Let There Be Water
Israel & Bergen County

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CBI Emerson
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Comparing Water Resources and Use in Israel & Bergen County
“Let There Be Water”
Seth M. Siegel

- [http://www.sethmsiegel.com/](http://www.sethmsiegel.com/)

“The Let There Be Water Movement”
Water Has Been Vital Since Biblical Times

- Hezekiah’s Tunnel
- Masada Cistern
We are reminded of the importance of water in our daily Shema

• “...And it shall come to pass if you surely listen to the commandments...that I will give rain to your land, the early and the late rains, that you may gather in your grain, your wine and your oil. And I will give grass in your fields for your cattle and you will eat and you will be satisfied.
But for the most part, we here in NJ take a clean, adequate water supply for granted.
It isn’t like this in Israel.

Israel lies within a climate that is arid and semi-arid. The Founders recognized that key to survival was self-reliance to provide all necessities for Life. Water was foremost among these.
Scarcity of water generated intense efforts to maximize use of the available supply and seek new resources. By the 1960s, Israel’s freshwater sources were joined in an integrated grid whose main artery, the National Water Carrier, brings water from the north and center to the south.

http://www.akhlah.com/israel/geography/
Over the past few decades, natural water supplies have been augmented by desalination, wastewater recycling, and other innovative technologies.
Keys to Israel’s Water Self-Reliance

• “The Water Belongs to All of the People”
• Imaginative pioneering immigrants, such as Simcha Blass
• Government Support Before/After 1948 David Ben-Gurion, Levi Eshkol
• National Laws and sorting out Ministerial conflicts
• Economic incentives and controls
Reminders to conserve
Innovative Technologies

• Drip Irrigation
Wastewater Treatment

WASTE WATER TREATMENT PROCESS

An overview of how waste water is cleaned and treated before returning to the water supply.
(Methods vary between countries depending on water standards)

1. Waste water and sewage is pumped underground to the lifting station where it is chemically treated and sent for separation.

2. The separation process filters out solids larger than 13mm. This waste is then transported to a refuse facility and buried.

3. Primary settling basins allow heavier material to sink and be scraped away. The waste is then fermented for 30 days and used as fertiliser.

4. Effluent is then pumped to the bio-reactors for 9 hours. Through a series of stages bacteria break down harmful matter and clean the water.

5. Secondary Clarifiers gravity feed the water through and bacteria continues to clean the water to a drinkable level.

6. The water is finally chemically treated with chlorine to ensure it is free from bacteria. Then it passes over a weir and into the water supply.

Source: World Health Organisation

36% of the world’s population does not have adequate sanitation
Wastewater Treatment Plant in Central Israel

http://www.haaretz.com/israel-news/science/.premium-1.648332
Dan River (Shafdan) Wasterwater Plant
From saltwater to tap water
A look at how desalination plants convert saltwater to drinkable fresh water.

1. Pumping seawater
Millions of gallons of seawater a day come in through intake pipes; protective screens minimize inclusion of sea life and large debris.

2. Pretreatment
Water is filtered for sediments, bacteria and viruses; solid waste is sent to a landfill.

3. Desalination
Seawater is pumped through concentric filters; more than 99 percent of the salt and minerals is removed.

4. Wastewater
Brine, the remaining water from desalination, is more salty than seawater, so it is mixed with industrial wastewater or other seawater to reduce salinity before it’s returned to the sea.

5. Post-treatment
Water is chlorinated; minerals can be added to match taste of existing water.

6. Storing and delivering water
Fresh water is stored and released into the municipal water system.

Source: Bay Area Regional Desalination Project, MCT
Graphic: Bay Area News Group

McClatchy-Tribune
New Technologies: Multi-Effect Distillation

1. Seawater feed
2. Seawater outlet
3. Propulsion steam
4. Thermo-compressor ejector
5. Produced water outlet
6. Brine outlet
7. Boiler condensate return
8. "Non-condensables" hydro-ejector

Steam flows through the distillation system, condensing and re-evaporating in each effect, ultimately producing purified water and brine.
Reverse Osmosis

http://www.iwapublishing.com/sites/default/files/Figure1.png
Ashkelon Desalination Plant
Human-Made Oases in the Desert
****/***** Resorts in a What Was Once Waste Land
Welcome!

The reserve is situated on the ash cone whose western side was swept away by a lava flow. Unique woodland species of the Rose family grow here, including Syrian pear (Pyrus syriaca), bear's plum (Prunus ursine), Mediterranean hawthorn (Crataegus azarolus), spiny hawthorn (Crataegus aronia), and dog rose (Rosa canina), as well as sumach (Rhus coriaria), and various species of oak and terebinth. The woodland and the open areas around it are a habitat for a variety of mammals and birds.

While in the reserve, for your safety and to protect it, please obey the following rules:

• Do not harm flora, fauna or geological phenomena!
• Use only marked roads and paths.
• The lighting of fires is prohibited!
• Keep the reserve clean. Take your refuse out with you.
• Do not remain in the reserve after dark!

Enjoy your visit!
The Israel Nature and Parks Authority
Hydro-Diplomacy

- 150+ countries
- China
- Iran
- 100+ less-developed countries
- Innovation: Africa
  
  https://www.innoafrica.org
Israel’s Guiding Philosophies (Chapter 12)

• “The Water Belongs to the Nation”
• Cheap Water Is Expensive
• Use Water to Unify the Country
• Regulators, Not Politicians
• Create a Water-respecting Culture
• Use Water Fees for Water
• Innovation
• Plan for Long into the Future
What About Here?

• Bergen County has a mix of private and public water supply systems

• When NJ was more of a “Garden State,” many farms relied on wells

• As towns and cities developed, private companies developed reliable networks
  Hackensack Water Company, Est. 1869
Comparing Israel’s & NJ’s Climates

• 29 – 33° N
• Subtropical
• North/Coastal have hot, dry summer & cool, rainy winters
• Rainfall peaks Dec - Feb
• Negev to Eilat receives negligible rain

• 38 – 41° N
• Mid-latitude temperate
• Warm summers, cold winters
• Moderate year-round rainfall
• Average about 16 in snowfall
• Jerusalem

• Newark

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4°C = 39°F  10°C = 50°F  20°C = 68°F  30°C = 86°F
NJ Climate Images

http://www.nj.gov/dep/drought/reservoir.html
Where Does Our Water Come and Go?
NJ Water Facts

• 1.2 billion gpd
• 88% from public water systems
• 12% from private wells
• About half from surface water, half from ground water
• Compliance with Standards improved since 1999 from 93% to 98%
• Suez Water Quality Information
A side note: New York City has the largest and one of the best water supply systems in the world.

Hackensack Water Company → Suez Water

- Founded 1869 to serve Hackensack, Hoboken, North Hudson
- Expanded to much of Bergen and surrounding counties through the 20th Century
- Reorganized as United Water Resources (1983)
- Suez Environmental acquired UWR (2000)
- Now part of Suez North America
Steps in Typical Water Treatment

• Screening
• Coagulation and Flocculation
• Sedimentation
• Filtration
• Disinfection
• Storage
• Distribution
Steps in Typical Wastewater Treatment
Bergen County Wastewater Treatment

- Bergen County Utilities Authority (www.bcua.org)
  Wastewater and solid wastes for 47 municipalities
  About 100 mgd at Little Ferry and Edgewater treatment plants
• Wasterwater effluent reuse with PSE&G and member municipalities for sewage cleaning

• Combines Heat and Power Cogeneration
How Might Climate Change Affect Us?

- Intergovernmental Panel on Climate Change (IPCC) – 5 Assessment Reports, latest 2013

- Impacts, Adaptation & Mitigation
Freshwater resources

• Freshwater-related risks increase significantly with increasing greenhouse gas emissions

• Climate change is projected to reduce renewable surface water and groundwater resources significantly in most regions

• Increased competition for water among agriculture, settlements, industry, energy
• Likely to increase frequency of droughts (less rainfall, less soil moisture) in dry regions
• Negatively impact freshwater ecosystems by changing streamflow and water quality
• Reduce raw water quality, posing risks to drinking water even with conventional treatment
Adaptation, Mitigation, and Sustainable Development

- Adaptive approach to water management can address uncertainty due climate change.
- Reliability of water supply, expected to suffer from increased variability of surface water availability, may be enhanced by increase groundwater abstraction.
- Measure to reduce GHGs imply risks for freshwater systems (irrigated bioenergy, hydropower, afforestation, carbon capture).
Water quality and water supply reliability are jeopardized by climate change in a variety of ways that affect ecosystems and livelihoods.

Changes in flooding, drought intensity, groundwater demand and recharge, coastal aquifers, ecosystem water quality, water demand and use, etc.
Impacts on the Northeast

• Heat waves, coastal and river flooding pose growing challenges, increasing vulnerability, especially of most disadvantaged populations
• Stressed infrastructures
• Planning and adaptation methods still at early stages
• How to balance public vs private adaptation and mitigation efforts?
Discussion
Thank you!

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MAYIM MAYIM
Ushavtem Mayim (Besason)

Ushavtem mayim b'sason mimainei hayeshua.
Ushavtem mayim b'sason mimainei hayeshua

Chorus:
Mayim - Mayim - Mayim - Mayim
Hey, mayim b'sason
Mayim - Mayim - Mayim - Mayim
Hey, mayim b'sason

Joyfully shall you draw water
From the fountains of triumph
Joyfully shall you draw water
From the fountains of triumph

Chorus:
Water - water - water - water
Hey, water in joy
Water - water - water - water
Hey, water in joy

http://www.hebrewsongs.com/?song=mayimmayim