

# *Water Resources of Israel*

## **מקורות המים בישראל**

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### **Synopsis:**

Israel is known to be a dry country, where the water resources are very limited, as in the rest of the geographical region. Although it has remained true, the Israeli inventive nature created solutions to this problem in ways that surprise students of all ages. The most known is the National Water Carrier (NWC), which was built in the 50s and was designed to carry water from the Sea of Galilee, the Kineret, all the way to the Negev. As the needs for water grew due to growth in population and geographical territory, the Israeli mind didn't stop from trying to come up with new ideas. We will focus of Desalination of water from the Mediterranean Sea, and Repurpose, or recycling of water.

### **Goals:**

Getting the students familiar with:

- The different water sources in Israel.
- Identify/knowing the names and resources of the NWC.
- Enduring understanding the water challenges in Israel.
- The ways that Israel created a surplus of water.

### **Objectives:**

Familiarize the students with related Hebrew vocabulary, geography and the water supply in Israel.

At the end of this unit the students will be able to recognize the geographical path of the NWC and other resources of water. The students will know the related Hebrew vocabulary. The students will also come up with alternative methods of bringing water to Israel.



### **Lesson 1: National Water Carrier of Israel**

- Association game: 10 minutes (3 to write, 7 to share). Need: Note cards, pencils  
Ask the class: What do you think of when you think of water? 10 words.  
Discussion: Why are we concerned about water and what is so important about water?
- Introduction: 10 minutes. Need: A 'naked' map of Israel (can be drawn by the students).  
Ask the class: Why are we concerned about water in Israel? What is the topography of Israel (more than 60% of Israel is desert)? Can you point on the map to the Negev?  
What are the water resources of Israel? (Let the students come up with ideas for all questions before supplying answers.) Did you know about: National Water Carrier, Reclaiming Water, and Desalination?  
What do you know about any of these methods?
- Practice activity: 10 minutes  
Teacher read: [https://en.wikipedia.org/wiki/National\\_Water\\_Carrier\\_of\\_Israel](https://en.wikipedia.org/wiki/National_Water_Carrier_of_Israel)  
The National Water Carrier of Israel (Hebrew: המוביל הארצי, HaMovil HaArtzi) is the largest water project in Israel. Its main task is to transfer water from the Sea of Galilee in the north of the country to the highly-populated center and arid south and to enable efficient use of water and regulation of the water supply in the country. Up to 72,000 cubic meters (19,000,000 U.S. gal; 16,000,000 imp gal) of water can flow through the carrier each hour, totaling 1.7 million cubic meters in a day.  
Most of the water works in Israel are combined with the National Water Carrier, the length of which is about 130 kilometers (81 mi). The carrier consists of a system of giant pipes, open canals, tunnels, reservoirs and large scale pumping stations. Building the carrier was a considerable technical challenge as it traverses a wide variety of terrains and elevations.

Video: <https://www.youtube.com/watch?v=WQAgr3dmRHE>

Today we will discuss the first solution the leaders of Israel came up with, the National Water Carrier of Israel (NWC). Here is a map of the NWC (Map of Israel English/Hebrew, depends on your students). Why do you think the leaders who came up with this plan drew the water from these resources and where was this plan not enough?

- Production activity: 10 minutes. Need: A giant map of Israel  
Have the students recognize the main cities of Israel. Then have them recognize the path of the NWC. Have the students remove their shoes and lay on the map, as many students as needed, to trace the path of the NWC. It can get aggressive, so make sure that they will divide in groups and everyone have a chance to do the activity. One suggestion: have the older kids tell the younger ones how to trace on the map, then switch.
- Review: 5 minutes  
Video: [https://www.youtube.com/watch?v=YVNcavEA2\\_s](https://www.youtube.com/watch?v=YVNcavEA2_s)  
What do you think of the creative ways Israel is getting water?  
Now that we know that the NWC wasn't enough, we will discuss next time how Israel came up with some groundbreaking solutions to its water needs.

## ***Lesson 2: Water Desalination***

Teacher read: <https://en.wikipedia.org/wiki/Desalination>

Desalination is a process that extracts minerals from saline water. More generally, desalination refers to the removal of salts and minerals from a target substance, as in soil desalination, which is an issue for agriculture.

Saltwater is desalinated to produce water suitable for human consumption or irrigation. One by-product of desalination is salt. Desalination is used on many seagoing ships and submarines. Most of the modern interest in desalination is focused on cost-effective provision of fresh water for human use. Along with recycled wastewater, it is one of the few rainfall-independent water sources.

Due to its energy consumption, desalinating sea water is generally more costly than fresh water from rivers or groundwater, water recycling and water conservation. However, these alternatives are not always available and depletion of reserves is a critical problem worldwide. Currently, approximately 1% of the world's population is dependent on desalinated water to meet daily needs, but the UN expects that 14% of the world's population will encounter water scarcity by 2025.

Desalination is particularly relevant in dry countries such as Australia, which traditionally have relied on collecting rainfall behind dams for water.

According to the International Desalination Association, in June 2015, 18,426 desalination plants operated worldwide, producing 86.8 million cubic meters per day, providing water for 300 million people. This number increased from 78.4 million cubic meters in 2013, a 10.71% increase in 2 years. The single largest desalination project is Ras Al-Khair in Saudi Arabia, which produced 1,025,000 cubic meters per day in 2014, although this plant is expected to be surpassed by a plant in California. Kuwait produces a higher proportion of its water than any other country, totaling 100% of its water use.

- Review of NWC: 10 minutes
- Introduction: 10 minutes  
<https://www.youtube.com/watch?v=L8XHuT1tcX0>
- Desalination experiment: 20 minutes Need: Bowls – big and small (each student can have one or have them work in pairs), water, food coloring, saran wrap.  
<https://www.youtube.com/watch?v=exVEJt-NAHw>  
<https://www.education.com/science-fair/article/fresh-water-salt-water/>

This experiment is one that you should have a space to leave it overnight/ until next class.

If you need to see results right away, you can try the following experiments:

<https://www.education.com/science-fair/article/salt-water-distillation/>

Set up a display for the week.

Conclusion:

What do you think will happen to the experiment by next week? Let's revisit this display and to the water in the bowls?

When I was growing up in Israel we watched *פרפר נחמד* and they, like Sesame Street, were a vessel for public announcements. They spread the message that every water drop is important so it would last for everyone.

<https://www.youtube.com/watch?v=ph9KnlvxlB4>

Animated video show the process of desalination: <https://www.youtube.com/watch?v=mZ7bgkFgqJQ>

### ***Lesson 3: Reclaiming Water***

Teacher read [https://en.wikipedia.org/wiki/Reclaimed\\_water](https://en.wikipedia.org/wiki/Reclaimed_water)

Reclaimed or recycled water (also called wastewater reuse or water reclamation) is the process of converting wastewater into water that can be reused for other purposes. Reuse may include irrigation of gardens and agricultural fields or replenishing surface water and groundwater (i.e., groundwater recharge). Reused water may also be directed toward fulfilling certain needs in residences (e.g. toilet flushing), businesses, and industry, and could even be treated to reach drinking water standards. This last option is called either "direct potable reuse" or "indirect potable" reuse, depending on the approach used. Colloquially, the term "toilet to tap" also refers to potable reuse.

Reclaiming water for reuse applications instead of using freshwater supplies can be a water-saving measure. When used water is eventually discharged back into natural water sources, it can still have benefits to ecosystems, improving streamflow, nourishing plant life and recharging aquifers, as part of the natural water cycle.

Wastewater reuse is a long-established practice used for irrigation, especially in arid countries. Reusing wastewater as part of sustainable water management allows waste water to remain as an alternative water source for human activities. This can reduce demand and alleviate pressures on groundwater and other natural water bodies.

- Warm up activity: 5 minutes. Need: Blank map of Israel, scarf for blindfold, name cards of cities in Israel. Pin the map: Blind fold a volunteer, spin them and have them pin the name of a city on the right place on a map (pin the donkey). If you have a small space it can be done on a work sheet, attached. Ask at the end of the activity if they remember where the NWC runs.
- Introduction: 10 Minutes. Today we will talk about **Reclaimed** or **recycled water** (also called **wastewater reuse** or **water reclamation**). What this idea makes you feel/think? How do you think Israel is reclaiming its water and what they are using this water for?  
<https://www.youtube.com/watch?v=twTTe6J3IT4>
- Practice and Production activity: 25 minutes. Need: Wadding (pillow filling), absorbent carbon

<https://www.youtube.com/watch?v=qjwzVezFLDg>

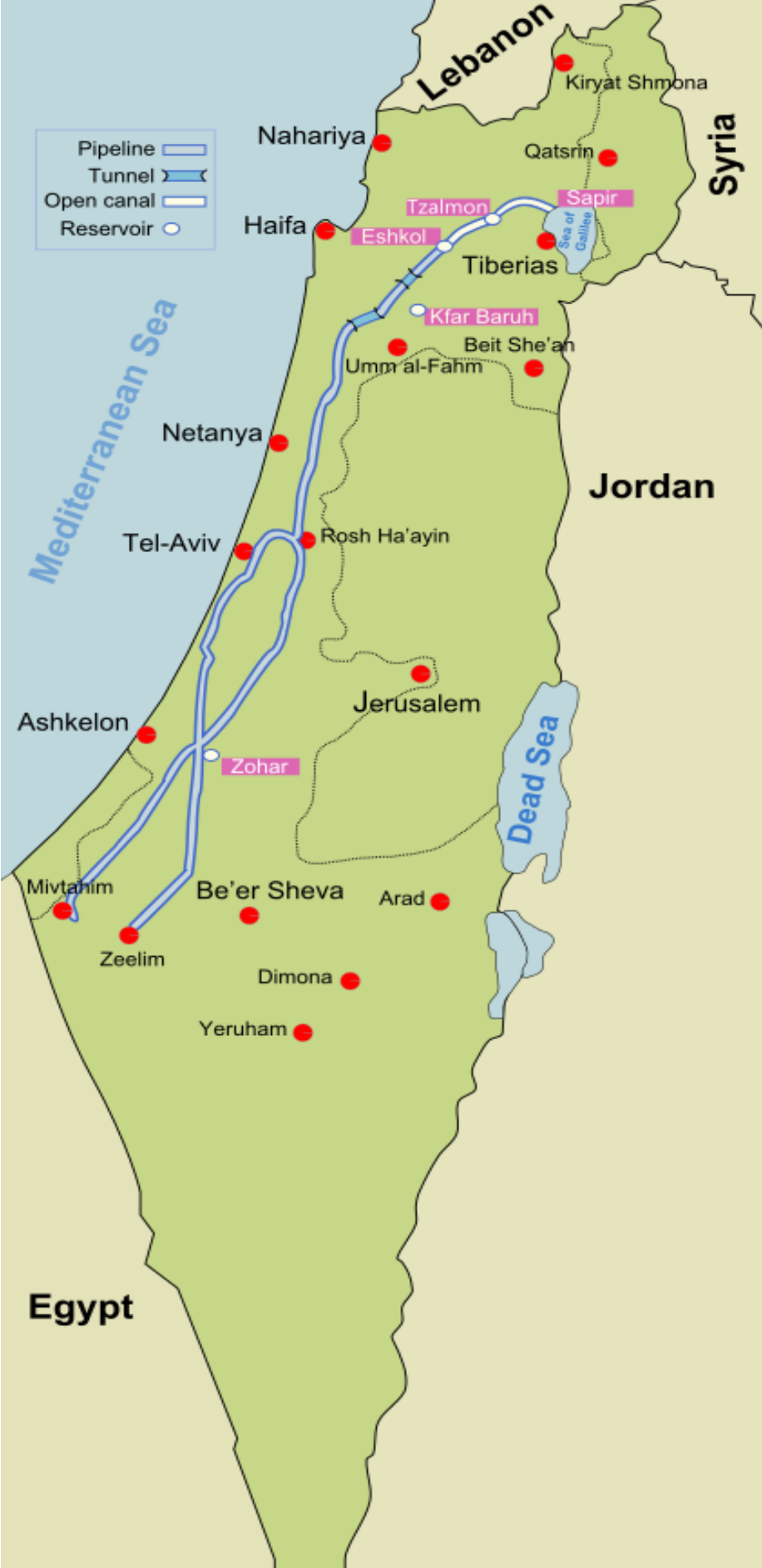
enjoy a science experiment together.

Clean up.

- Conclusion: 5 minutes

Expressing appreciation for water and ties to Jewish tradition

[file:///C:/Users/Sarit%20Cioban%20Spector/Documents/CIE/chagigat\\_mayim.pdf](file:///C:/Users/Sarit%20Cioban%20Spector/Documents/CIE/chagigat_mayim.pdf)





More resources:

[http://support.jnf.org/site/DocServer/Water\\_Facts\\_and\\_Figs\\_Nov\\_09.pdf?docID=5343](http://support.jnf.org/site/DocServer/Water_Facts_and_Figs_Nov_09.pdf?docID=5343)

<http://modernsurvivalonline.com/how-to-turn-salt-water-into-drinking-water/>

<https://secure2.convio.net/jnf/wwmd/handbook.pdf>

[https://secure2.convio.net/jnf/images/education/grown\\_ups\\_plus\\_kids\\_5/chagigat\\_mayim.pdf](https://secure2.convio.net/jnf/images/education/grown_ups_plus_kids_5/chagigat_mayim.pdf)