



# ASK HERZL

Program Title: Israel's Water Conservation

Program Tagline: Created by JNF Australia, participants will become familiar with the water shortage situation in Israel and the JNF activities that deal with water issues in the country.

Target Audience: Middle School, High School

Grade: 7<sup>th</sup> - 10<sup>th</sup>

Length of Program: 90 minutes

## Goals:

- Familiarize participants with the water situation in both Israel and around the world
- Familiarize participants with water sources around camp
- Introduction to basic concepts in the field of water: water reservoirs, river restoration, bio-filters, runoff harvesting
- Familiarization with JNF's areas of activity related to water issues

## Materials needed:

- Shovels
- Garbage bags
- Ropes
- Disposable cups, empty jugs
- Map of Israel kit
- Computer, speakers, and projector
- Pens and post notes
- Clipboards
- Copies of water audit questionnaires
- Buckets and smaller containers like empty yogurt containers

## Implementation

### **Part 1: Water treasure hunt (20 min)**

Initiate a "treasure hunt" where two teams compete to find the special and secret treasure -- a bottle of water and cups. The path on the way to the treasure goes between different stations that relate to issues of water and their applications. Examples of stations can include: water pipes, outdoor taps, water fountains, garden or greenhouse irrigation, etc. Once the water treasure has been found, have the campers drink the water in the jug. As they are drinking ask:



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- Why is water a treasure?
- What do all the stations we passed during the hunt have in common?

Note: it is not necessary to prepare a complex game that requires a lot of prep time in advance. It is also possible to hide the treasure and hint the location using questions or as "hot/cold" game. If there is prep time available the teacher or even the students can divide into two groups and each group can hide the treasure for the other group. In this case it is important that the students not know what the treasure is. The teacher should ensure that the treasure is wrapped up thoroughly so it will still be a surprise.

## **Part 2: Water Conservation (25-30 min)**

- Ask the students to list the water sources in the vicinity of the class or even the school.
- Discuss the differences in usage (i.e. irrigation, drinking, industry, fishing, etc.).
- Ask: Do you know where the water from your tap at home comes from?
- Emphasize that the feeling of water abundance is actually very misleading. Introduce the film we are going to watch - *Chasing Water* (<http://vimeo.com/52955892>). It is a 12 minute documentary put together by the world class photographer, Peter McBride. This film, which won awards at the Banff International Mountain Film Festival, is all about water, specifically about the use and recession of the Colorado River.

But emphasize that this film could be about any number of rivers that supply your hometown's water. For example, if you're from New York, your water comes from primarily the Catskill mountains and the Delaware River. If you're from Boston, your water comes from the Quabbin and Wachusett Reservoirs. If you're from Houston, your water comes from Lake Houston, Lake Conroe, and Lake Livingston. Or if you live in Israel, depending on where you live, your water might come from the large freshwater lake the Sea of Galilee, or your water might come from desalinated sea water, or even from reclaimed or treated recycled water. In other words, as we watch this movie about the places fed by the Colorado River, we could potentially replace the situation of the Colorado River with other water systems.

- Explain that in Israel, a country where more than half of its territory is desert and its water sources are very limited, the water crisis and the need to save water is a hot topic. Note that this shortage has forced Israel to find creative solutions and in many ways has become a leader in the responsible water usage and has developed an innovative water-conservation industry whose products are used around the world.

## **Part 3: Water Sources in Israel (20 min)**

Spread a large map of Israel on the ground and ask campers to identify the country's water sources. Expand and explain the various water sources visible on the map.

Talk about other water sources that are hidden such as aquifers. You can demonstrate how aquifers contain water and explain about the landscape structure and watershed line.



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Ask for two volunteers and give them a long rope. Tell them about the route of the national water carrier, with the help of their teammates the volunteers should arrange the ropes to illustrate the route of the national water carrier: from the Sea of Galilee the carrier heads southwest, towards the Mediterranean. It continues along the Mediterranean coast until it reaches Rosh HaAyin north-east of Tel Aviv. At that point it splits into two sections: The first section continues along the coast and second section heads inland towards the Judean plain. Both sections intersect by the city of Ashkelon, at that point one section breaks east towards Be'er Sheva and ends at Tse'elim. While the other section heads west and ends near the coast, just north of the Mitspe Gvulot. Show the real map of the National Water Carrier route (Appendix 1) and compare the result to their map. Explain that the southernmost point of the National Water Carrier is Mitzpe Ramon.

- Ask for a volunteer - have him take another section of rope and mark the boundary of the desert in Israel.
- Demonstrate that more than half of the country is desert and explain how the boundary of the desert is defined: An area that receives less than 200 millimeters of rain annually. For comparison, bring some local precipitation data from the camp various U.S. states.
- Ask participants: How do you live with so little water? How do you get more water? What would you do?

## **Part 4: How to deal with water shortage in Israel? (25-30 min)**

Up until recently it seemed as if Israel was about to drain out its major source of fresh water--the Kinneret, which provided Israel with 70% of its drinking water. Sea level was almost down to the dangerous black line of -215 meters, when pumping water would be impossible and severe damage would be caused to the lake's eco-system. Ask: How to deal with water shortage in Israel? What would you do?

Offer two main strategies: with older groups ask participants to suggest their own strategies, use an explanatory approach to the younger groups.

1. Find other potential sources of water that can be used. Ask the participants to offer examples of potential water sources and add the following sources if they are not raised by the campers: reservoirs of treated wastewater and recycled water, desalinization plants that turn salty water into sweet water, biofilters, harvesting runoff, brackish water use.

2. Conserve existing fresh water where possible: ask participants to offer potential ways to conserve water, and add the following sources if they are not raised by the campers: water saving devices, dual flush toilets, drip irrigation, reuse of recycled water and treated wastewater, runoff water utilization, biofilters.

But today the situation is different. Show the following movie clip which presents new innovations developed in Israel to face that challenge and conserve water. As you play the movie, hand out pens and paper, and ask the students to list all of the innovations presented in the clip and choose one that they think is the most effective solution.



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View clip: <http://www.youtube.com/watch?v=x7G9v6JdYwc>

- Tell the campers that JNF provides more than 300 million cubic meters of water for various uses by means of over 250 reservoirs it has constructed.
- Explain the different types of reservoirs and their construction process.

## **Reservoir Construction Game**

Divide the group into teams and present a challenge: every team gets a shovel, a plastic bag filled with water, and a jug full of water. Each team must build a reservoir that is able to hold the maximum amount of water for five consecutive minutes. Allocate time for dig and construction and then have a competition. Sum up with the different types of reservoirs and related data.

## **Part 5: Research & Development (10 min):**

In the previous activity, we discussed another important source of water - recycled water. JNF is constantly reducing the consumption of water through agricultural research and development centers. Brackish water use can be used as an example:

Brackish water is water where the level of salts (chloride, potassium, and other salts) is higher than that of fresh water (drinking water) and lower than that of seawater (which is salt water). In Israel, in the southern Negev and the Arava, the underground water reserves consist of brackish water. In the north part of the country brackish water is found in springs, such as the Beit Shean Springs or the Nachal Taninim Springs. Brackish water is undrinkable; however, it can be used for industrial and agriculture purposes. In industry, brackish water is used for cooling machinery and other industrial processes. In agriculture, brackish water is used to irrigate crops, including palms, tomatoes, and grapes. In recent years, developments have been made in the growth of brackish water fish.

Brackish water usage has many benefits: irrigation with brackish water encourages the creation of sugars in fruit and creates fruits that are sweeter than those irrigated with freshwater; brackish water usage saves fresh water and improves the condition of the water economy in Israel.

JNF Research and Development centers are constantly working on the development of agricultural varieties suitable for irrigation with brackish water for the agricultural and environmental future of Israel.



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Desalination can be demonstrated as an additional way to increase available freshwater resources. In order to explain desalination to the students, conduct the following experiment: dissolve salt in a pot of water, then boil the salt water until steaming. Cover the pot with a cold cover. Collect the droplets that condensed on the cover and taste them - the sweet water will have evaporated, leaving the saltwater in the pot.

### **Summary (5 min):**

In today's activity we've learned that water shortage is a global problem that affects all of us, even here at school. Israel, which is mostly desert, suffered from this problem severely, but innovation, creativity, and investment in Research and Development has led us to find potential solutions to this problem, and today Israel not only has solved its water shortage, but it also exports these innovative solutions and helps other countries solve their own water problems.



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**Appendix 1: Water Audit Form**

LOCATION OF ASSESSMENT:

WHAT ARE YOU MEASURING:

AMOUNT OF WATER USED IN 1 MINUTE:

WHAT ARE YOU MEASURING:

AMOUNT OF WATER USED IN 1 MINUTE (OR IN TOTAL):

OTHER OBSERVATIONS:

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LOCATION OF ASSESSMENT:

WHAT ARE YOU MEASURING:

AMOUNT OF WATER USED IN 1 MINUTE:

WHAT ARE YOU MEASURING:

AMOUNT OF WATER USED IN 1 MINUTE (OR IN TOTAL):



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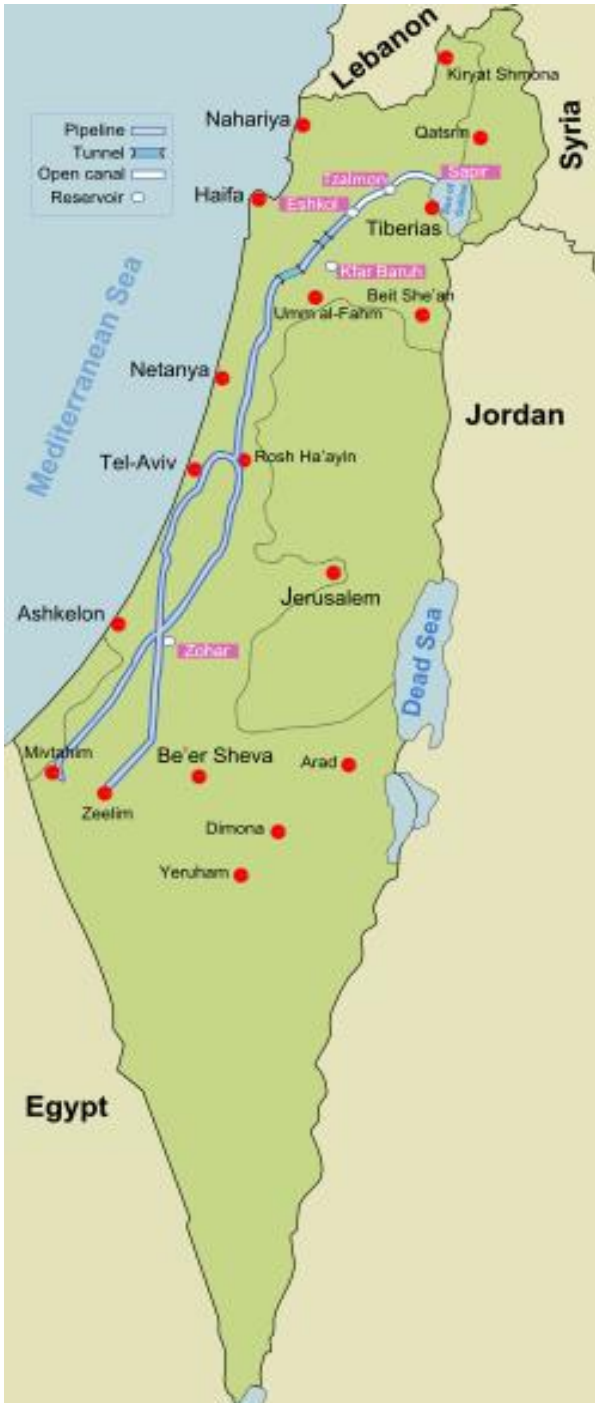
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## Appendix 2: Map of the National Water Carrier



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