Water Security in Bulgaria

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# Safety of Dams in Cyprus

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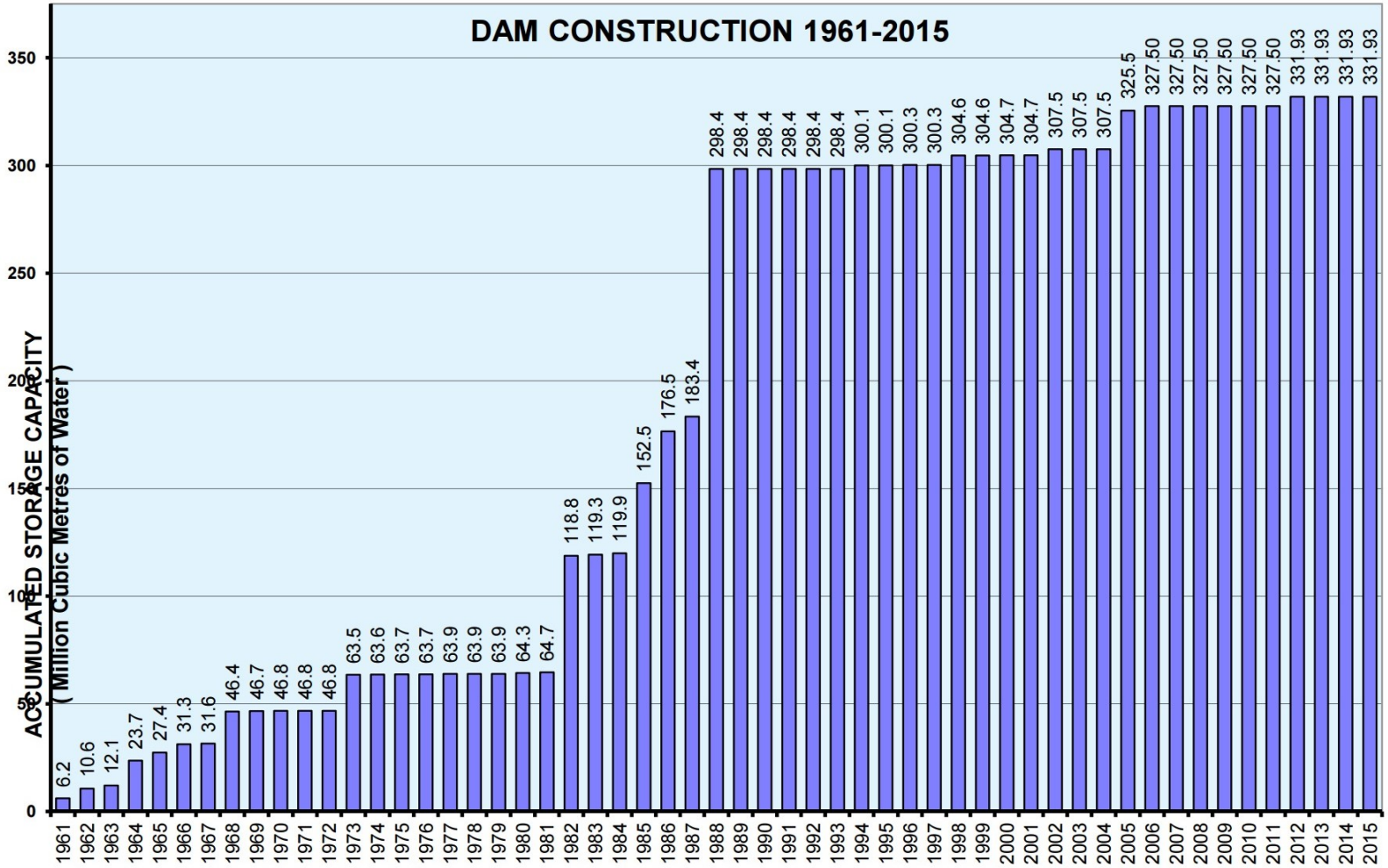
WORLD BANK GROUP

# Construction of Dams

- In Cyprus, the first dam - an earth-fill dam – was built at Kouklia in 1900, and during the period 1945-1958,15 more dams were built – 13 gravity dams and 2 earth-fill dams.
- After the establishment of the Cyprus Republic, the Water Development Department (WDD) of the Ministry of Agriculture, Natural Resources and Environment began the construction of a large number of dams, most of which were of the earth-fill type.
- This type of dam was chosen for financial reasons but also because of the nature of the topography and geology of the region in which each dam was situated.
- The basic principle behind achieving the most cost effective way to construct a dam is to use materials found in the vicinity to the site, and for almost all the major dams of Cyprus natural materials, such as clay, gravel etc were used.

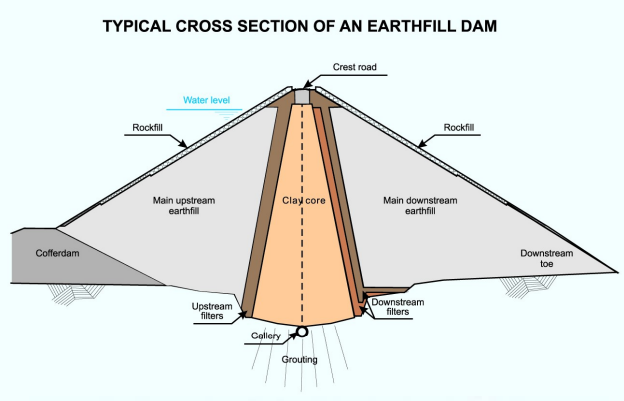
# storage capacity

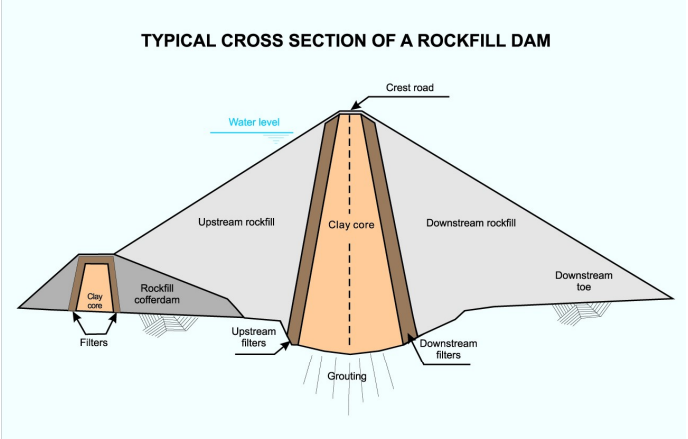


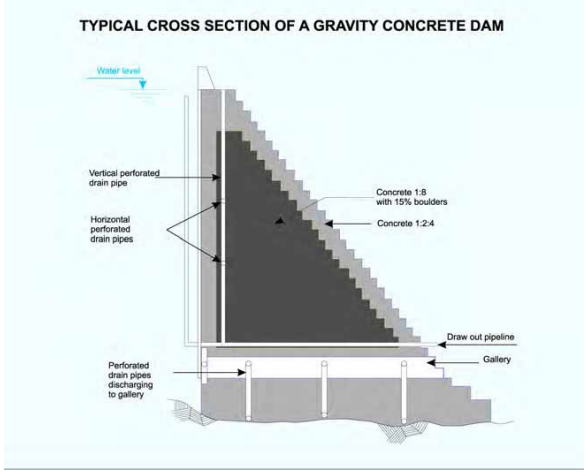
- At present Cyprus has over 100 dams, 56 of which are included in the Register of the International Committee on Large Dams (ICOLD), of which Cyprus has been a member since 1969.

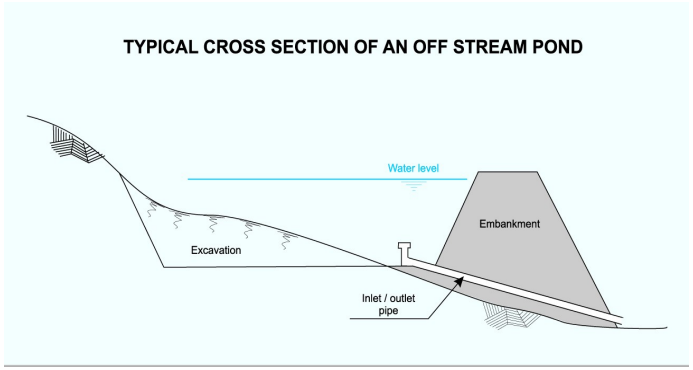
- Out of these large dams 18 are off-stream ponds. The total capacity of all the dams is approximately 331 million cubic metres of water

# The types of dams built in Cyprus belong mainly to 4 categories



# KOURIS DAM

# Integrated Water Management Law

- In 2010 an Integrated Water Management Law (Law N. 79(I)/2010) was established giving the responsibilities of water management to the Water Development Department (WDD). Safety of Dams was a main component of this law.
- In 2015 Regulations for the safety of the Dams No 4855 were approved by the Parliament

# Records to be kept by a competent authority

- A competent authority must keep the following records about large raised reservoirs under its control——

  (a) water levels and depth of water, including the flow of water over the waste weir or overflow;

  (b) leaks, settlement or other works and repairs; and

  (c) any other relevant information determined by the Director or an engineer acting under this Part.
- The competent authority must install and maintain such instruments as may be necessary to obtain the information required for the records to be kept.
- The records are to be disclosed to any person who requires them for the exercise of a power or performance of a duty under this Part.

# List of qualified civil engineers

- The Director keeps a list of qualified civil engineers for the purpose of this Part, which are approved by the Minister. There are three categories of qualified engineers:
- **Category 1 – supervising engineer:** 7 years certified experience in design, construction, supervising of large raised reservoirs. Or 5 years plus post graduated diploma in a relevant subject
- **Category 2 – construction engineer**: 10 years certified experience in design, construction, supervising of large raised reservoirs. Or 7 years plus post graduated diploma in a relevant subject, he played a significant role in the construction of 3 Dams out of which , the one has a high over 30 meters. He has at least two publications relevant with the safety of large dams.
- **Category 3 – inspection engineer/arbitrator:** 20 years certified experience in design, construction, supervising of large raised reservoirs and he played a significant role in the construction of 5 Dams out of which , the one has a high over 50 meters. He has at least three publications relevant with the safety of large dams.

# Inspection of large raised reservoirs

- The competent authority must appoint an independent engineer (an “inspecting engineer”) and ensure that a large raised reservoir is inspected as follows:

  (a) within a maximum of 2 years after the date of issue of a final certificate;

  (b) at any time when the supervising engineer so recommends;

  (c) as soon as reasonably practicable after the conduct of any alterations to the reservoir which do not increase its capacity, but are such that may affect its safety and were not designed and supervised by an engineer;

  (d) within a maximum of 10 years after the last inspection or such shorter period as the inspecting engineer who conducted that inspection recommended.

As soon as reasonably practicable after an inspection under this section, the inspecting engineer is to prepare a report and send it to the competent authority. The report must include—

- (a) recommendations of measures required on grounds of safety; and
- (b) comments and recommendations, if required, relating to issues raised in any previous inspection report.

# Supervision of large raised reservoirs

- Except where a reservoir is under the supervision of a construction engineer, the competent authority must appoint an engineer, (a “supervising engineer”) to supervise the use and management of the reservoir to ensure compliance with this Part and, in particular, that the reservoir may be used safely.
- Where any matters have been noted in a final certificate or the latest certificate of the inspecting engineer as matters that must be monitored by the supervising engineer, the supervising engineer must report in writing to the competent authority about the monitoring and action taken.
- If the supervising engineer considers that an inspection is required the engineer must recommend that the competent authority arranges an inspection

# Abandonment of large raised reservoirs

- Where the use of a large raised reservoir as a reservoir is to be abandoned, the competent authority must obtain a report from an engineer in relation to any measures that must be taken on grounds of safety, so as to ensure that there is no risk of the reservoir being filled with water by mistake or as a result of natural causes, above the natural level of any part of the surrounding land.

# Extraordinary powers of Director

- The Director may take any measure necessary to protect any person or property from the risk of water escaping from a large raised reservoir.
- The circumstances are where the Director has reasonable cause to believe that—
- (a) a large raised reservoir—

  (i) is in a dangerous condition; or

  (ii) is no longer being used; and
- (b) that measures must be taken immediately to protect a person or property against the risk of water escaping from the reservoir.
- In the exercise of his power, the Director must—

  (a) appoint an engineer to advise on the necessary measures and the work required must be supervised by the engineer; and

  (b) send a written notice (which may be served by post) to the competent authority or former competent authority stating the measures to be taken or which have been taken.

## Reports, certificates and decisions to be sent to Director

- The Director may determine the form of reports and certificates issued by an engineer appointed for any purpose under this Part.
- The competent authority must send a copy of each report and certificate issued under this Part to the Director as soon as reasonably practicable.
- An engineer appointed under this Part must send the reports or decisions to the Director within 28 days of sending them to the competent authority.

# Reports to the Minister

- The Director of WDD submits reports to the Minister of Agriculture, Rural Development and Environment at the end of every year.

## Record of reservoirs

- The Director of the Water Development Department (WDD) keeps a record of large raised reservoirs with such information as specified in the regulation. The record is to be deposited with WDD and available for inspection during normal office hours.

# ASPROKREMMOS DAM