

Desalination and Public-Private Partnership (PPP)

The Israeli Experience

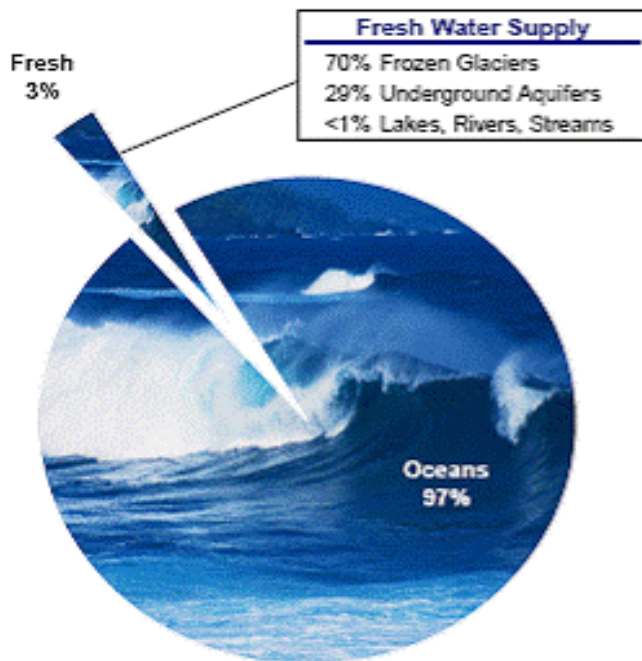
**“The Importance of the Colorado River for
Arizona’s Future”**

June 24th 2008, Phoenix AZ



Countries projected to experience water stress or water scarcity by 2025, UN medium population projection

The World's Water Supply¹



Global Water Supply vs. Population²

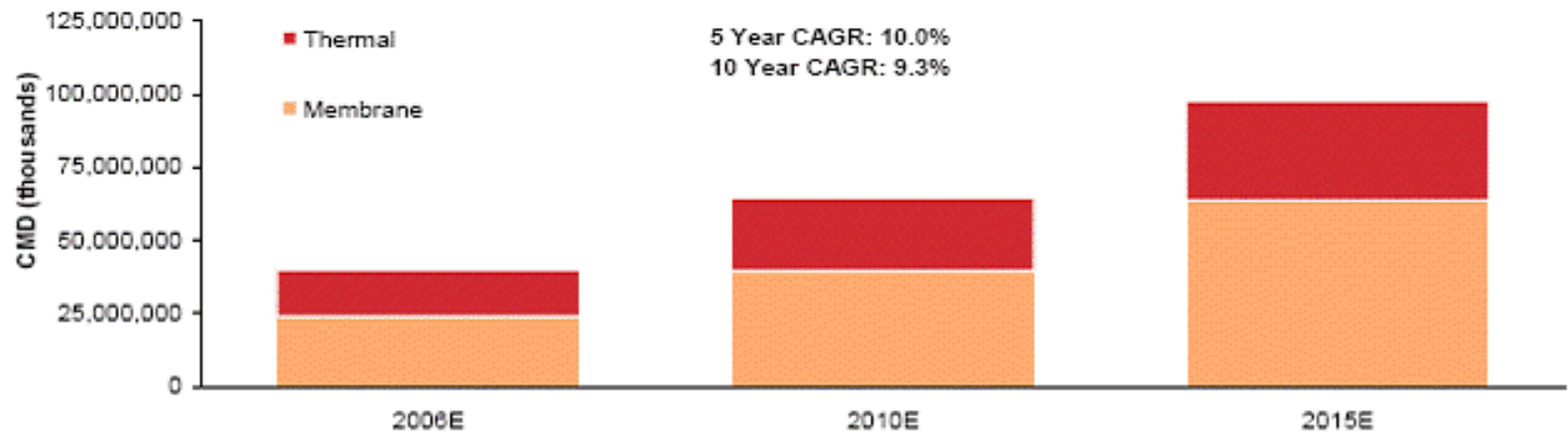


- North America has 15% of the global water supply, but only has 8% of the population. In contrast, China only has 7% of the renewable water supply, but 21% of the population
- Over one billion people use unsafe drinking water, with 3-4 million people dying each year from waterborne diseases
- The number of people living in scarce-water conditions globally is expected to double in 20 years, and those in water stressed geographies should increase six times

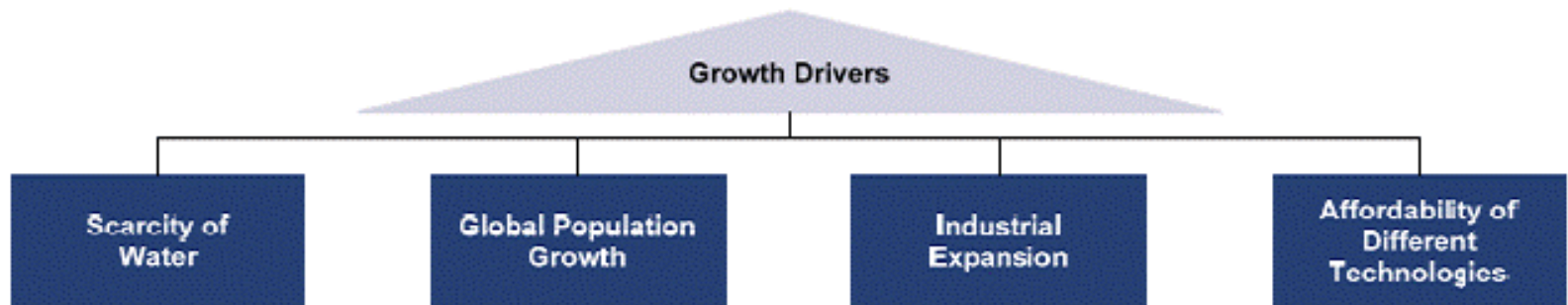
¹ Source: Goldman Sachs Research

² Source: United Nations Educational, Scientific and Cultural Organization/International Health Programs.

World Expected Desalination Capacity (m³/day)



Growth Drivers

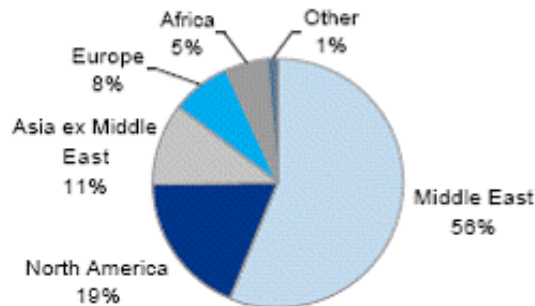


Source: Global Water Intelligence

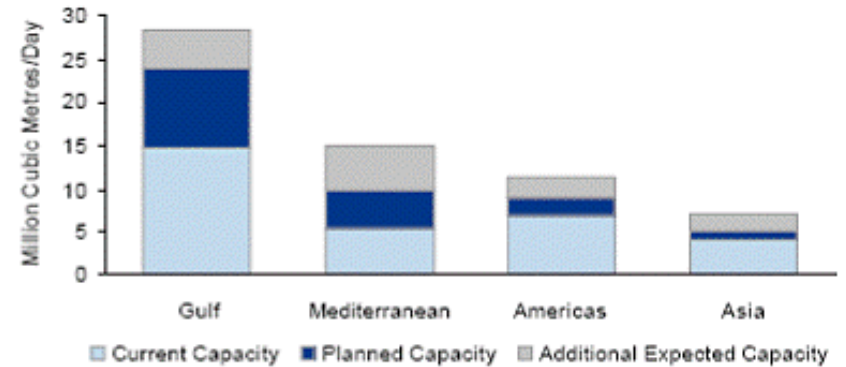
Overview

- Global spending on desalination is estimated at c.\$4.3bn in 2005, with the market split 60%-40% between municipalities and industrial users
- c.56% of installed capacity is in the Middle East
- Over the next 10 years, the global desalination market is expected to grow between 9-14% annually
- The largest market will continue to be the Gulf area, where the combination of rapidly growing populations, depleted groundwater resources and the retirement of capacity built during the oil boom years of the 1970s and early 1980s will require a near doubling of the total capacity
- China and India are also set to enter the large-scale seawater desalination market. Both have large populations in water-stressed regions and political backing for higher water tariffs

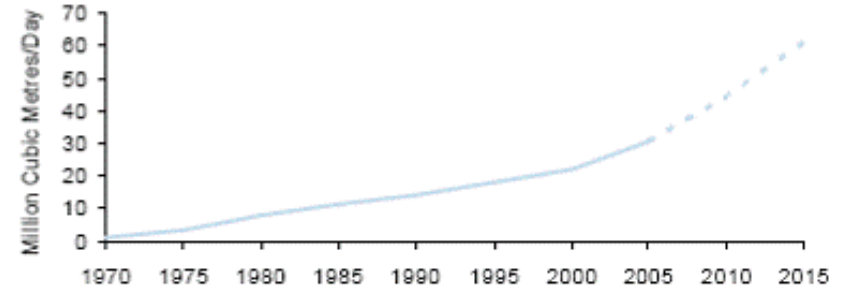
Capacity by Geography



Forecast Additional Capacity by 2015



Forecast Global Desalination Capacity

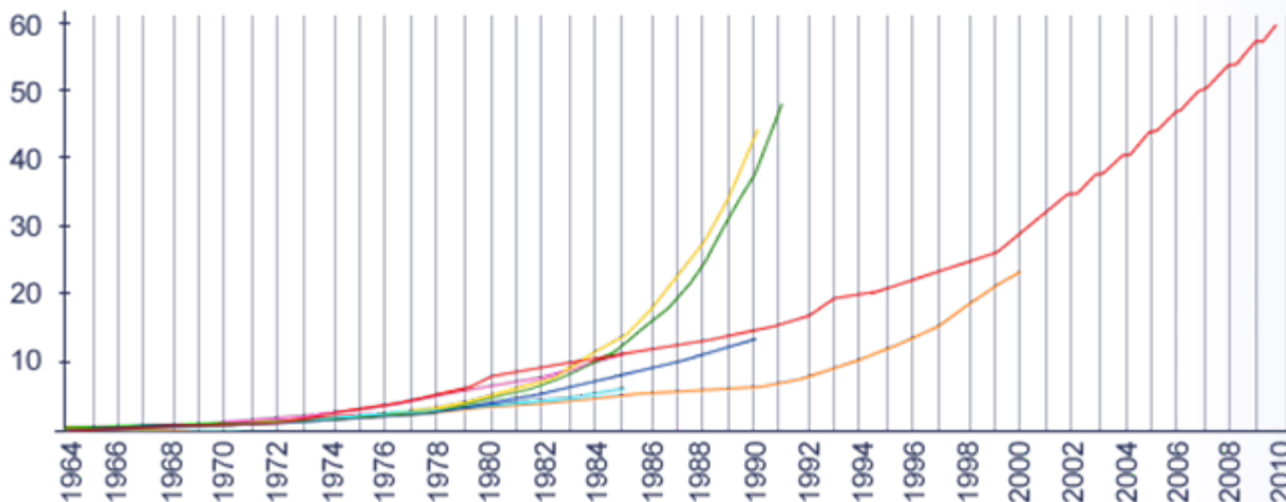


Source: GWL

- Strong long term demand for water due to Population growth and industrial expansion
- Historical market growth 8% to 10% per year. Expected yearly growth of over 10%
- Increased demand in water scarce countries in the next 25 years
- The sector started a long-term investment cycle in developed and emerging countries

Market Forecast

Cumulative Contracted Capacity (in M)



- Report No. 17 Cumulative
- Thyssen 1978
- Lahmeyer 1976
- Batelle 1970
- Krupp 1975
- Larsson 1979
- Prognos 1977
- Wangnick 2002

Case Study - ISRAEL

Sea Water Desalination

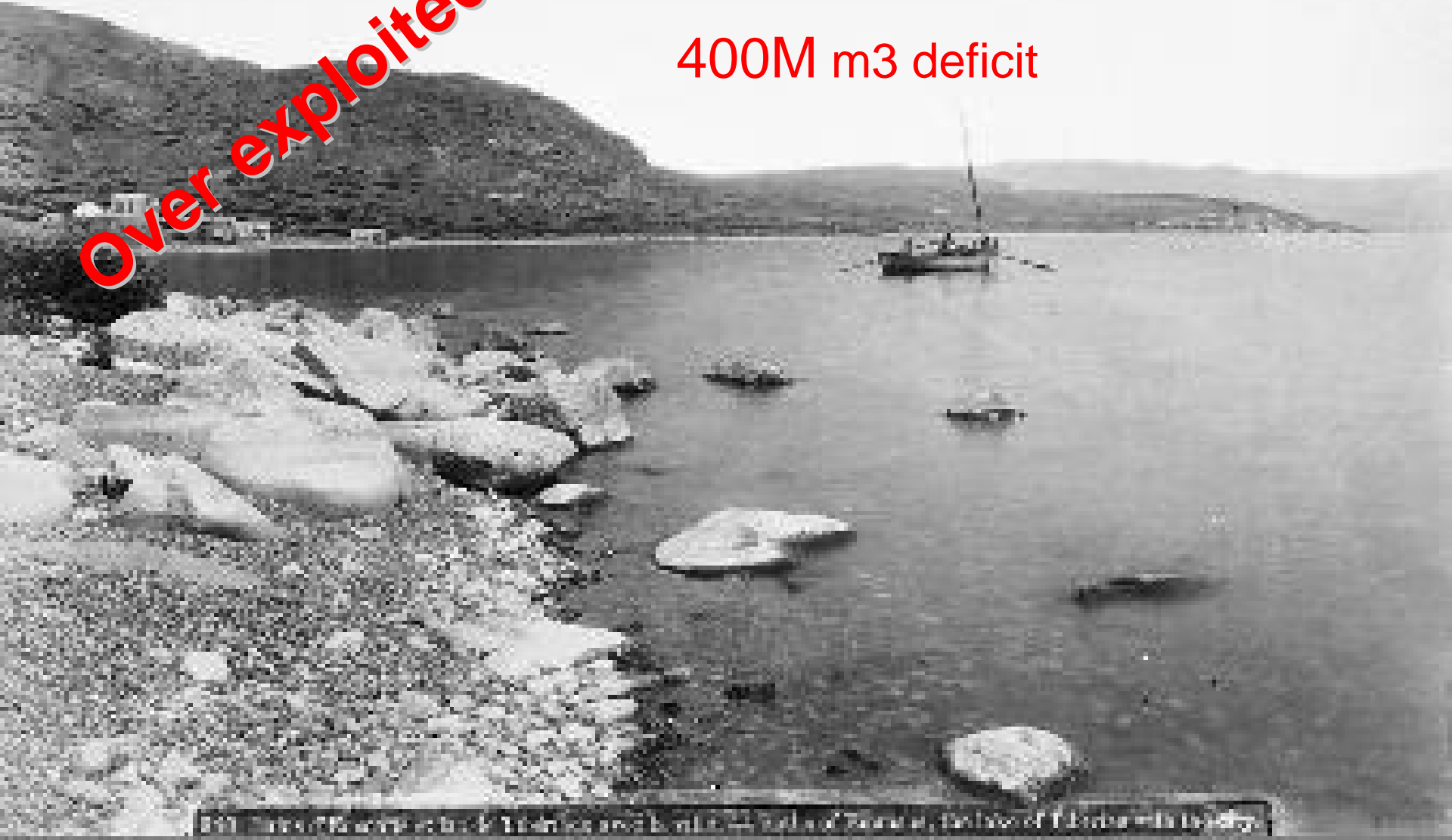
A Comprehensive Solution for Sustainable Water

Lake Galilee

Regions' largest Natural Reserve

400M m³ deficit

Over exploited



A matter of National Priority

1950's-60's

- **Desalination cost 37.85 \$/Kgal**
- **Israel's National Carrier top National Priority**



2007

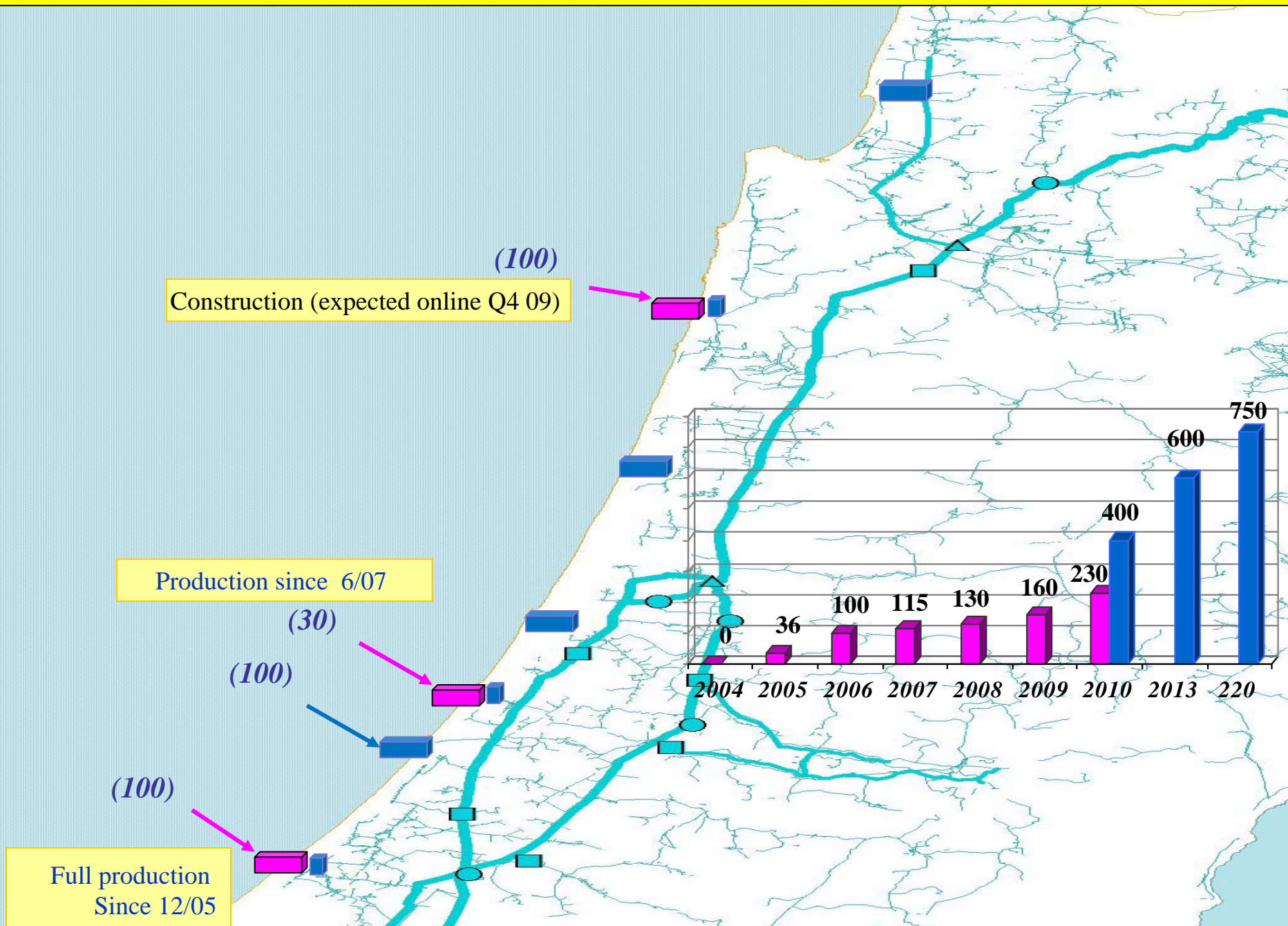
- **Desalination Price ~\$2.3 Kgal**
- **Desalination becomes the next national priority.**



- ✓ Improves water quality in national grid.
- ✓ Enables dilution with brackish water.
- ✓ Reduces over-pumping of Lake Galilee
- ✓ Stops salting of Aquifer.
- ✓ Frees up Jordan River flow and stops destruction of Dead Sea.



Development of sea water desalination plants in Israel along the national system

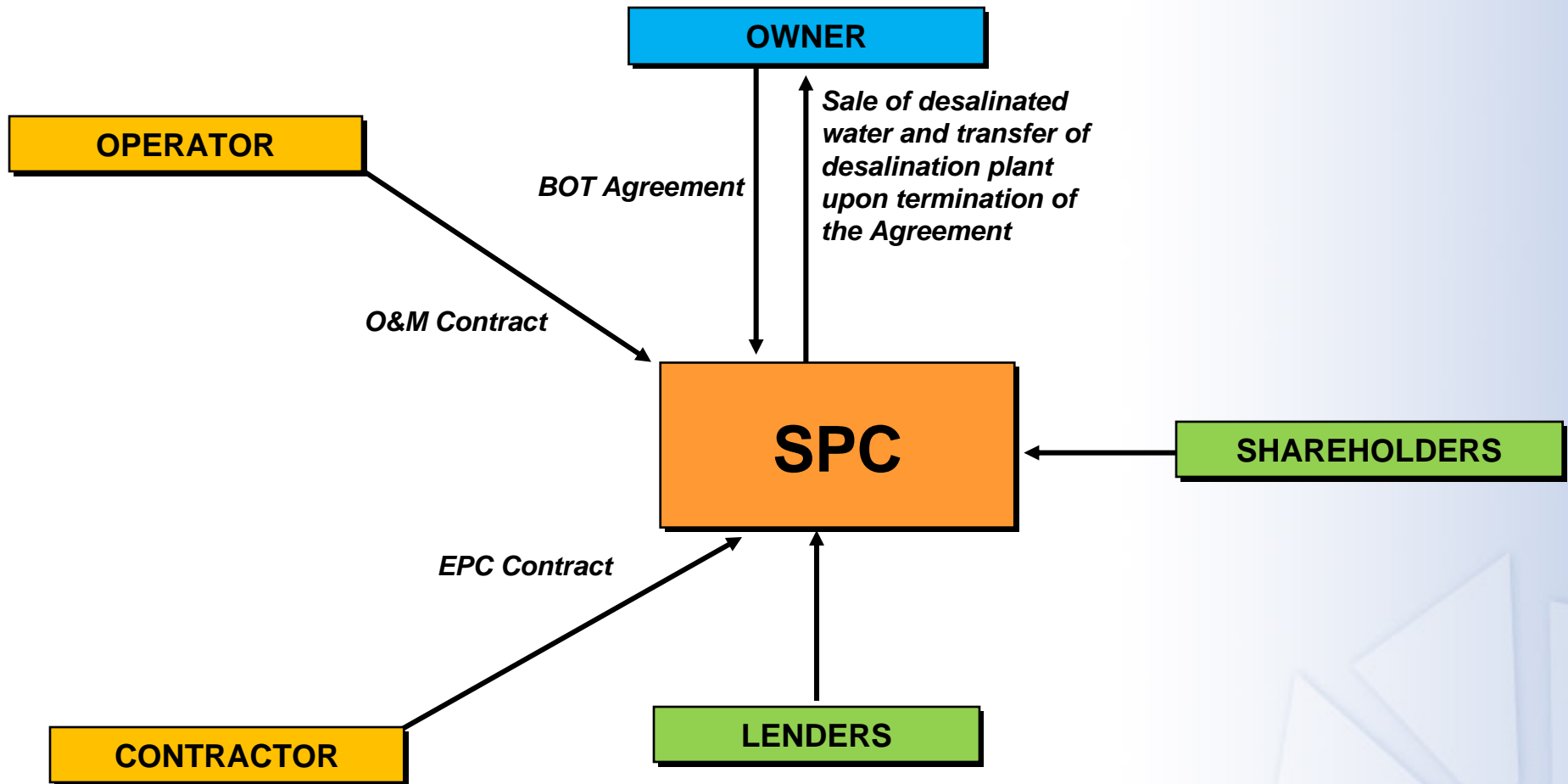


Political Benefits

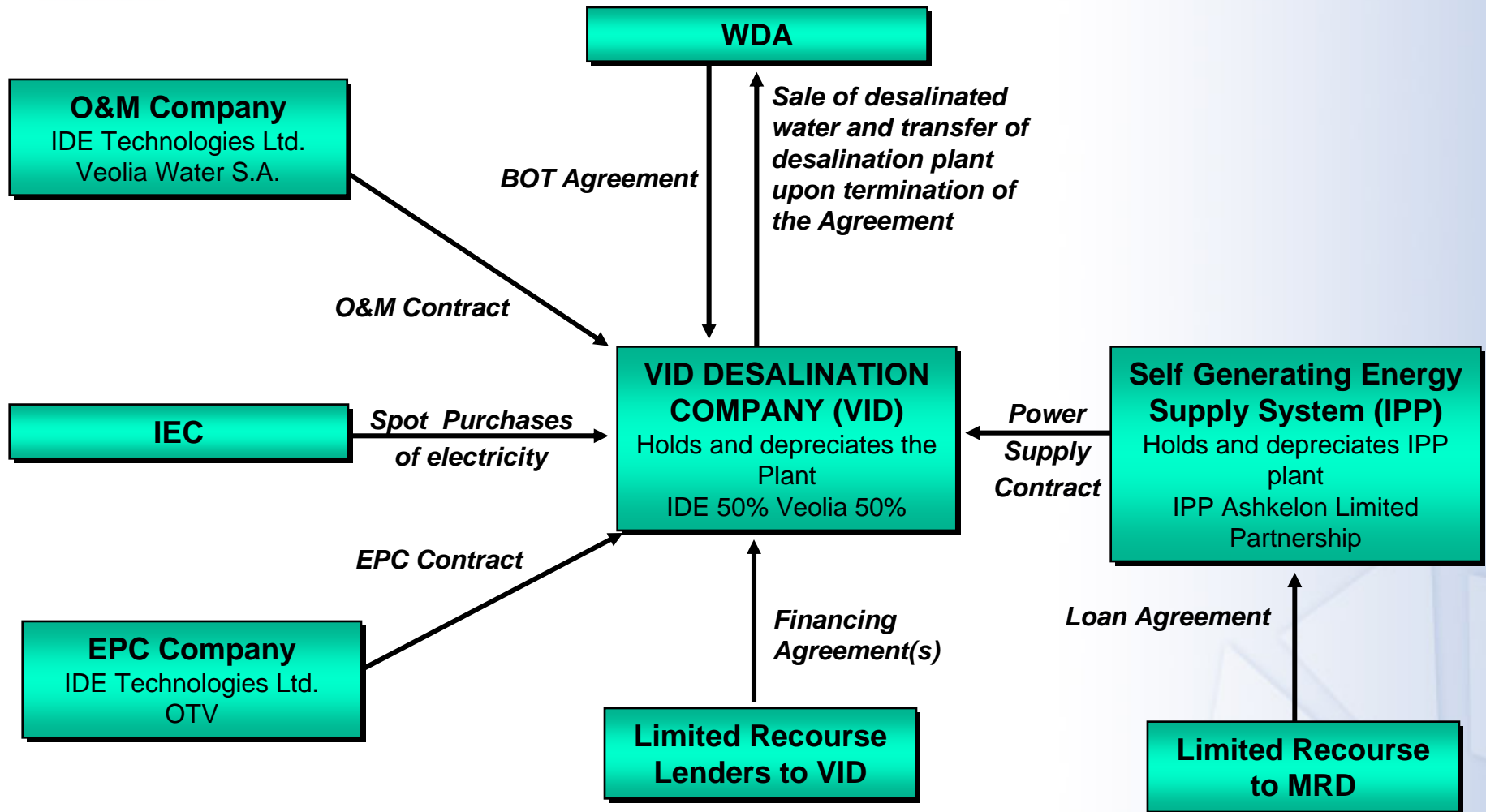
- 1953, Syria tries to stop construction of the National Carrier. Fighting erupts.
- 1964, Syria tries to divert Baniyas. Israel attacks Syrian pipeline.
- “The Six Day War started because of conflict with Syria on water, starting two and a half years earlier...” Ariel Sharon
- 2002, conflict between Lebanon & Israel over Lebanon plans to divert the Wazzani.
- “The only reason Jordan might go to war against Israel is over water.” King Hussein, after signing the Peace Treaty with Israel.

The Ashkelon 100 Mm³/year Sea Water Desalination Project (87 MGD)

PPP Contractual Structure



Contractual Structure



Financing Plan

- **Equity fund 23.5% of the total financing requirements**
- **Credit facility provided by lenders fund 76.5% of the total financing requirements (Bank Leumi + 106 Institutional Lenders)**
- **Standby facilities provided by shareholders and by Bank Leumi fund 6% of the total financing requirements**

Water Tariff Structure

Total Price ~ 53 US¢ / m³
(2.00 \$/Kgal)
(at bid stage)

Variable component
Indexed to:
•electricity prices
•CPI (USD and NIS)

42%

To cover:

- energy costs
- variable O&M costs
- membranes & chemical costs
- profit

Fixed component
Indexed to:
•NIS (min 33%)
•USD

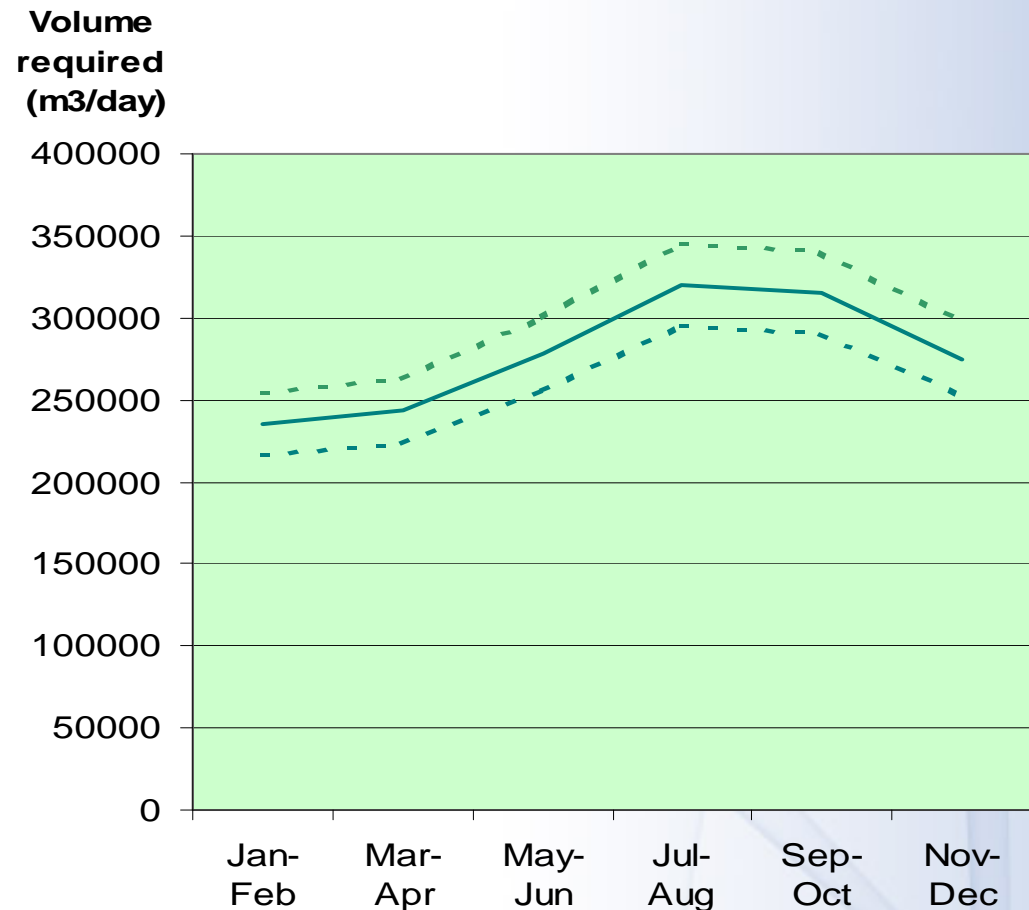
58%

To cover:

- capital expenditure
- fixed O&M costs
- profit

Volume Requirements

- The bi-monthly quantities required in the summer months are higher
 - design of plant to facilitate this requirement
- Tolerance band of +/- 8%
 - LDs payable for delivery less than 92% of requirements
 - additional agreement with WDA required for quantities in excess of 108%
- Payments are weighted towards meeting short-term goals:
 - Daily: 50% of capacity payment
 - Bimonthly: 40% of capacity payment
 - Annual: 10% of capacity payment



🔴 Timetable

- ☹️ achieve all permits in time for construction commencement
- 😊 Detailed design start upon Award
- 😊 National and Regional permits by Government/WDA experts during Bid Stage.
- 😊 Building permits by SPC/EPC experts

•Financing

- ☹️ securing long term (local) debt in time for financial close
- ☹️ lack of Project Finance local precedents in the field of desalination
- 😊 securing support of Arranger/Lender and candidates for Syndication starting at Bid Stage (incl. “ technical education”)

Ashkelon SWRO 330,000 m³/d (87 MGD)



25 years BOT project; built on time & on budget; 2nd year of successful operation

Hadera SWRO 330,000 m³/d (87 MGD)



25 years BOT project; under development



10 years BOT project; under 6th year of successful operation

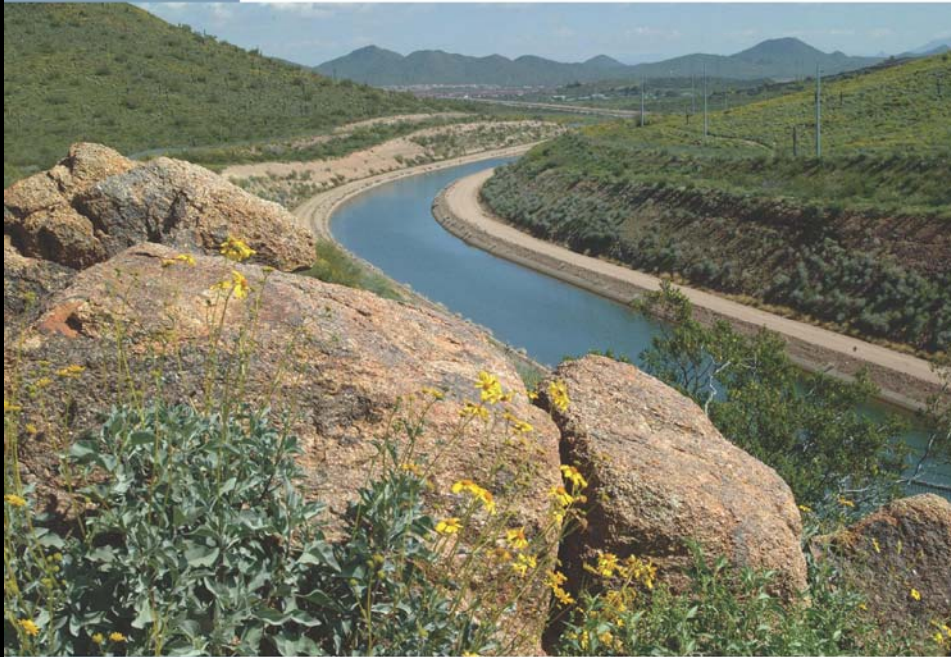


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Thank you

THE UNIVERSITY OF ARIZONA.

Water Resources Research Center
College of Agriculture and Life Sciences



The University of Arizona



The Importance of the Colorado River to Arizona's Future

June 24, 2008
Phoenix, Arizona

