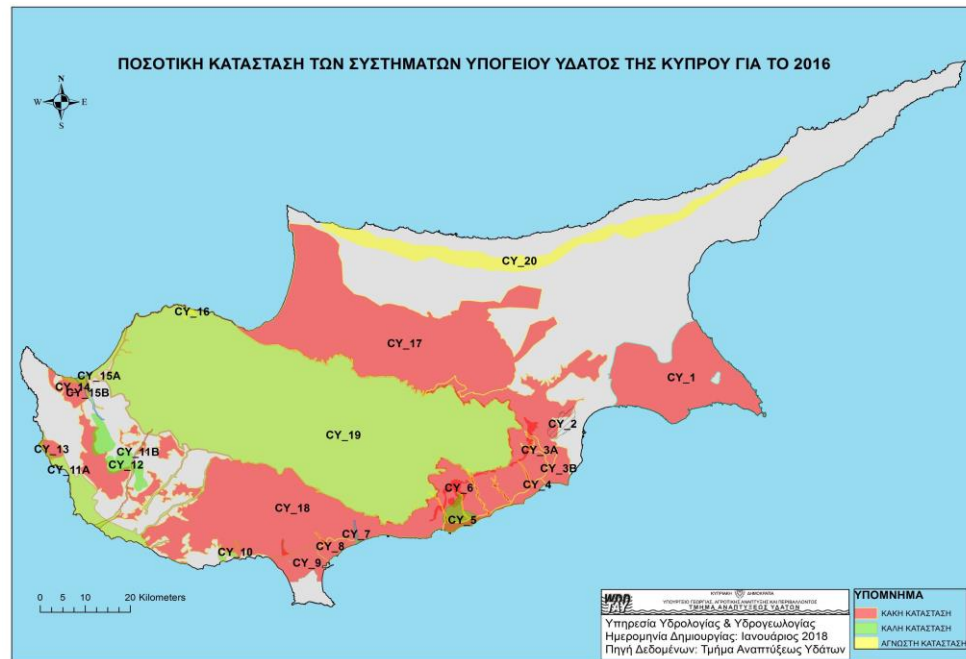
2002-2012: Storage capacity increase

GW used to be the most obvious and easily accessible source. Today, aquifers are highly overexploited and deteriorated. Piezometric levels decrease rapidly and resulting in seawater intrusion with the relevant quality effects.

Groundwater Water Bodies Quantitative status, 2016

GW serve;

- 10% - 15 % of the total drinking water
- Up to 60% of the total irrigation use



A long tradition in domestic & irrigation sector since the construction of the GWW

■ Long Term Measures

- ❑ Legislation
- ❑ Institutional restructuring
- ❑ Storage and recharge works
- ❑ Significant DWS, irrigation and waste water treatment projects
- ❑ On farm advanced irrigation systems and techniques
- ❑ GW abstraction regulation
- ❑ Pricing (metering & volumetric pricing, rising block tariffs, overconsumption charges etc)
- Education and awareness

■ Short Term Actions

Yearly **allocation scenarios** for the supply from GWW using a quota system & overconsumption charges.

- ❑ Domestic water priority
- ❑ Recharge and safety storage for future needs
- ❑ Irrigation (**restrictions in irrigation may reach 70% of the needs. Priority to permanent crops (40%-80%) and greenhouses (80-100%)**)

Despite the supply and the demand management measures the adverse climatic conditions and the increase in demand necessitated the use of non-conventional water resources

➤ **Desalination:**

Allocated **through the GWP** for the supply of domestic water to the Local Water Authorities in bulk. Despite the environmental and financial cost, it is vital for the water balance (increase water security, gives room to irrigation, helps water reserves in the GW bodies).

➤ **Recycled Water - Tertiary treatment of sewage effluent:**

A highly **stable source**, with significant **environmental benefits**. Used for agricultural crops, under legislation, specific quality standards & code of agricultural practice. Also, for green/recreational areas and GW aquifers' recharge.

- Introduced in 1997. Permanent and temporary desalination plants have been used till today, as part of a long term or an emergency plan/ accordingly.
- Today, four permanent RO desalination plants operate **under self-financing BOOT contracts** (Built, Own, Operate & Transfer) to serve the DWS needs of the areas of Nicosia, Limassol and Larnaca-Ammochostos.

Total production yield: 200.000 m³/day

- Dhekelia: 60.000 m³/day
- Larnaca: 60.000 m³/day
- Limassol:: 40.000 m³/day
- EAC Vasilikos: 60.000 m³/day

The extension of the Desalination Plants is currently examined.

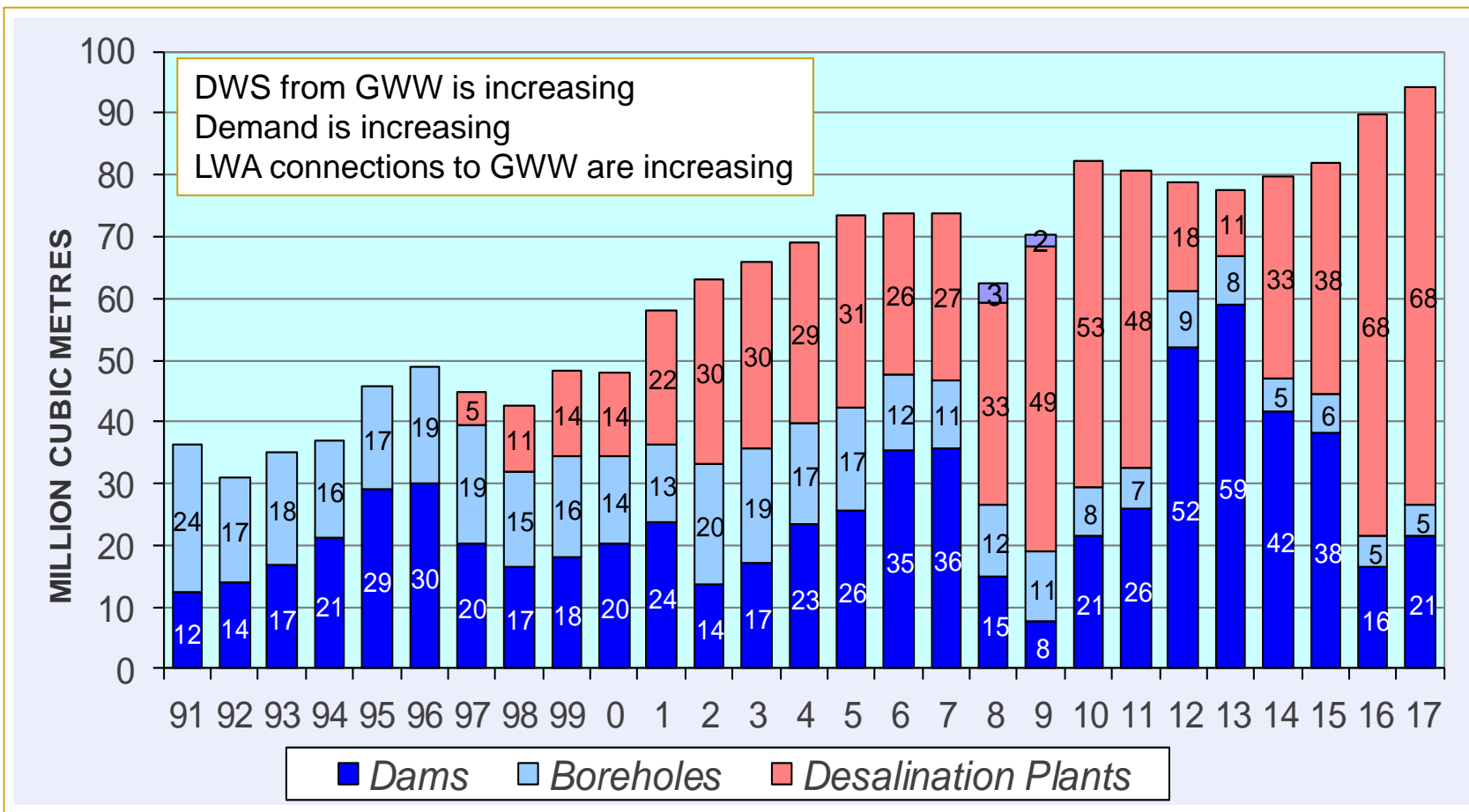
Non Conventional Water Resources Desalination

- A desalination plant in Paphos is expected to operate by the end of 2019 (15.000 m³/day). Until then, a mobile desalination plant is on the stage of tendering.

Desalination for irrigation

- Recently, the Council of Ministers decided to facilitate the installation of small private non-potable **water desalination plants to serve irrigation** (farms, hotels, golf courses, waterparks or other related facilities) to produce up to 1,500 m³/day. The relevant license can be achieved following a specific quick procedure.

Not a promising perspective, due to the high cost and the technical difficulties.



1991-2012: the major dams are fully operational

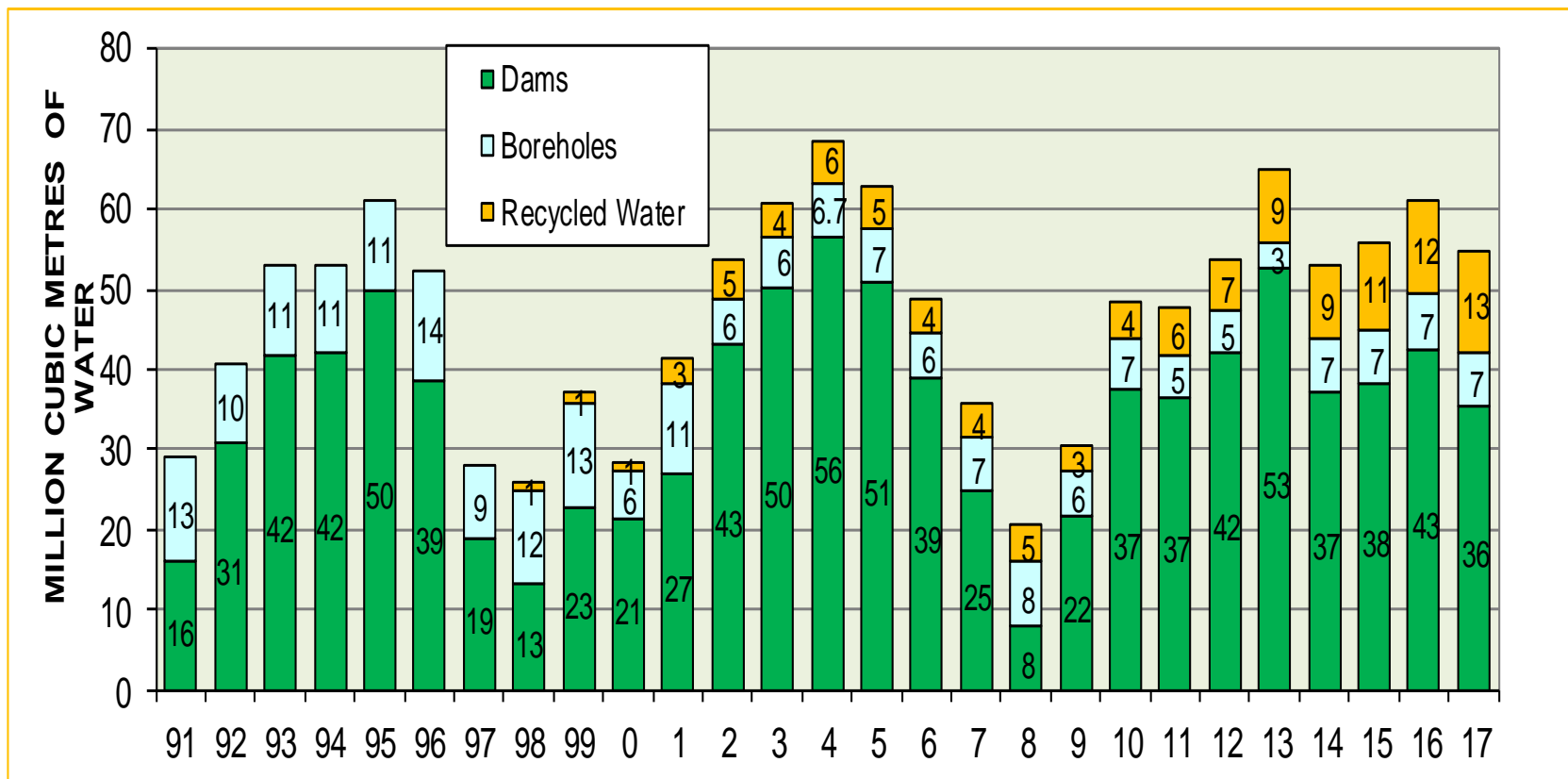
1997: The 1st desalination plant was put in operation

Non Conventional Water Resources

Waste Water Reuse

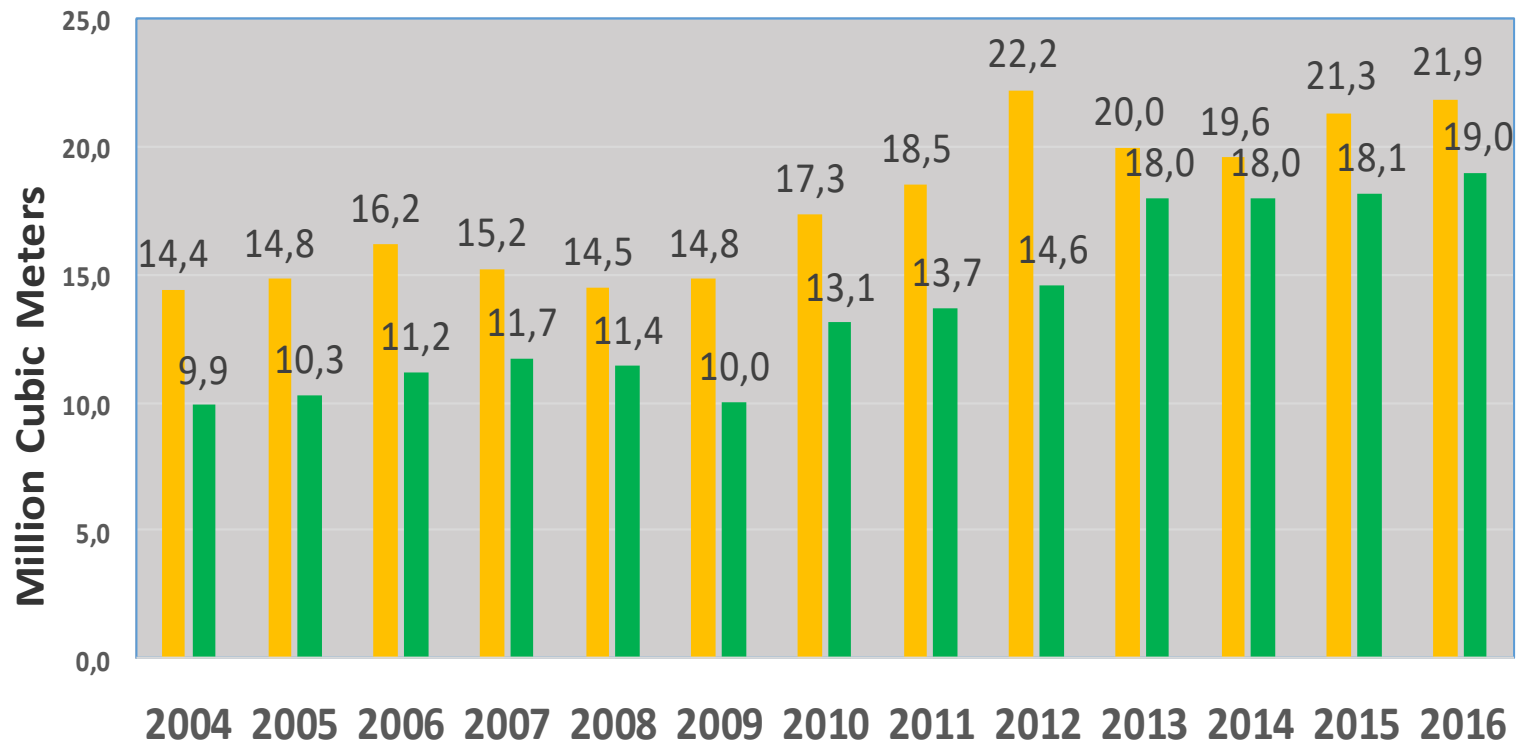
- Tertiary treatment is **mandatory** by law
- The production and use of recycled water is **regulated by the legislation**: laws and regulations and other legal actions.
- the **code of the good agricultural practice** sets the rules for irrigation. e.g. Crops irrigated, safety precautions, irrigation practices and methods.
- **Urban Sewage Boards**: collection and treatment
- **Department of Environment**: issuing the discharge permits.
- **WDD**: management and distribution of the recycled water from the USB.
- **Rural Sewage Boards**: collection, treatment and distribution of the recycled water

Irrigation water supply is highly unstable / insecure



BH includes abstraction from aquifers recharged with recycled water

Tertiary Treated Water production & use (From Urban WWTP)



**Recycled water production
will reach 85 EKM/yr**

- A **permanent and evolving water scarcity**, which acts as a limiting constraint for economic and social activities
- The **allocation of available quantities** is a debate
- Severe adverse **effects to the environment**
- **Agriculture** and rural life is heavily influenced (decline of the primary sector, rural life negative effects, food production insecurity ...)
- The increase in storage capacity and the **demand management** increased capabilities to withstand drought episodes. However, the use of (expensive and energy consuming) **non conventional water resources** is necessary and of vital importance
- Adverse effects on the government budget/public finance

It is imperative to **seek for new solutions** to increase the efficiency of the existing infrastructure and better control the demand

The **objective** is to provide water for all uses to the maximum extend possible, taking into account the need for sustainability and the protection of the environment



Thank you for your attention!

Water Development Department

director@wdd.moa.gov.cy
www.moa.gov.cy/wdd

