

Resource Guide for Environmental Educators

GOOD WATER NEIGHBORS

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GOOD WATER NEIGHBORS RESOURCE GUIDE 2013

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EcoPeace / Friends of the Earth Middle East (FoEME) is a unique organization that brings together Jordanian, Palestinian, and Israeli environmentalists. Our primary objective is the promotion of cooperative efforts to protect our shared environmental heritage. In so doing, we seek to advance both sustainable regional development and the creation of necessary conditions for lasting peace in our region. FoEME has offices in Amman, Bethlehem, and Tel-Aviv.

To read about our organization, download the full .pdf version of the Guide, and to access all publications, go to www.foeme.org

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INTRODUCTION

The Good Water Neighbors project by EcoPeace / Friends of the Earth Middle East (FoEME) has been operating since 2001 in Israeli, Palestinian and Jordanian communities who share a transboundary water resource.

The Good Water Neighbors Resource Guide for Environmental Educators is the natural extension of the book, "WaterCare". Taken together, they constitute the part of the educational program on the topic of water as a shared resource for neighboring communities. The program includes experiential activities which allow youth of junior and senior high school ages a learning and familiarization process on topics related to the resource of water in order to promote conservation, shared responsibility and interests in regional management of this resource. The Resource Guide is also geared at developing tolerance and openness among neighboring communities in Israel, Palestine and Jordan, and understanding the vast, inherent potential of the environment and of water as a tool of mediation and connection among these communities.

The Resource Guide focuses on regional and cross-border areas but activities can be equally implemented at localized levels.

Objectives of the Good Water Neighbors Resource Guide

- To complement and make educational materials accessible on the topic of water with a regional perspective
- To arouse critical thinking on the topic of water and environmental management
- To provide tools for field work on the topic of sustainable management of water resources
- To provide tools for environmental activism towards reducing the water crisis at local levels
- To provide tools for peaceful environmental dispute solving
- To rouse curiosity about and desire to meet neighbors of the same age who live in neighboring communities beyond the border
- To inspire respect and appreciation for the environment, for water, and for other people

The ideas for the Resource Guide grew from efforts by community coordinators in the FoEME organization. The guide is the outcome of joint brainstorming and writing by the Israeli, Palestinian and Jordanian educational team. As with any process in the Middle East, this guide is also the result of a long, complex path encompassing data collection and processing, adaptation to different cultures, coordination and translation. Relative to linguistic editing, we made every effort towards gender equality without damaging the text's flow, and sought inclusiveness of female and male students. When it comes to actually implementing the guide's activities, you are invited to adapt your approach to your group's members as you see fit.

We hope this Resource Guide will serve you in inculcating the values of respect for water and good neighborliness, that it will empower experiential facilitation, and will deepen and expand the circle of partnerships seeking a better regional-environmental future.

With best wishes, "Good Water Neighbors" Education Coordinators

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ASSIMILATING THE REGIONAL PERSPECTIVE IN EDUCATION TOWARDS SOCIO-ENVIRONMENTAL ACTIVISM

ECOPEACE / FRIENDS OF THE EARTH MIDDLE EAST

The environmental transboundary challenge

If each of us lived on a desert island, our reciprocity with the environment would be fixed by the availability of resources, and our needs. The complexity in organizing and managing environmental resources derives from the fact that they're shared by an increasing number of people from diverse societies, cultures and political entities which are often in conflict with each other. Tensions and complications heighten when it comes to natural, transboundary resources such as water.

Water is an existential resource for all peoples and despite its sensitivity and great value, it's a resource often forgotten and neglected, polluted and in short supply. The challenge in managing transboundary water resources derives, on the one hand, from its status as fundamental to resource disputes that cause conflict, and on the other hand, from it being the basis of cooperation and promotion of good neighborly relations.

Coping with this challenge is the Friends of the Earth Middle East organization's starting point. The organization's activities are typified by emphasizing our mutual dependency – Israel, PA and Jordan – when referencing the shared resource of water. Mutual dependency requires collaborative management. In seeking to turn around the status quo in this area, where "game total" is zero for all sides, especially when it comes to protective water sources and sharing the resource, the organization operates to instill a regional vision based on the principle of sustainability, and works to address the interests of all sides, including that of nature itself. Based on our organization's methodology, to prevent narrow perspectives relative to water, the challenges and needs of all those involved must become more deeply understood by ourselves and our neighbours, and the improved familiarization should be the starting point for shared thinking on solutions appropriate to all sides. Clearly, environmental activism must be inseparable from social activism since both are founded on acquaintanceship, respect and understanding towards the environment and its partners, through ongoing dialogue among the cross-boundary communities.

Expanding the circle of linked youth

The organization's work with local communities demonstrates the links between environment, society and the economy, as well as the need to work within a finely balanced web. Gaining a regional perspective expands the holistic perspective relative to the limitations of the ecological system. For youth in the formative years of identity consolidation and establishing their place in various groups of belonging, experiential learning on regional environmental issues allows them to expand their sense of belonging to include their immediate environment's watershed and its diverse complexities. Deepening the ties and exposure to the water basins' complex environmental reality encourages them to ask questions, examine interconnections, and promote critical thinking about things considered obvious, normative and unchangeable. An important component throughout this educational journey is the presentation of great challenges as opportunities for improvement and change, chances for dialogue and interaction, and a means of attaining constructive cooperation with neighboring communities who are coping with the very same issues beyond the border. No, the process isn't easy. It's paved with obstacles and hurdles of a cultural and political nature, but acquiring knowledge and increasing awareness, integrated with personal and practical experience and experimentation, develop activist capabilities in our youth.

How can we translate worldview into educational opportunity?

1. Maximization of dynamic interactions and self-exploration, and minimization of frontal learning. This allows youth to create connections, express critical views, develop creative thinking, and more. Examples of the methods employed include: structured discussion, simulation, role play, field work, building models, mapping hazards, and more.

The year-long Good Water Neighbors program assists in studying issues such as ecology, water and peace that arouse the interest of youth, who are exposed to a range of contexts on environmental issues where the focal point is water as a resource. Areas covered include topography, climate, geomorphology, hydrology: these are basic areas of knowledge needed to ask questions about the quality of water, health, development, city expansion, agriculture, waste disposal, sewage treatment, and purification. The students are encouraged to cope with questions such as fair division of water, infrastructure, price setting, resource privatization, ownership, saving, storage, and of course responsibility and decision making.

We warmly recommend that you get out of the classroom, choose the topics that interest the students most, allow them to express their honest opinions and criticism, and guide them towards means of implementation.

2. Meetings based on a broad common denominator among youth from different populations allows them to familiarize "up close" with their peers who live nearby in Palestine, Jordan or Israel.

Personal acquaintance with other youth who have different lifestyles, conditions of living and attitudes, highlights the complexity and importance of diverse aspects studied in the group activities. Intercultural dialogue requires a trust building process, which makes it vital to prepare the students before they meet others from a different culture (i.e. nationality) who have undergone a similar learning process. In the joint activities of workshops such as mud building, youth camps and multicultural (multinational) outings, a process of shared learning and creation occurs through questions asked, changing preconceptions, searching for shared interests and emphasis on the geographic and environmental connection among the youth. Coping with the difficulties arising through intercultural encounters requires drawing conclusions and improving educational processes.

- **3. Setting a personal example.** The Israeli-Palestinian-Jordanian educational team's personal connections and cooperation constitute a role model and demonstration for the youth of the possibility of managing shared areas of interest together, despite the existence of conflict. Structuring cooperation in the education team requires ongoing training and periodic meetings.
- 4. Creating the space that allows for activism means being actively able to implement the ideas: ecological building, leading community campaigns, creating films and maps, recording a song, guiding young classes, active class breaks, internet meetings through Facebook, writing blogs, and more.

In summary, the experience undergone by these adolescents contributes to their sense of belonging, of building mutual trust, and of enhancing their own self-confidence in their abilities to lead change in perceptions and outlooks, which in turn leads to change in modes of action and decision making. Raising awareness, together with mutual trust, allow for the existence of activism.





FOEME'S PRINCIPLES ON THE TRANSBOUNDARY ISSUE OF WATER

Four principles

Rationale

All the activities in the Resource Guide are geared at reflecting and/or translating and/or explaining one or more of the foundations forming the Friends of the Earth Middle East's principles relative to water. Our goal is that students will learn the program and internalize the approach as a totality of guiding values through analysis of transboundary water issues. The principles are listed below but no significance should be placed on their order of appearance.

1. Water is a natural, mobile resource: water flows over and beneath political borders

- Water can't be "cut" like, for example, a slice of cake. Therefore, water can't be divided among countries that share the same watershed. The divisional approach can be applied when we refer to land, for example, but not in the case of water.
- Traditional legal approaches to allocation of water resources, such as the "Firstin-time First-in-right" approach, are being gradually exchanged for more innovative approaches that emphasize the shared commitment derived from use of water, and which protect the resource of water in a more fair and just way, for the purpose of preventing harm to neighboring countries.
- Water can be reused over and over from the moment it appears as precipitation and until it flows back to the sea and/or deep aquifer and/or evaporates.

2. The right to water and sanitation are basic human rights and not a consumer product

- Clean drinking water and appropriate sanitation are necessities for realizing basic human rights.
- The laws of water allocation must be sufficiently flexible to allow for long term changes in needs and changing circumstances, and must not be formulated in terms of fixed, absolute percentages. It is reasonable to assume that a quantitative allocation that seemed just at the time of formulating an agreement will not be just relative to one or the other party at some future point.

3. It is vital to ensure the continued existence of water resources and protect the ecological system

- Ecological fresh water systems (aquatic habitats) are particularly important, especially in arid areas. This is because they supply a large range of services for the field units compared to terrestrial systems: they serve humanity, natural and environmental resources, and much broader ecological systems that rely on a source of water, such as the gazelles, birds and eagles that need springs and aquatic habitats that these waters create.
- In arid and Mediterranean climates, aquatic habitats allow for the existence of a rich and unique range of species that cannot exist without these habitats. Some of these species are endemic (unique to a particular area).

4. Water disputes must be resolved peacefully through mediation among the involved parties

- International experience has proven that settling water disputes often leads to settlement of disputes in general through dialogue, rather than exertion of force. In the past 50 years, 37 violent disputes over water were registered, compared to 150 agreements signed. These agreements carry weight since they develop into stable and expectable international water relations.¹
- Resolving conflict over water means identifying the needs of each of the parties involved and mapping alternative solutions that may address these needs, while maintaining balance between the said parties and the ecosystem.

¹ See http://www.unwater.org/water-cooperation-2013/water-cooperation/facts-and-figures/en/



CHAPTER ONE THE LEGACY OF WATER





THE LEGACY OF WATER

INTRODUCTION

Since earliest times, water was considered the basis of society. Humans congregated around water, which also served as transportation and trade routes. Even before the development of human culture, bodies of water were a vital component of evolution. We find ancient fossils in layers of stone which indicate that aquatic habitats were filled with diverse creatures that have since become extinct.

Throughout history, bodies of water such as rivers, oases, seashores, lakes, springs and channels served as an essential resource for plant life, animals and humans. Ancient cultures thrived around bodies of water, establishing complex social systems. Bodies of water were meeting points, transport routes, sources of energy and irrigation, places to bathe and wash clothes.

It's no surprise that water features as a formational element in source texts and ancient writings, in the creation narrative and other biblical stories, in folklore, poetry and in works of modern times.

In the book of Genesis, water features even before the appearance of light:

1. In the beginning, God created the heavens and the earth. 2. And the earth was yet unformed, and darkness was upon the depths; and the spirit of God hovered above the waters. 3. And God said, "Let there be light," and there was light....

In the Koran, water appears in the Alanbeiaa Sura, verse 30:

30. And from the water we created every living thing.

In the New Testament (Matthew 3:16) water becomes sanctified during Jesus' sanctification by John the Baptist in the Jordan River:

16: When He had been baptized, Jesus came up immediately from the water; and behold, the heavens were opened to Him, and He saw the Spirit of God descending like a dove and alighting upon Him.

The most ancient love stories also occur near water: Jacob and Rachel are linked by the well, and a similar narrative appears in the Koran relative to Moses and Tzipporah.

However, despite ancient water cultures, there is a real threat to ancient water systems. Remnants of flour mills, aqueducts, water tunnels, irrigation systems and wells are scattered throughout almost every settlement, and are painful reminders of the price paid for the "development over conservation" approach. Changes to bodies of water have a strong impact on nature and landscape, as well as on our ties to our rich and ancient cultural legacy.

This chapter contains five activities aimed at renewing the emotional, cultural and historical connection between us and water, and the most basic common denominator linking all people. The activities emphasize the primal shared legacy of all religions in our area, by:

- Establishing and consolidating an active group of "water trustees"
- Reviewing water in language, literature and poetry
- Exploring the world of images linking water and love
- Historical study and follow-up on local water systems and coping with questions of conservation or development
- "Water Not what you thought it is" Out of the box thinking on water



1.1 WATER TRUSTEES



Objectives

- Familiarization with FoEME
- Establishing and consolidating an active "water trustees" group
- Personal and emotional connection to water

Outline

This activity is intended for the start of the year and the commencement of the Good Water Neighbors program. The activity lets students encounter FoEME for the first time through games and a brief experiment which will get them thinking about the deeper connection between themselves and water.

Materials

- Empty water bottles
- The FoEME emblem
- Personal photograph of each participant taken in or near water
- Map of FoEME communities (in Appendix 1)

Opening and warm-up

The names bottle – for the first round, participants stand in a circle and pass the water bottle from one person to the next, saying their own name as they pass it on. In the second round, participants receiving the bottle say the name of the person who passed it to them. In the third round, they pass the bottle in exactly the same way and order but add a short question, such as: When is your birthday? How many siblings do you have? and so on. The introduction game can be made livelier by bringing a second bottle into the circle.



What's in the emblem? Present the FoEME emblem and ask students what can be learned of the organization through it. Answers should point to cross-boundary environmental activities in areas with a water shortage; cooperation among parties can lead to positive outcomes (like sweet dates).

Next, explain to the students that this year they will be part of the Water
 Trustees group, and that they'll be going out on water related adventures

together in the Middle East.

Main activity session

Pictures of water. Each participant brings a photo of her- or himself in a water environment. Participants sit in a circle and spin a bottle. When the lid stops facing someone, that person talks about the event or circumstance of the photograph, and her or his personal connection with the topic of water. In cases of large groups, it's recommended to split them into circles. Alternative activity: in the center of the circle place various water related pictures (examples in appendices).

Truth or dare. Three participants sit facing the rest of the class and talk about an interesting, strange or amazing experience in the context of water. All three need to talk about their stories very convincingly and as dramatically as they can, but two of them must make up stories and only one of the three tells a true story. The class needs to decide which of the stories is true. **Closed circuit irrigation.** The task is to develop a pot for plants that waters itself independently!

Materials

- A bottle cut in half
- Seeds or plant
- Earth
- Sticky tape
- Waterproof markers
- Shoelace or thin strip of cloth
- Water

Photograph: Gundi Shahal, Ein Gedi Eco-Park

Conducting the experiment

- Cut a bottle halfway up its height
- Make a hole in the bottle top and pull the cloth or shoelace through it
- Take the upper half of the bottle and fill it halfway with earth
- Fill the lower half of the bottle with water
- Position the half bottle holding the earth so that the bottle top and cloth or shoe lace face down and into the water. The cloth or shoe lace act as a root providing the plant with water. Plant a seed or seedling in the earth.
- Decorate the bottle and label it.
- Place it on a windowsill in the sun.

Notes in a bottle. All participants write down on a note what their expectations are of the coming year's activities, and insert them into a bottle. At the end of the year the water trustees can open the bottle and check if their expectations were realized.

Summary

Discussion questions

- What place does water hold in our lives?
- Do we devote any thought to water in our daily lives?
- Do any of the participants feel like a fish in water?
- Are any of them afraid of water?
- Have you ever seen a polluted creek?

Map of the FoEME communities.

Using the map (Appendix 1), show that 28 communities in Israel, Jordan and Palestine are partners in the Good Water Neighbors project and that youth from these communities are studying the exact same program and undergoing water trustees training. Convey the message to the students that the program's objective is to create a young generation of environmental leaders who have in-depth familiarity with the topic of water. The objective will be realized through trips, mapping environmental hazards, consolidating an environmental campaign, and by part of the group that will represent the organization in the regional youth camps.

The discussion should end with the conclusion that water is a basic need for our existence, but also part of our experiences, emotions, memories and dreams.





Good Water Neighbors Communities, FoEME

The Good Water Neighbors program was established by FoEME in 2001, seeking to raise awareness of the water problems shared by Israel, Jordan and Palestine. The project is conducted in 28 neighboring communities on both sides of the borders that share water resources (creek, aquifer, and so on). People of the Middle East, and especially those of Jordan, Israel and Palestine, depend on shared water resources for the existence. Nonetheless, we see continuing neglect and pollution of these water sources. Water crosses boundaries and constitutes the basis for educational activity and creating dialogue and cooperation towards seeking shared solutions to the problem, while building a bridge and relations of trust between the communities on either side of the border.

Watch the film (14 minutes) about The Good Water Neighbors Project².

² See http://www.youtube.com/watch?v=BiGOpeOH V8

1.2 WATER WORDS

Objectives

- Motivating creative thinking about water
- Writing texts about water

Outline

Many idioms and proverbs are linked to water. In this activity, students learn new idioms, enrich their vocabulary, and experience the process of creative writing on the topic of water.

Materials

- Water paints
- Sheets of paper

Opening and warm-up

Match each idiom to its meaning. Then divide the students into groups; each group chooses one idiom and prepares a presentation or pantomime to the class. The other participants need to guess which idiom is intended.

	ldiom		Meaning
1	Storm in a teacup	А	Getting very angry or worried about something that isn't important
2	Cast your bread upon the waters, for you will find it after many days	В	To do good without expecting gratitude or reward
3	Like water off a duck's back	С	Without any effect
4	Like a fish out of water	D	To feel awkward/uncomfortable in a situation you haven't experienced before
5	Still waters run deep	E	A quiet manner may conceal a more passionate/turbulent nature
6	A drop in the ocean	F	A quantity too small to make a difference
7	Blood is thicker than water	G	Relationships within a family are the strongest and most important ³
8	To be in hot water	н	To be in trouble, or a difficult situation
9	Water under the bridge	I	Something that occurred in the past that is no longer important or troubling
10	You can lead a horse to water, but you can't make it drink	J	You can give someone the opportunity to do something, but you can't force them to do it.

3 This idiom is commonly misused, as its original meaning was exactly the opposite: the blood covenant of soldiers who fight together on the battlefield is stronger than the waters of the womb (i.e. family relations).



Main activity session

Each student makes at least 10 very large drops by dripping water, or using water colors, on an A4 sheet.

Once they have dried, each student writes an association in each of the drops. Associative words can be a thought, feeling, color, animal, activity, plant, memory or anything else that is relevant.

Students split into small groups and produce a word tree that links the association by category: for example -



The groups will link the different word trees until a web of water related words is produced.



Students will then split into pairs or individuals and will compose a song / story / proverb / message on water. At the end of this activity, the works can be hung in the classroom.

Summary

A story in installments. Students sit in a circle. One student receives a piece of paper

folded into an accordion. On the first fold she or he writes a sentence that includes the word "water." The last word of the sentence must appear in the next line. Fold the paper so that the next student can't see what the previous one wrote; now this second student writes a sentence that contains the words "water" and the last word of the previous sentence somewhere in the new sentence. Continue with the rest of



the students in this way. In the end an odd narrative is produced that may have no connection between its sentences but all the sentences are linked by the word "water."

1.3 WATER AND LOVE

Objectives

- Motivating creative thinking about water
- Connecting personal lives and the topic of water

Outline

A great many ancient love stories occurred in contexts of water, such as the Biblical story of Jacob and Rachel at the well, and the meeting between Moses and Tzipporah as described in the Koran. The objective is to reveal the many parallels between water and love: depth, clarity, power, force, and so on.

Materials

- Projector
- Computer with internet connection
- Loudspeakers
- Cards shaped like drops of water
- Bible / Koran

Opening and warm-up

Watch a scene from the movie "The Source"⁴ or the entire movie.

Main activity session

From the book of Genesis, chapter 29, read the love story of Jacob and Rachel at the water well, where Jacob, using almost super-human strength, moves the heavy stone covering the well so that Rachel can give her sheep water to drink.

10 And when Jacob saw Rachel, daughter of Laban his mother's brother, and the flock of Laban, his mother's brother, Jacob approached, and rolled the stone from the well's opening, and gave water to the flock of Laban, his mother's brother. **11** And Jacob kissed Rachel, and raised his voice and wept. (Gen. 29:10-11)

Alternately, read the story of Moses and Tzipporah from the Koran.

Together, analyze the role of water in the biblical love story. The author Meir Shalev wrote a very refreshing analysis of the narrative in his book, "Bible Now"⁵.

Ask the students to write on their water-drop cards sentences that in their view express the connection between water and love, traits that water and love share, similarities and differences between water and love (e.g. true love is as deep and clear as water).

Conduct a discussion where each student in turn explains what she or he has written on the water drop cards. Make a hole in the cards, thread the expressions of love on a piece of string or thread, and hang them around the classroom.

Ask the students to write a story at home that connects love and water.

Summary

Project "A local love song"⁶ written and recorded by water trustees from Jordan and Israel, about two rivers, the Jordan and the Yarmukh.

⁶ See http://www.youtube.com/watch?v=aqnfMfeJgC4&feature=youtu.be



⁴ See http://www.youtube.com/watch?v=UwanQtCJGeM

⁵ Shalev, Meir (1985). Bible Now (in Hebrew). Israel: Schocken Publishing

1.4 ANCIENT WATER SYSTEMS

Objectives

Historical investigation of ancient water

systems in the community

- Familiarization with the "community elders" and their memories of water systems
- Coping with questions of conservation versus development



Outline

This activity divides participants into small groups that will investigate ancient water systems in the community, such as streams, springs, wells, flour mills, channels, levees. The groups will interview the community's elders, will prepare the "axis of time" relative to water systems, and will formulate a forecast pertaining to the future of water systems while analyzing the forecast's consequences for the community and the ecosystem.

Materials

- Reed stalk
- Map of the settlement
- Internet
- Camera

Opening and warm-up

Bring to class a reed stalk that grew in a creek or swamp and tell the following anecdote:

The stalk of the reed is marked by joints. In ancient times, the reed served as a measuring tool for dividing water needed for irrigating agricultural crops. The phrase "standard of measure" has come down from that ancient measuring tool: a reed or cane, where the joint marks were used by farmers to open and close sluices or valves that directed the flow of water through irrigation channels. These marks on the cane or reed let the farmers check how much water was coming from the main supply source, just like a water meter in our times. To this day, in the village of Batir, west of Bethlehem, this



ancient culture is preserved and used for watering the agricultural levees using a system of pools and channels.

Check the map of your location and ask students to choose one of the water systems as the topic of a group study. A water system can be a wadi*, creek, natural lake, pool, or winter puddle, water channels, springs, flour mill, well or ancient levee.

* A wadi is a valley, gully, or streambed that remains dry except during the rainy season

If it's possible, visit one or more of the bodies of water before beginning the study. A visit of this kind will give the students a more comprehensive picture of the state of local water systems.

Main activity session

- 1. Divide the students into small groups. Allocate a role to each student within the group so that each student is responsible for a particular area of knowledge connected with water systems (e.g. botanist, zoologist, hydrologist, anthropologist, archeologist, historian, economist, planner). Fixing areas of knowledge helps structure the historical totality of water systems and encourages the students to develop research abilities.
- 2. Students should define the sources they need for their investigation, such as:
 - Local residents, especially the older ones familiar with the local nature, landscape, and heritage
 - People in their communities who are experts or professionals in any of the relevant areas of knowledge
 - Sources of information: internet, library, archives, old newspapers, and more.

Even though each student is studying a specific area of knowledge, it is very possible that others in her or his group could be assisted when this knowledge is shared, especially when it comes to the personal interviews.

- 3. Every participant defines three main investigative (research) questions before setting out to collect data. Recommend that students take a camera or video with them wherever possible.
- 4. On completing the data collection stage, each group gets together to:
 - organize, analyze and summarize its materials
 - consolidate a text describing the original role of the water system it investigated, including changes that have occurred to it over time
 - the impact and consequence of these changes to the community, the ecosystem, the landscape, and the current state of the water system
 - and lastly, what can be expected to happen to it in the future
- 5. Timeline: The group members prepare a timeline, recording the information chronologically and the changes occurring to the water system over the years. Then tie a rope from one side of the classroom to the opposite side, prepare cards (preferably with pictures) representing the different periods of time that the body of water has endured, and hang the pictorial cards chronologically using clothes pegs.



6. Alternately, group members can prepare a clip or presentation describing the story of the water system it investigated.

Summary

Conservation versus development

Hold a discussion in the classroom about the future of water systems: how would the students want to see the particular place they investigated in 10, 20 and 50 years' time? What advantages and disadvantages are there to conservation? What are the advantages and disadvantages of development?



- Describe to the students the state of a water system in a neighboring community (Jordan, Israel or Palestine). Think about how the state of that water system impacts the lives of the neighboring community, and what is common to both communities.
- Try to set a meeting with the responsible authority at the local level (e.g. local council planner) to hear what she or he has to say about plans for the future and their relevant considerations.
- Hold a vote for / against the area's development plan, or have the students present an exhibition with an alternative plan.
- You can go one step further and begin a local campaign rousing support for the preferable plan.

1.5 WATER - NOT WHAT YOU THOUGHT IT WAS

Objectives

Brainstorming in several areas linked to water and preparation for the coming sections.

Outline

Studies in school on water often cover only the most basic aspects, such as how nature recycles water, the amount of precipitation, and how to save water. This activity aims to "open the mind" to seeing the multiple contexts of water in our lives.

Materials

- Board
- Paper

Opening and warm-up

Draw nine points on the board in three rows of three dots to form a square. Ask students to copy them onto their pages, and join them using only four lines and without raising their pencil from the page. Lines can cross over each other. Give them several minutes to cope with the task. Hint: they need to think "out of the box."

Pay attention: some students will try once and give up. Some will try repeatedly without despairing, and others might find the solution on their first attempt.

Solution for the facilitator: the idea is to go outside the borders, i.e. not to end the line at a point but to continue it further in order to create an angle that will allow continuing.

Main activity session

What is the connection between the graph you've made, and water?

Water is a complex topic. Behind each glass of water is a long story with multiple links. This is why it's necessary to think out of the box and go beyond the expected limitations if we want to find creative solutions for water issues.

Demonstrate a range of water related topics on the board by drawing new lines inside the shape and creating new "areas" linked to water. Conduct a brainstorming session with the students and write titles inside these new shapes, such as culture, neighbor relations, consumption, ecology, tourism, economy, health, underground aquifer, farming, and more.

Summary

Summarize the activity with the statement that over the coming year, we will all be doing a lot of out of the box thinking about water, and learning about many of the areas that this activity has revealed.





Upstream Jordan River, Summer Camp 2013. Photograph: Gundi Shahal

APPENDICES CHAPTER ONE



















CHAPTER TWO TRANSBOUNDARY WATER



The Lower Jordan River

INTRODUCTION

"As I travel around the world, people think the only place where there is potential conflict [over] water is the Middle East, but they are completely wrong. We have the problem all over the world." (Kofi Annan, United Nations Secretary General, 1997 – 2006).

A watershed is a geographic entity defined by the drainage divide. Water in the basin's region drains from tributaries into one main river flowing to the sea or a lake; the sea or lake is the watershed's base. Another type of watershed is the aquifer, an underground reservoir of groundwater caught between layers of rock. The aquifer may be linked to a surface basin, and generally drains into a spring that spills into one of the tributaries or into the watershed.

Israel, Jordan and Palestine straddle a limited geographic area comprised of shared water basins, including the Jordan River, the Dead Sea, the mountain aquifer and the coastal aquifer. Experience has shown that division of water in a rigid, fixed manner, as though it were a slice of cake, and allocation among countries sharing the same watershed, is not sustainable. This approach is relevant for division of ground area, for example, but doesn't apply to water, simply because unlike land, which is fixed in place, water will continue to flow, ignoring all political borders. For this reason, traditional approaches to the allocation of water resources are slowly being replaced by solutions that emphasize the commitments which are inherent to making use of shared water resources. These solutions focus more on considering the diverse needs of both the human parties involved and the ecosystem.

In our arid climate, all the watersheds are subject to water stress which will become exacerbated in the future due to population growth and changes in global climate. Beyond that, the governments of Jordan, Palestine and Israel take advantage of the shared water resources with divergent levels of responsibility which also happen to be unsustainable. The political dispute among the parties causes erroneous allocation of natural resources, prevents enforcement of supervised pollutants, and prevents sustainable management of these shared water resources.⁷

An example of a transboundary watershed in our region is the Lower Jordan Basin, a river sacred to three religions. It drains tributaries from Syria, Jordan, Israel and Palestine, and ends in the Dead Sea. The Lower Jordan River is a sad example of the transboundary resource's mismanagement. Currently, less than 5% of the historical volume of water flows into the fenced-in, polluted lower river.

These trends are found all over the world. 145 countries of the world, which constitute more than 75% of all countries, share transboundary watersheds.⁸ Borders set by people stretch political lines across watersheds, but no one can change the direction of water (or sewage) flow. This chapter turns the abstract concepts of "surface water", "groundwater" and "watershed" into tangible concepts, and describes the numerous human contexts relevant to transboundary watersheds. The goal is to instill an understanding in the students that water is a shared and scarce resource. Activities in this chapter include:

- Experiments to visualize the relationship between rainwater, runoff, and groundwater
- Exercises and critical discussion vis a vis the question: is water really a renewable resource?
- Structuring a model of the local watershed and presenting its transboundary relevance
- The game "whose water is this?" simulating life in the watershed. The background materials on these concepts are summarized in the book "WaterCare"⁹, pages 1-40.

8 See http://www.unwater.org/wwd09/faqs.html



⁷ Retrieved from a FoEME publication entitled "Why Cooperate Over Water?" 2010

⁹ See http://www.watercare.org/WaterCare/textbook/textbook-eng.html

2.1 SCARCE WATER

Objectives

A brief exercise demonstrating the scarcity of fresh water across the face of the earth.

Background

Most of the water on earth is salty or frozen. Fresh water* is less than 3% (!) of the total water on earth. Of this miniscule percentage, more than 77% is trapped in icebergs, making them inaccessible for use. If we could compress all of earth's water into a 200 liter container, the amount of fresh water available to us from groundwater, rivers and lakes would not be more than one single tiny spoonful!¹⁰

Preparatory reading:

"WaterCare", pages 3-8.

* Sweet water is a synonym for freshwater

Materials

100 beans / peas



Water level ruler in the Ziglab dam, Sharahabil Bin Hassneh Eco- Park, Jordan

Opening and warm-up

Explain to the students that the beans or peas represent all the water on the face of the earth

Main activity session



Ask the students to divide the peas/beans into 3 categories, in the same ratio as the percentage of water for each category.

Note: The three categories are fresh water, frozen water and saltwater. **Answer:** The ratio is 97 (saltwater) : 2 (frozen water) : 1 (fresh water) Now think about the following data:

Over the course of 100 years, a water molecule spends 98 years in the ocean, 20 months in ice, 2 weeks in rivers and lakes, and less than one week in the atmosphere.¹¹

Summary

- What have we learned from this exercise?
- Are these results surprising?
- What additional questions arise from this exercise?

In the coming classes we'll study the nature of fresh water more deeply.

¹⁰ See http://www.watercare.org/WaterCare/textbook/textbook-eng.html

¹¹ Lenntech website: http://www.lenntech.com/water-trivia-facts.htm

2.2 SURFACE WATER

Objectives

Conceptualizing the link between the amount of precipitation and surface water. Students will think about the annual precipitation which could hypothetically be collected around their school area, so that they can understand where the water "disappears."

Outline

Surface water is the quantity or percentage of rainfall which doesn't infiltrate or evaporate, but instead flows on the earth's surface or in channels of some kind. The amount of surface water in the Middle East is a naturally small volume. In urban areas, the ground is covered by cement and asphalt, which raises the ground level and prevents rainwater from permeating the soil. Instead, it accumulates as surface water, and is directed into localized channels or drains and very often causes flooding and damage. In the activity presented below students will measure the school grounds, and the type of ground coverage. They will calculate the amount of potential surface water and discover where the water flows after rain has fallen: on the ground, into a wadi, or into runoff drains.

Materials

- Tape measure
- Math exercise book
- Writing tools
- Calculator
- Assistance from the math teacher 🤅



"WaterCare"¹² pages 9-18, 32-40, 49 Rainfall Collection,¹³ The Green Web & Partners

Main activity session

- Measure the school's campus.
- Prepare a detailed draft with the area of buildings, area of playgrounds or yards covered in asphalt, and areas that are not covered but are open ground.
- Check the average annual precipitation (millimeters) using the table presented on the Israel Meteorological Service site.¹⁴ Deduct 20% of the annual precipitation figure to account for evaporation.
- Calculate how many Olympic pools could be filled if all the rainwater falling on the school grounds was collected.

Example:

The "Broshim" school campus is situated on 3 dunams of land. The school is in northern Israel with an annual precipitation of 500 millimeters. The average annual precipitation in the school's area, after deducting evaporation, is: 400 mm = 40 cm = 0.4 m





¹² See http://www.watercare.org/WaterCare/textbook/textbook-eng.html

¹³ The website for Rainfall Collection in Schools http://www.rainwater.org.il/document/109,70,50.aspx

¹⁴ See http://www.ims.gov.il/IMSEng/CLIMATE/LongTermRain/

- Calculation:
 3 dunams = 3000 sq.m
 3,000 sq.m x 0.4m = 1,200 cubic meters.
- Calculation of Olympic pool An Olympic pool is 50 meters long x 25 meters wide x 2 meters depth = 2,500 cubic meters

In other words, the average annual precipitation in the Broshim School's grounds is enough to fill half an Olympic pool!

Or, in other words, 1,200 cubic meters of water = average annual domestic water consumption for **20 people** for **one whole year!**

Analysis of findings and questions for discussion

- What really happens to all this water? Some seeps down through the ground into the groundwater, but usually, most of the water in built up areas flows into drains and from there to the local channel, and some of it continues all the way to the sea.
- What do you think needs to be done with the water? Ideas include: infiltration into groundwater, collection in tanks for the summer, use in toilets, redirection into wadis, etc.
- What are environmental impacts of the different actions you've suggested?
- Prepare a poster summarizing the findings, and offering recommendations for handling surface water; and/or prepare an exhibition and present it to the local planning authority in order to receive feedback.

A drop of thought

The largest surface water reservoir in our area is the Kinneret (Sea of Galilee), also known as the lowest freshwater lake in the world, at 210 meters below sea level!

The Sea of Galilee holds an important function in the peace agreement between Israel and the Hashemite Kingdom of Jordan, signed on 25 July 1994. Section 6 of this agreement deals with "a comprehensive sustainable agreement covering all water issues" between the two countries. Among other things, it was agreed that every winter, Israel would store water from the Yarmukh River in the Sea of Galilee, and return them to Jordan during the summer months via a pipe from the Degania Dam to the Yarmukh Stream, and from there to the Abdullah Channel.

This is an example of the concept that "the issue of water can constitute a basis for promoting cooperation" between neighboring countries.

More information and the full agreement is on the Knesset (Israeli Parliament) website.¹⁵

15 See http://www.knesset.gov.il/process/docs/peace-jordan_eng.htm

2.3 GROUNDWATER

Objectives

- What is groundwater?
- What happens when too much water is pumped out?
- Is groundwater a renewable resource?

Outline

This activity demonstrates the aquifer's structure, and how water infiltrates and is collected.



Diagram from http://findwaterfirst.blogspot.co.il/2012/09/aquifers.html

Preparatory reading:

- The "WaterCare"¹⁶ Book pages 21-33
- Good animation¹⁷ from the American Environment Protection Agency (EPA)
- Expansion on the mountain aquifer shared by Israel and Palestine at the end of this activity.



Materials

- Plastic bottle
- Exacto knife
- Plasticine
- Transparent salad bowl
- Local earth or sand
- · Plastic bag
- Drinking straw
- Piece of sponge

16 See http://www.watercare.org/WaterCare/textbook/textbook-eng.html

17 See http://www.epa.gov/safewater/kids/flash/flash_watercycle.html


Opening and warm-up

Tell the story of the droplet of water in nature's water system, and use visual demonstrations.

Draw the chart and repeat the concepts relevant to groundwater: recharge area, permeable layer, permeable layer, aquifer (collection layer), aquiclude (impermeable layer), water flow direction.

Present the map of the Mountain Aquifer shared by Israel and Palestine (at the end of this activity) and repeat the concepts once more.

Main activity session

Divide the class into groups and give each one the materials needed for building an aquifer model and presenting it to the class.

The bottle model

- Cut the upper third of the bottle and create the following layers:
 - A layer of Plasticine indicates an impermeable layer at the bottom of the bottle
 - A layer of fine gravel (the aquifer) representing fissures in the rock where water can accumulate
 - A layer of fine sand representing the ground through which water seeps
- Now "shower" water above the model and observe what happens.
- Make a hole in the top layer of the gravel and put a small piece of the straw, to demonstrate a spring. Insert a straw from the top, to demonstrate a well.
- Try to differentiate between the well of water that the groundwater is drawing from, and the pit of water that is dug to collect surface water.



- Place fine gravel in the large transparent bowl. Create a valley in the center and a slope on either side of it.
- Scatter a little earth above the "wadi".
- Shower "rain" above it and watch how the aquifer fills with water. The wadi near the groundwater level will also fill with water and form a lake.
- Insert a straw at the "mountain peak" and draw water out.
- What happens to the water level in the lake?
- Add a couple of drops of red food liquid into the water, to represent pollution. Watch the impact on the groundwater.

Analysis of the experiment

- What happens when the ground is saturated?
- What advantages are there to underground reservoirs? (no evaporation, water absorbs minerals and is preserved at its optimal level)
- What happens in a dry year when there's little rainfall?
- What are the consequences of excess pumping?



Summary discussion: Is water a renewable resource or a non-renewable resource?

Groundwater is a renewable resource **BUT** if its rate of consumption is higher than its rate of renewal, the aquifer is harmed.

The amount of accessible water is limited, but consumption is constantly on the increase. Therefore, if there's less rain in a particular year, or if water is being pumped out without supervision, the amount of accessible water also lessens.

Stories of springs

Talk about the state of a spring / well in your community (e.g. Ein Yizreel) and a neighboring community (e.g. Al-Auja, Ziglab or Wadi Fukin). Show pictures of this water source and explain how the spring used to be a focus of activity, what the water was used for, and what the spring's current state is.

Examples can be found on pages 46-48 of this chapter and pages 102-104 of Chapter 4.

- Why does the issue of resources concern us deeply in our current times but bothered no one 100 or 200 years ago?

Teacher's answer: the intensive usage of resources and technologies of developed countries as a result of the agricultural and industrial revolutions, development of medicine which led to significant increase in world populations, improved living standards, and global warming which constitute an additional threat to water availability.

What do all these mean for us now?

What can we / must we do with all this information?





Map of the mountain aquifer shared by Israel and Palestine and division of sub-basins

The Mountain Aquifer shared by Israel and Palestine¹⁸

The Mountain Aquifer is located beneath the West Bank and parts of Central Israel, but most of its **recharge area** is in the West Bank and most of its **confined area** is in Israel.

The Mountain Aquifer encompasses three main aquifers:

- the western aquifer is the source of most of the water pumped by Israel west of the green line, and for the cities of Tul Karm and Qalqilya
- the northeastern aquifer supplies water to Shechem (Nablus) and Jenin, and to the Jezreel Valley and Bet Shean Valley
- the eastern aquifer, whose water flows to the Jordan Valley and the Dead Sea, is the only reservoir that is **almost** totally in the West Bank

The mountain aquifers' groundwater is of an extremely high quality compared to other water sources in the area. They serve as the only source of water for the Palestinian population in the West Bank, and the main source of water for central Israel's cities including Tel Aviv and Jerusalem. The mountain aquifers are also the source of water for springs, and constitute the main and permanent water source for streams such as the Yarkon River and the Taninim Stream. The mountain aquifers are therefore perhaps the most significant water source for both Israelis and Palestinians.

This source of water, shared by Palestinians and Israelis, is in increasing danger following decades of over-pumping (mostly by Israel in the past) and the flow of unpurified sewage/waste water (currently chiefly by the Palestinians). Israel, which effectively controls the amount of pumping and access to the aquifers' water, pumps some 80% of the annual amount of renewed water, while Palestine pumps the rest. In very dry years, the renewed amount is small and over-pumping endangers the sustainability of the groundwater in the long term, leading to springs drying out.

The hydrological characteristics of the mountain aquifers' seepage and recharge areas make the groundwater extremely sensitive to pollution. Some 3 million Palestinians and Israelis living above the recharge area contribute to the aquifers' ongoing pollution. FoEME is making every effort to prevent continued aquifer pollution through the «Protecting Groundwater Project», whose goals are: establishing a transboundary monitoring system, mapping and management of environmental hazards, handling and treating pollution that endangers the groundwater.

Children and youth can also contribute to these efforts by locating and mapping environmental hazards that endanger sources of water in the community. After analyzing the findings, they can consolidate public campaigns with the goal of raising awareness about preserving this precious resource. Chapter 4 of this Resource Guide includes facilitated activities for investigative / research procedures.

¹⁸ Why Cooperate Over Water? http://foeme.org/uploads/12893974031~^\$^~Why_Cooperate_Over_Water.pdf



2.4 THE TRANSBOUNDARY WATER BASIN

Objectives

- Defining the characteristics of the local watershed
- Linking between the population's geographic location and its location within the watershed
- Listing at least 3 implications of having a transboundary water basin

Outline

As of 2013, a total of 28 Israeli, Palestinian and Jordanian communities active in FoEME share a transboundary watershed such as the Lower Jordan River, the Dead Sea, Alexander River, Kishon River, Harod Stream, Besor Stream, Kidron Stream and more. In this activity students work in groups and investigate the watershed in the area where they live, producing a model from recycled materials, thereafter discussing the implications of a transboundary watershed.

Preparatory reading

"WaterCare"¹⁹ pages 32-40 Animation²⁰ describing watersheds

Materials

- Map of watershed (see example below)
- Markers, gouache paint, large sheets of art paper
- Materials for producing a model: blue wool, plasticine, toilet rolls, bubble wrap, newspaper, magazines, bottles

Opening and warm-up

Beware! Flood! Is a game in the style of "Sharks and Minnows" or "British Bulldog". It's worth playing this on a slope.

How to play the game:

Most of the students are drops of water, and the others are the catchers. In a class of 20 students for example, 17 are droplets and 3 are the catchers. The 'droplets' need to stand in a high place and on being given a signal, they start to run and 'flow' down

the slope of the watershed and reach the first tributary without being caught. On each round some additional obstacle can be added, such as a border they can't pass, or something they must clamber over (representing sovereignty of some other area).

TIP for empowerment: appoint two students to 'manage' the game



Photograph: Tal Shamir – Children of the "Eshkol Regional Council" are "Droplets" in the game, January 2013

¹⁹ See http://www.watercare.org/WaterCare/textbook/textbook-eng.html

²⁰ See http://www.fcwa.org/education/watershed/

When the game is over, analyze together with the children the concepts of **drainage divide**, **tributaries**, **basin base**, and **watershed**. What is the implication of a droplet that got caught? (evaporation / seepage / storage)

While discussing, use the terms:



Lower River Jordan Basin

Drainage divide – an imaginary separating line between two watersheds. Usually the drainage divide is the highest topographical point in the area from which the flow of water spills down both sides.

Watershed – the area from where all its water accumulates into the creek.

Drainage base – a topographically low area into which the water drains.

Tributaries – carry the water and sediments that collects in various sub-basins. Generally, tributaries of a river are given a decreasing scale level as follows: the main river is scale 3, the creeks running into it are 2, the rivulets flowing into them are 1, and so on.

Main activity session

- Split the class into groups

- Each group receives a map of the regional watershed and erasable markers in three colors: red, blue, green. It's best that the map isn't too detailed, but it should note height of mountains, indicate tributaries, and main populated areas.

- Example: the Lower Jordan water basin map



Group activity

- With the red marker, mark the highest points in the area and write the height of those peaks. Join the peaks with a line to discover the local drainage divide.
- With the blue marker, mark wadis and creeks and write their names. Mark them as follows: 1 main tributary, 2 secondary tributary, 3 smaller tributary, 4 even smaller, and so on. Where is the drainage base shared by them all?
- With the green marker, color the area where your home and other large populations are in the area of the watershed.
- Draw a line that encompasses each whole water basin.
 - Do any transboundary creeks flow in this area? If so, write their names down.
 - Is the drainage base shared by Israel and any others of its neighbors? Give details.
 - Which creeks flow from the drainage base of a neighboring country?
 - Which populated areas (villages, towns) can be found on the higher areas of the watershed?
 - Which populated areas are on the lower slopes of the watershed?

3D Model

Divide the students into groups. Each group builds a 3D model of a watershed from the materials noted above and/or any others you think suitable. Alternately, students can draw a colored graph of a watershed. Examples:



The Water Trustees, Experimental School, Jerusalem 2013

What's the connection?

Distribute the following quotes among the groups of students. They are linked to tributaries and watersheds. Each group should choose a quote that reflects its work the best, and explain why.

- "First of all, my child, make sure you're upstream and that your rival is downstream." Native American proverb
- "Whiskey is for drinking, water is for fighting over." Popular quote, South Dakota area, USA
- "As I travel around the world, people think the only place where there is potential conflict [over] water is the Middle East, but they are completely wrong. We have the problem all over the world." Kofi Annan
- "Only those who go against the current will find the source of the river." Folklore

Discussion: What are the implications of a transboundary watershed?

What did the Native American chief mean with this saying? What do Kofi Annan's remarks imply? What do the other statements mean? Analyze them, together with the advantages and disadvantages of the transboundary watershed.

What advantages are there to a watershed common to Israel and another of its neighbors? Sample responses: a large reservoir area (for example, redirecting the Yarmukh's water to the Sea of Galilee), sharing the work of safeguarding the resource, establishing joint resource management projects (e.g.: tourism, wastewater purification installations).

What disadvantages are there to a shared watershed between Israel and one of its neighbors? Sample responses: transboundary pollution, competition over water collection on either side which then causes nature to be the victim, each side using its water without coordinating with the other party leading to severe damage to the resource, argument around use of the resource that leads to violence and reduces the potential for tourism.

Conclusions: Water in the watershed flows over and under political borders whether we want them to or not. This means that neighboring countries share the resource whether they want to or not. And this also means there is shared responsibility in preserving it, for our own sake and for the sakes of our children and future generations.

Demonstrate the inherent potential of cooperation over water by referencing Section 6 of the Israel Jordan Peace Agreement.²¹

Musical conclusion: Water Rap!

Present the "Water Trustees"²² song about the Jordan and Yarmukh rivers: "Local Love Story"

Materials

Darbukas (Middle Eastern goblet drums)

Ask the groups to compose a rap song about the drop of water flowing into the regional watershed. Alternately, draw comics about the drop of water. The results can be presented during a trip / lesson / youth camp.



- 21 See http://www.knesset.gov.il/process/docs/peace-jordan eng.htm
- 22 See http://www.youtube.com/watch?v=aqnfMfeJgC4&feature=youtu.be



2.5 WHOSE WATER IS IT ANYWAY?

Objectives

- Experimenting with power relations among stakeholders in the watershed
- Managing the negotiation process and consolidating a consensus on the topic of water
- Analyzing water problems in the shared watershed and suggesting resolutions

Outline

By simulating the actions of residents from the mountain, spring and creek areas, raise questions such as:

- Does the water belong to someone?
- How can we cope with competition over a resource in short supply?
- How can cooperation over water issues be promoted?

Materials

- Playing cards see Appendix 1
- Candies and bowls
- Large drawing sheets and markers

Opening and warm-up

The class divides into three villages which all live in the area of one large watershed: The mountain village, the spring village, the stream village.

Each group is given a description of its village in terms of climate, environment, economy and more. Each group's members have to invent a name for their village and design a flag. Then without letting anyone from the other groups know, each group will make secret plans for ways of accumulating water for their village, which is getting larger. For example: building a dam, building a water reservoir, deep drilling, preserving water in huge tanks, trade, recycling.

The game's facilitator holds a bag of jelly candies that represents a rain cloud. Every group gets a starter quantity of raindrops (candies in a bowl). The goal is to think how to catch more drops of water (from the facilitator's hand) and collect them so that the village will not have a shortage of water.

Main activity session

In the first round of the game, each village presents its name and flag, explains why it's the best village in the area, and details only one way of collecting water.

At the end of these explanations, the facilitator decided how many drops of water (candies) each group succeeded in collecting based on their explanations. The number of drops should be recorded on the blackboard. It's best to give each village a **different** amount so that the students are encouraged by competition.

Continue with additional rounds. Each round should include a "news flash" in which the announcer, chosen in advance, challenges the villages and creates the atmosphere of competition. Each village needs to present a new way of collecting water.

Here are examples of news flashes:

- A very dry winter was experienced with a drop in precipitation compared to last year.
- Cost of water has increased significantly, at \$100 per container of 10 cubic meters (10,000 liters).
- The mountain top and spring villages polluted the stream with sewage.
- At the Creek University a ceremony is being held to celebrate the completion of the first Wastewater Purification Engineering course.
- The spring area residents need to pay higher taxes because the head of the village
 was angered over the fact that the mountaintop residents did not send him cherries
 as a gesture of respect on the occasion of his 70th birthday.
- A survey by the Ministry of Health in the mountain top region indicates a severe shortage of Omega 3 among mountain village children.
- The stream residents are closing a successful fish export season and planning to expand their ponds based on anticipated profits.
- The spring area military force is on high alert due to fears that a tunnel is being dug from the mountain village towards the spring.
- Successful experiments by the spring village residents in raising vegetables by using wastewater.

Once all the rounds are complete, the facilitator gives out drops of rain according to the effectiveness of the water storage methods presented.

Game summary

Add up the points and declare which village is the "winner".

Discussion questions

- How did the strategies adopted by each village impact your village?
- How did you feel when your neighboring villages had more water than you did?
- Which of the villages has the "real right" to the water?
- Is one of the villages entitled to more water?
- What's the divisional principle in the game claiming water based on geographical location? Claiming water by force? Some other possibility?
- What kinds of problems arise from the game's rules and the residents' behavior?
- How did you feel when you realized that the source of your water was starting to deplete?
- Who are the losers in this game, and who are the winners? (No one wins....)
- What happens to a limited resource when technology develops so quickly and consumption increases without restraint?
- What's the connection between this game, and the reality we live in?

Reaching a consensus on issues of water

The leaders of the villages have decided to meet and check if they can cooperate on the issue of the water resource. Each village needs to write up its negotiation demands.

- A. Divide the class into new groups, so that each group contains a representative from each of the villages. The representatives need to:
 - Define each party's needs
 - Think of as many solutions as possible for the problem
 - Choose one solution that is acceptable to all representatives
 - On a large sheet of paper, divided into two columns, write the solutions in the left column.





B. Hand out to each discussion group a true story about its watershed: the Kishon / Besor / Alexander / Kidron / Jordan (sample stories are at the end of the chapter).

The groups must now repeat the previous process:

- Define the problem
- Define each party's needs
- Think of as many solutions as possible for the problem
- Choose one solution that is acceptable to all representatives
- Write this solution in the column on the right

Summary

Each of the discussion groups must present the solutions it found.

Discussion:

- Can these solutions be implemented by decision makers?
- Once all the parties involved have received the amounts of water they need, is there enough for the ecosystem?
- Present a brief review of the two types of solutions which are currently being focused on and promoted in the watershed.

Stories

Here are three true stories from our areas that demonstrate the damage caused by competition among the hilltop / spring / creek residents over water, and the importance of cooperation when managing a transboundary watershed.

1. The story of the Al-Auja Spring: Did drilling on the mountain cause the spring to dry up?

Auja is a very small Palestinian village in the Jordan Valley, 12 km north of Jericho. Many people are familiar with the "slide" at the Al-Auja Spring, which used to flow freely until a few years ago and provide the village farmers with their livelihood.

In recent years, the spring's flow has drastically decreased, and many village farmers were forced to dry their fields and look for other sources of income, while Israeli settlements in the area continued to enjoy a routine supply of water for their agricultural produce.

Several hypotheses are offered to explain the spring's drying up:

- Drilling by the Mekorot Company near the spring and by the Palestinian Water Authority on the mountainside in the Ramallah area, lowers the level of groundwater in the area. In research funded by FoEME, findings were not unequivocal. Some tests showed a connection between this drilling and the spring's flow, and others negated that possibility. More information is needed to solve this issue.
- 2. The years of drought and the small quantity of precipitation in recent years have reduced the spring's recharge.
- 3. According to the Palestinians, the Mekorot Company's drilling to the east of the spring has direct impact on the spring's flow. Mekorot and the Israel Water Authority explain that this claim is false, since their drilling is from a deeper aquifer. The dispute has yet to be settled.

The case of the Al-Auja Spring demonstrates that the "spring residents", who are completely dependent on rain and the spring's water, live in a state of uncertainty and suffer from fluctuations in the supply of water, compared to those who control deeper groundwater and enjoy continuous water supply throughout the year. Since the Palestinian village residents depend on the spring's flow for their livelihood, in times of drought they are forced to find alternative work in nearby areas or in the city of Jericho.

FoEME is trying to settle this situation in various ways, including increasing awareness among decision makers of the difficulties experienced by the Auja residents, preparing hydrological studies explaining the drop in the spring's output, establishing an environmental center in the village towards educating the public about their environment and water, and promoting political policies of a more fair division of water between Israel and Palestine.

2. The Dead Sea is dying: Overuse of water leading to "The Tragedy of the Commons" ²³

The case of the Dead Sea is a classic example of "the Tragedy of the Commons", where overuse of the water by a few individuals or groups is leading to destruction of a natural resource that belongs to the entire public.

The Jordan River was the main source of water feeding the Dead Sea. Over the past fifty years, however, its waters have been redirected to other needs, and currently some 95% of its original flow is diverted long before it reaches the Dead Sea. Half the amount is used by the State of Israel, and half by Syria and Jordan. This means that the Dead Sea has lost its original natural recharge source. Additionally, Israeli and Jordanian industries that produce minerals from the Dead Sea pump enormous quantities of water for the production of various minerals, to evaporation pools on the Southern side of the sea.

As a result, the natural wonder is in danger of extinction. Its area has reduced by one third, and its level continues to lower by about 1.3 meters annually. The sinkholes appearing as a result of the declining sea level seem to indicate nature's revenge, and damage infrastructure, as well as the livelihood of farmers and the tourist industry on both the Jordanian and Israeli sides of the sea.

And sinkholes are just one aspect of the damage....

FoEME is making concerted efforts towards raising awareness among decision makers and the general public of the damage caused by unsustainable management of the southern Jordan watershed. FoEME is also working on a regional master plan for rehabilitating the river. Simultaneously, FoEME is facilitating and cooperating with Israeli, Palestinian and Jordanian communities along the Jordan basin slopes in localized activities that contribute to rehabilitating the Jordan River. FoEME is also a partner in the campaign calling for the Dead Sea industries to bear the environmental costs, including the damage caused by the drop in sea level resulting from overuse of the Dead Sea's water, and for these industries to develop alternative technologies for producing minerals that prevent the damage of evaporation.

23 Read "The Tragedy of the Commons" by Garett Hardin: http://cecs.wright.edu/~swang/cs409/Hardin.pdf or watch short video explanation: http://www.youtube.com/watch?v=4RE9PMwwaFc Further reading: "Of tragedies and Crises: Talmudic views on managing the Commons" by Jeremy Benstein http://old.lifshiz.macam.ac.il/siach/benstein.pdf



3. Wadi Fukin: The dilemma of conservation versus development

Wadi Fukin is a picturesque Palestinian village in the Judean Mountains, 12 km west of Bethlehem and 660 meters above sea level. Wadi Fukin is blessed with 11 springs, a very unique characteristic for one single wadi in the Judean Mountains. The springs are fed by a perched aquifer, which is a local aquifer perched on top of an impermeable non-contiguous layer of marlstone. The aquifer's recharge areas which feed the springs overlap the valley's topographic watershed and spread across some 6 km alone, which is why there is no recharge to these springs beyond the valley's topographic boundaries. Throughout hundreds of years, Wadi Fukin's ancient farming heritage was preserved, using irrigation methods that relied on the springs. Growing agricultural produce along terraces was based on tens of watering pools, several kilometers of aqueducts, and an established cultural system among the village's families.

Unfortunately, Wadi Fukin's underground watershed is extremely vulnerable. Accelerated development processes over the past few decades have critically damaged the wadi: including the construction of the settlement Betar Illit in the east, and the expansion of Tzur Hadassah to the west, which have damaged the local aquifer and the wadi's slopes, causing a significant reduction to the water in the springs. Two springs have already ceased to flow, and others are in danger of pollution as a result of repeated sewage seepages from Betar Illit into the wadi, and the lack of sewage infrastructure in the Wadi Fukin village itself. Additionally, expansion of the towns in the area are in initial implementation stages and the plans for Road 375, from the east to the separation wall in the west, may cause irreversible damage both to the wadi's springs and to the cultural heritage they birthed and which has lasted for thousands of years.

In the framework of the Good Water Neighbors project, FoEME is promoting activities together with residents from Tzur Hadassah and Wadi Fukin to prevent the wadi's destruction. Based on a hydrological study, a sustainable development plan has been produced for the area, handling of domestic wastewaters is being promoted, and a "farmer's market" has been established to market local produce. Proposals for turning the area into an educational park have been consolidated: on one hand, this plan preserves the hydrological recharge, while on the other hand, allows a shared place for encountering and enjoying nature.





APPENDICES CHAPTER TWO





Appendix 1: Playing cards for the activity "Whose water is it anyway?"



Mountain Village residents

Your village is located on the peak of the highest mountain, 1500 meters above sea level and overlooking the valley. You specialize in growing cherries and apples. The weather on the mountaintop is comfortable, and not too hot. About 880 millimeters of rain fall in the area annually. The area is mountainous which means there is no natural reservoir for water and precipitation seeps deep into the ground or flows in the stream. Your forefathers dug a well to reach the groundwater, but as the village population has grown, you're now coping with increased demand for water.

- Think of a name for your village, and draw an appropriate emblem / flag
- Think about the advantages and disadvantages of your location relative to water availability

Advantages	Disadvantages

- Draw a model or map of the village, and plan the water collection points for the village
- Your secret mission: to ensure you never run out of water! Listen to the other groups and discover how you can cope with the increased demand for water in your village





Spring Village residents

Your village is built around a flowing spring at the base of the high mountain slope. Your spring's water supply is from the groundwater and runoff from the high mountain. The spring has allowed you to develop a rich agricultural life including raising a wide range of vegetables. The weather is comfortable but very humid and you tend to shower a lot. The annual average precipitation is 600 mm. Until recently you were never short of any-thing, but as the village population grows, you anticipate an increase in water usage.

- Think of a name for your village, and draw an appropriate emblem / flag
- Think about the advantages and disadvantages of your location relative to water availability

Advantages	Disadvantages

- Draw a model or map of the village, and plan the water collection points for the village
- Your secret mission: to ensure you never run out of water! Listen to the other groups and discover how you can cope with the increased demand for water in your village



Stream Village residents

Your village is situated along the banks of a stream filled with refreshing flowing water. The stream's water source is in a spring in the neighboring village, higher up the stream. The stream has enabled you to develop a rich life: you specialize in fishing and building boats. You also use the stream water for drinking, laundry, washing, and shipping merchandise to neighboring villages downstream. The weather is hot and humid, and average annual rainfall is 400 mm. Until recently you never experienced any water shortage, but as the village population grows, you expect increased water consumption.

- Think of a name for your village, and draw an appropriate emblem / flag
- Think about the advantages and disadvantages of your location relative to water availability

Advantages	Disadvantages

- Draw a model or map of the village, and plan the water collection points for the village
- Your secret mission: to ensure you never run out of water! Listen to the other groups and discover how you can cope with the increased demand for water in your village





CHAPTER THREE THE WATER FOOTPRINT





THE WATER FOOTPRINT

INTRODUCTION

In the past decade, a new term entered our lexicon: Ecological Footprint.

The term refers to the impact of an individual, society or political entity on its environmental resources. It is an index for estimating the quantity of natural resources required to provide the needs of a population having specific standards of living.

Based on this, another term came into existence: Water Footprint. It is the index for evaluating the amount of water needed and consumed directly or indirectly by a population having a specific standard of living.

We tend to think of direct water consumption in terms of cooking, showering, gardening and so on. However, the water footprint relates to the total quantity of water needed for production, use and removal of the products we consume. This has led to another term being coined: Virtual Water, which is discussed in more detail later.

The average water footprint per person in Israel in 2005 was 2303 metric cubes of water per year. For the sake of comparison, the average water footprint for the same year per person in Jordan was 1678 metric cubes, and in the USA, 2842 metric cubes.²⁴

Unlike fossil or carbon energy sources, water is not considered a non-renewable resource, but it does change its physical state in cycles. The rate at which freshwater sources are being used, together with the rate of pollution as a result of human activities, have a strong impact on the quantity of fresh water available.

Understanding the water footprint at all stages of the water cycle requires relating to the following three aspects:

- Blue water footprint the amount of water from aboveground or underground reservoirs needed to produce an item.
- Green water footprint water in our environment, in the ground or in the atmosphere. Growing wheat that uses only rainwater, and does not use additional irrigation, is an example of a green water footprint.
- Grey water footprint the amount of water that has become polluted as an outcome of production processes. A dairy diverting wastewater into a creek is an example: the amount of polluted water is a grey use of water.

How much water is really in your coffee?

The term **Virtual Water** describes the amount of 'hidden' water needed for production of an item or service we consume.

The calculation encompasses the amount of water evaporated or polluted by the production process. For example, producing paper includes, among other things: growing trees, felling them, shredding the wood, washing the shredded pulp, adding colors and glues, extraction (squeezing out excess which requires washing out the excess polluted liquids that were added to the pulp), activating industrial machinery (which involves cooling with water), and transportation. In other words, even though paper in our minds is something thin and dry, the average amount of water needed for producing one page is 10 liters!



In the same way, we can calculate the real amount of water for our cup of coffee, which is much more than what we pour from the kettle into the cup. We have to include the water needed to grow the coffee beans, and water used in harvesting, processing, packaging and transporting the coffee to the market. In total, about **140 liters of water are used to produce 1 cup of coffee.** By contrast, "only" **30 liters are invested in producing one cup of tea.**²⁵

Using this same method, we can examine the virtual water footprint in a country's import and export activities: for example, countries that export beef, flowers or citrus fruit are actually "exporting" virtual water. Does the exporting country include that in its environmental and economic calculations?

Based on the above, water consumption and savings are a very complex issue. If we want to create real and meaningful environmental change, we need to examine our consumer habits, and explore how we can reduce our water footprint at the personal and national levels without lowering our standard of living.

This chapter includes five activities dealing with the following topics:

- 1. How much water do we use at the domestic level, and how can we save water?
- 2. The role of water in production processes for a variety of products (food, clothing, paper) and understanding the concept of virtual water which is inherent to production processes, even though we do not see this water in the final product.
- How much water is in the food we eat? Comparing our water footprint to that of other countries and cultures, including aspects of globalization, environmental responsibility and environmental justice.
- 4. Solutions for water shortages: desalination what is it, what are its advantages and disadvantages, and its environmental cost.
- 5. The economy of water conservation: saving instead of creating more water; the problem of overuse; grey water how to handle and use it.



The Economist, 25 February 2009, http://www.economist.com/node/13176056

25 From http://environment.nationalgeographic.com/environment/freshwater/embedded-water/

3.1 NEED OR CONSUMERISM?

Objectives

- Raising awareness about the quantities of water we use and waste every day.
- Thinking about creative ways to save water.

Outline

This activity has students comparing real and ideal as far as economic water usage. They will think of creative, simple ways to save water and offer solutions for addressing the issue of growing populations that imply growing consumption.

Materials

- Cards with domestic water usages (see Appendix 1)
- Test yourself (see Appendix 2)
- Smart savers or other devices for saving water
- Internet and speakers for viewing clip
- Additional background material: Water consumption in Israel and the hydrological balance²⁶

Opening and warm-up

Average domestic water consumption in Jordan and Palestine is some 70-80 liters per person per day and in Israel is 166 liters per person per day. Think about how many bottles of water (1.5 liters) a person uses daily in each of these countries.

Main activity session

Familiarize yourself with the norms of water usage in your home. You're holding cards on which different kinds of water usage are listed. Match the type of use to the number of liters (see Appendix 1).

Test yourself: are you water savers or water wasters? Use the water habits questionnaire (see Appendix 2).

Turn the tap on for 15 seconds and measure the amount of water it fills in a bottle.

Average daily water consumption in Israel ²⁶			
Activity	Rate of consumption in percentage	Liters per person per day	
Toilet flushing	36%	60	
Drinking, cooking, washing dishes	18%	30	
Bathing	36%	60	
Laundry and cleaning	5%	8	
Home gardening	5%	8	
Total average domestic consumption	100%	166	

26 See http://www.waterfootprint.org/?page=files/WaterFootprintsNations

27 Data correct for 2005-2007. From the Water Authority website: www.water.gov.il



Bring a "water wise device" (faucet aerator) to class as an example of a device that helps save water at home. Check the table for how many liters can be saved daily, by upgrading with relatively simple technologies:

Purpose of water consumption	Water cur- rently con- sumed	Water consumed with water saving devices	Tips for saving water
Showering	26 liters per minute	8-11 liters per minute	 Installing a smartsave device Taking a short (4 minute) shower Closing the tap while soaping Filling a bucket with the water that flows until hot water appears
Bath	106-136 liters for a full bath	53-68 liters for a half filled bath	- Preferring a fast shower to a bath
Tap left open (brushing teeth, washing dishes, etc.)	11.4 liters per minute	4-8.5 liters per minute	 Installing a smartsave device - Turning the tap off while brushing teeth, soaping dishes, etc. Using ecological dish soap to re- cycle the water for the garden Filling a tub to rinse dishes after soaping
Washing machine	150-208 liters for a full machine	68-95 liters for a full machine	 Activating only a full machine Upgrading to water and electricity saving machine
Dishwasher	56.8 liters per load	22 liters per load	 Filling the dishwasher Upgrading to water and electricity saving machine
Watering the grass	11-38 liters per minute		 Reducing the grassed area Planting water preserving plants Building a domestic green reservoir for purifying grey water for gardening purposes
Flushing the toilet	9 liters for a full flush	3 liters for half flush, 6 liters for full	 Installing a half-flush handle Diverting grey water for flushing the toilet Using dry "compost" toilet

Sources:

Community Science Action Guides: The Franklin Institute Science Museum and the Science Museum London: http://fi.edu/guide/schutte/howmuch.html

Israel Water Authority: http://www.water.gov.il/Hebrew/Water-saving/Pages/Save-Accessories.aspx

Creative minds

Think of creative ways to reduce the amount of domestic water consumption from 166 liters daily per person to 100 liters daily per person. Sketch a water conscious home and/or neighborhood.



See examples of cool water saving inventions: Sink Positive²⁸ – a way of saving toilet-flushing tank water Drip irrigators – from The Top 12 Ways Israel Feeds the World²⁹

Summary

The more the population grows, the greater the consumption of water becomes, but the supply of water remains very limited. Do we actually use only the amount of water we really need?

Question for class discussion

What can be changed in the formula below?







Possible answers:

- Reducing population growth.
- Using technology to make consumption more effective, such as drip irrigators, smartsavers, etc.
- Changing water consumption habits at the domestic level: using less, implementing simple water storing actions such as catching cold water in a bucket in the shower.
- Changing water consumption habits in the agricultural sector: planning water saving agriculture, using reclaimed wastewater.
- Increasing available water supply by implementing water conservation economy methods: recycling grey water for irrigation, purifying and recycling wastewater/sewage, preventing leakage from taps and pipes, diverting runoff into the aquifer, limited desalination after exhausting other options. More on water conservation economy in the desalination section later.
- Preventing pollution of water sources.

Outlooks and perspectives need to change if we're going to "preserve the environment". We need to shift from policies and cultures that allow and even encourage over-consumption, which increases the systemic problems and eradicates our water sources, and move to policies and cultures based on smart water usage. This is especially true for policies relative to water in our region. We need to manage our water in sustainable ways for now, and for the future generations.



²⁹ See http://israel21c.org/technology/the-top-12-ways-israel-feeds-the-world/



²⁸ See http://www.youtube.com/watch?v=B BG75lxoEw



3.2 TURNING GREY TO BLUE

Objectives

Implementing a simple technique to demonstrate the way a grey-water purification system works.

Outline

At this stage, we're already familiar with, and hopefully employing, some basic methods for saving water. In this activity students will build a demonstration model of a water purification system using clear recycled bottles, gravity (no pumping) and different types of ground covers and plants. You can also use larger containers where the ground covers are arranged in layers and the water stays in them for a lot longer.

Background

Grey water is water that has been used for domestic purposes but does not include sewage. Grey water includes water from showering, washing dishes, cleaning and laundry. This water contains food residue, which is organic matter, as well as dirt, and detergents.

Grey water can be recycled once these materials have been neutralized in various ways, leaving the water at different levels of purification by using physical filtering, and/ or chemical or biological breakdown.

A large range of systems for handling grey water use ground covers, large stones and various types of granules, as well as plants with roots that house organisms which absorb and/or break down these materials.

Recycled water is not pure at the level of drinking water and does not uphold standards set for domestic use, so it must not be used in contact with the body. However, grey water can help save on freshwater consumption by being used in place of flushing water, or to water the garden, and even in certain agricultural fields, saving up to 40% of domestic water usage.

With good maintenance, recycling grey water does not constitute a health issue. Recycled water should be encouraged as it reduces the amount of groundwater being pumped while simultaneously saving on the amount of water needed from desalination.

Additional information

- Constructed wetlands for wastewater treatment video³⁰
- Do it yourself video³¹ on building a domestic green reservoir.

Materials

- Plastic bottles with the bases removed
- Thin wires
- Filling materials: stones sorted by size, ceramic shards, gravel, sand, tuff, cheesecloth or cottonballs or similar and activated carbon.



Photograph: Filtering system for domestic laundry water, Emek Hefer, Israel

³⁰ See http://www.howstuffworks.com

³¹ See http://en.wikipedia.org/wiki/Main_Page

Opening and warm-up

- List all the methods that the class members use to try and save water. Some ideas appear in the "Need or Consumption" section of this chapter.
- What does saving by recycling mean?
- How can we recycle water?
- How many liters, and therefore how much money, can we save by recycling domestic grey water?

Main activity session

We will build a filtration system to improve the quality of water.

- Cut off the bases of the plastic bottles
- Turn the bottles upside down, and tie them to a pole, wall or tree, at araduated heights, so that the water will spill from one bottle to the next above an area you want to water.
- Fill each bottle in graduated layers of filtration materials according to size, so that the finest materials (sand, tuff) are on the bottom and the coarser ones (pebbles, stones) on top. In the bottle at the very bottom, place cottonballs or cheesecloth or a filtering material at the bottle's mouth.
- Place a container to catch water at the bottom, so that it's possible to take measurements and make various tests, such as turbidity, pH, quantity, and more.
- Pour water from a puddle, from washing up dishes, or other used water into the top bottle and.... Start collecting clean grey water!



Activated charcoal (Also Activated Carbon) is charcoal that has been treated with oxygen to open up millions of tiny pores between the carbon atoms. The use of special manufacturing techniques results in highly porous charcoals that



the carbon surface, they attach to the surface and are trapped. Activated carbon is used in gas purification, decaffeination, gold purification, metal extraction, water purification, medicine, sewage treatment, air filters in gas masks and respirators, filters in compressed air and many other applications. From "How Stuff Works"³² and Wikipedia³³.

Summary

Questions for discussion

- What materials are important to filter out of our water? (Metals, detergents, pathogens, organic waste)
- How can each of these components be handled, and does a filtering device for improving water quality actually do that job?
- What types of filtering do different systems offer? Which component is handled by each type of filter? (physical, chemical, biological, UV)
- What purposes can this water serve after having been treated in different ways? Can this water be drunk? (depends on level of purification)
- How can water from our homes be recycled?

32 See http://www.howstuffworks.com



Tuf

Sand

Activated

carbon

Cottonballs

³³ See http://en.wikipedia.org/wiki/Main Page

3.3 VIRTUAL WATER

Objectives

Understanding the concept of virtual water and how water is used for production, manufacture, consumption and waste of various products.

Outline

Virtual water is water used for the production of food and industrial items, from the raw materials and the agricultural stage, to processing (including water needed for production of electricity for processing), transportation, and consumption; as well as water that becomes polluted as a result of production, consumption and waste.

Virtual water is "hidden" in the product.

Students will compare quantities of water invested in the production, marketing, consumption and waste processes of several products, and will draw comics describing the full cycle of water usages for a particular product.

Materials

Cheese
An orange
Sugar
A sheet of paper
A T-shirt

A map of the world A comic strip template Markers

Opening and warm-up

How much (water) does it cost us?

Present the different items above to the students and ask them to guess how much water each one contains. It's likely that they will guess at the actual amount of water they think they can see, rather than the total amount of water invested in production, marketing and waste. A student who guesses correctly will 'win' that item.

When this round is over, ask students to explain why a tomato contains more water than an apple, and why a hamburger contains such a large amount of water. Help students to reach the conclusion themselves: the amount of water in any item is measured according to the total water used in all stages of producing that item, starting with raw materials, through production processes, consumption, transportation, and wastage.

Present the term **virtual water** and ask students to arrange the items according to the total amount of water used in the production and consumption processes.

Tap water	1 liter	Sheet of paper	10 liters
1 orange	50 liters	1 tomato	50 liters
1 apple	70 liters	A cup of coffee	140 liters
A potato	180 liters per 200 gm	Wheat	200 liters per 200 gm
Sugar	300 liters per 200 gm	Cheese	909 liters per 200 gm
Hamburger	2500 liters per 150 gm	Cotton T-shirt	2700 liters
Bread	40 liters for one slice	Milk	1040 liters for 1 liter milk



Water in comics

Ask students to list all stages that require water in the production and consumption processes for:

- Producing raw materials
- Processing and manufacture
- Transportation
- Purchasing (buying the item in the shop)
- Using it (washing)
- Removing garbage (garbage removal, garbage landfills, pollution)

Divide the class into pairs and ask each pair to search, using the Internet, for information on production processes for one item, such as tomato, shirt or hamburger. Later the students will draw this information as comics, noting the quantities of water needed for each stage.

We recommend using the following two sites:

http://environment.nationalgeographic.com/environment/freshwater/embedded-water/ http://www.waterfootprint.org/?page=files/productgallery

Example: How much water is there in a Pizza Margherita?



Drawing: Amy Lipman Avizohar

Examples of production processes

Tomato. Tomatoes are one of the most common agricultural products in the world. The production processes worth thinking about include growing it (irrigation, polluting with fertilizers and pesticides, etc.), freight (water in the production process of fuel for trucks and ships), consumption (washing the tomato at home, cooking soup, washing dishes).

Hamburger. Water used, from the stage of raising cattle for beef, giving cattle drinking water, cleaning the cowsheds, and handling sewage. Industrialization stages such as slaughtering, preparing the meat, packaging, transport, etc.

1 kg meat needs 6.5 kg grains, 36 kg dietary fiber and 155 liters water.

Cotton T-shirt. Water is needed for growing cotton, for industrial processes, freightage, laundering, and waste.





Summary

Make a list of every food item in your home, including in the fridge, freezer and cupboards.

Calculate how much water each item contains using the information appearing here³⁴.

Photograph all the food items and bring the photos to the next class in which our water footprint will be discussed.

Try to initiate a visit to interview a farmer or production plant owner or manager, discussing the amounts of water involved in what they produce.

Enrichment experiment

- Plant tomato or chickpea (humus) seeds
- Check on the amounts of water you give them, and write the date and quantity of each watering
- When they sprout, add up the total amount of water used to grow them. You'll have the total amount of virtual water needed to grow tomatoes or chickpeas



34 See http://environment.nationalgeographic.com/environment/freshwater/embedded-water/

3.4 How much water do we eat?



Objectives

Linking our everyday habits to the term water footprint.

Outline

Students will calculate the water footprint of their daily food consumption and compare it to that of other cultures.

Materials

- A written list or a photograph of food items in your homes (fridge and cupboards)
- Pictures of families from different places in the world

Opening and warm-up

Questions for discussion

- What do you eat on a regular day?
- Who is vegetarian? Who likes meat? Chocolate? Fruit?
- Have you ever thought about where our food comes from and how much water is invested in producing it?

Main activity session

Use the sites below to calculate your water footprint³⁵, and the water footprints of other families in different countries from the pictures below.

The amount of water needed to produce different products (National Geographic)³⁶

Average water footprint by country (Water Footprint)³⁷

- Cut a large sheet of cardstock (thick paper) in the form of a footprint and write on it the water footprint of the food you usually eat
- Cut another large foot and write the water footprint of another culture
- Compare the two water footprints
- Invent a game using the feet or create a colorful exhibition around the classroom walls
- Write an advertisement for a recommended healthy diet for people wanting to "lose" some of the virtual water they use

Summary

Discussion about norms of consumption:

- Where does the food we eat come from? Is it made locally, nationally or imported from overseas? Is the component of virtual water in our food high or low?
- How do our consumption habits affect the environment and its water sources?
- What can be done at the personal level to reduce our water footprint? (Reducing on luxury items, thinking twice about buying something with a high water footprint, buying locally produced food, eating less meat, recycling to reduce water pollution, recycling grey water, etc.)
- What is your opinion concerning the following statement: **Vegetarians are more en**vironmentally friendly
- Can reducing our water footprint contribute to better relationships between Israeli, Jordanian and Palestinian neighbors? (Increased local trade, directing water to environmental rehabilitation thereby increasing tourism, etc.)

- 36 See http://environment.nationalgeographic.com/environment/freshwater/embedded-water/
- 37 See http://www.waterfootprint.org/?page=files/WaterFootprintsNations



³⁵ See http://environment.nationalgeographic.com/environment/freshwater/change-the-course/water-footprint-calculator/



These pictures display the weekly food expenses of single families from around the world.

Germany: The Melander family from Bargteheide: US\$375.39



http://loving-shepherd.org/blog/what-the-world-eats/food families 01/

USA: The Revis family, North Carolina: US\$341.98



http://loving-shepherd.org/blog/what-the-world-eats/food_families_02/

Italy: The Manzo family of Sicily: US\$214.36



http://loving-shepherd.org/blog/what-the-world-eats/food_families_04/

Mexico: The Casales family of Cuernavaca: \$189.09



http://loving-shepherd.org/blog/what-the-world-eats/food_families_05/



Poland: The Sobczynscy family of Konstancin-Jeziorna: \$151.27

http://loving-shepherd.org/blog/what-the-world-eats/food_families_06/



Egypt: The Ahmed family of Cairo: \$68.53

http://loving-shepherd.org/blog/what-the-world-eats/food_families_07/




Ecuador: The Ayme family of Tingo: \$31.55



http://loving-shepherd.org/blog/what-the-world-eats/food_families_08/



Bhutan: The Namgay family of Shingkhey Village: \$5.03

http://loving-shepherd.org/blog/what-the-world-eats/food_families_09/



Chad: The Aboubakar family of Breidjing Camp: \$1.23

http://loving-shepherd.org/blog/what-the-world-eats/food_families_10/

3.5 GLOBAL WATER TRADING

Objectives

- Learning that international trade in food means import and export of virtual water
- Analyzing the consequences of import and export of water in agricultural products and attempting to achieve policy decisions on this issue

Outline

The Middle East in general does not export a great amount of virtual water compared to other countries. Nonetheless, an interesting question arises: is it preferable to preserve this limited and therefore precious resource, taking advantage of it for environmental purposes, such as rehabilitation of streams and rivers, and developing environmental tourism?

Diverting water for rehabilitating the Lower Jordan River, for example, would lead to greater ecological tourism in the area, to creating work places, and to new sources of income instead of the expensive water-greedy agricultural activities. This is an example of out of the box thinking on the topic of water: it's a complex situation but effective regional and systemic management by all partners to the resource, being Jordan, Palestine and Israel, can profit all partners, and also be very beneficial to nature.

Materials

- The Import Export domino game
- (see Appendix 3)
- World trade map
- Graph of Israel agricultural exports (see Appendix 4)
- Simulation cards of a cabinet meeting
- Data on global trade, from the United Nations Food & Agriculture Organization, FAOSTAT³⁸



The map shows the balance of food trade by country.Dark green represents a country with more food export than import.

Opening and warm-up

The Import - Export Domino game:

The game contains 33 cards. Each one holds information on the main import and

export product categories of different countries in the world, and the amount of water needed to produce one kilogram of that item. The chosen products represent main foods traded among countries, based on statistical data from the United Nations Food & Agriculture Organization, FAOSTAT.

Objectives of the game

To create a picture of the reciprocity among different countries relative to global food and virtual water trading

38 See http://faostat.fao.org/site/342/default.aspx







Rules of the game

Each domino card shows a product imported by a particular country, and on its reverse side, a product that this same country exports. Each student receives one domino card. Students create a chain of cards by matching import to export. For example: if Brazil exports coffee beans and USA imports coffee beans, the faces of those two cards can be matched. The chain does not have to be linear but can have offshoots. At the end of the game, a picture of global food and virtual water interlinking is formed (see Appendix 3 for full game).

Analyse the domino chain, and relate it to the world food-trading map.

Questions for discussion

- Which countries export virtual water, and which countries import virtual water?
- Is there any logic in Australia, which has a relatively dry climate, exporting to rainy Europe?
- What are the consequences of trade in virtual water on the local environment?
- Analyze the main areas of agricultural export from Israel for advantages and disadvantages (graph – see Appendix 4)



Main activity session

Cabinet simulation game – Setting policy on import and export for the State of Israel

Divide the class into groups of four students. Each group receives:

- Graphs of Israel's agricultural import and export (see Appendix 4)
- The following article to read: "Stop Wasting Food"³⁹ by Selina Juul

The Cabinet must discuss and decide

The Cabinet meets each week. Attending are four Knesset members: the Minister of Agriculture, the Minister of Environment, the Minister of Tourism, and the Minister of Industry, Trade and Labor. They will discuss the issue of virtual water:

- On the one hand, the Minister of Agriculture is very concerned about high water prices, but on the other, very proud of Israel's export of bananas and flowers.
- The Minister of Environment has promised to get water flowing in the streams by the end of the year, and can't understand why Israel's exporting so much of a resource in dire shortage.
- The Minister of Tourism sees a drop in the number of Christian pilgrims due to the drop in the Kinneret's water level, and the pollution of the Lower Jordan River. A drop in tourism leads to increased unemployment.
- The Minister of Industry, Trade and Labor is really worried about unemployment in agriculture, following raised water prices, and is looking for ways of creating new jobs.

³⁹ See http://www.thinkeatsave.org/index.php/stop-wasting-food See also: http://www.youtube.com/watch?v=dllhbjY4s8A, http://www.unep.org/wed/quickfacts/, and http://www.epa.gov/foodrecovery/

Let's look at a hypothetical situation, of five years of drought in Israel. Would it be good to continue the current modes of trade which include virtual water?

Each minister must prepare an opinion addressing this question, appropriate to her or his area of responsibility. Use the following guiding questions to help you prepare responses:

- Are we exporting agriculture that is most suited to our climactic conditions? (bananas, tomatoes, potatoes)
- Would it be worth shutting down or transferring any of the export areas in order to improve the economic status of the sector you're responsible for? (agriculture, tourism, environment, employment)
- Think of creative ways to save water that might contribute to improving the local economy

Summary

List three recommended actions on virtual water that are acceptable to all your cabinet members.

Based on these recommendations, summarize the advantages and disadvantages of import and export relative to your local economy.

Virtual water: Points for consideration

- Is there any logic to the fact that countries with relatively dry climates, such as Australia, should export to rainy Europe?

The answer's not so simple. There are many additional considerations, such as the amount of water invested in production, as well as available agricultural areas, demographic data and more. The import and export norms of any country need to take into account long term environmental concerns, and water is just one of them.

What's the story with us here?

Israel suffers from severe water shortage. However, it exports large amounts of fruit and vegetables to Europe, who are usually water guzzlers. The question that surfaces, then, is whether export of virtual water is sustainable in the long term?

On one hand, Israel profits from this export, since in the short term, export of virtual water is good for the economy. Policy makers should also continue to encourage the cultivation of water-efficient plant varieties, which are capable of being irrigated with marginal water use through adoption of water-saving technologies. On the other hand, relative to the cost of water alone, it may be preferable to limit export of fruit and vegetables and let more water flow into the ecosystems.

Hypothetically, water saved on agricultural production can be diverted into natural creeks. As a result, the creek's ecosystem would improve, and draw tourism. Local tourism would develop, and in the long term possibly bring greater economic benefit compared to agriculture Rehabilitation of ecosystems have many additional benefits apart from tourism too. So in fact, there's no simple unequivocal answer to the water footprint issue. What's important is that all aspects and alternatives are worth thoroughly investing.

 How does each of us contribute to saving water at the personal level? Various food items are differentiated by their virtual water cost. The process of growing and producing meat products requires much more water than growing fruit and vegetables. We need to be aware of our consumer habits. This doesn't mean we must all become vegetarians, or raw foodies, but perhaps we can reduce meat, for example, to twice a week instead of every day.

Remember: water is needed for the production of almost everything, from clothes to electronics. Smart water consumption will reduce our water footprint.





3.6 DESALINATION – HOW MUCH, AND WHAT ARE THE ALTERNATIVES?

Objectives

Expanding knowledge and critical thinking in this field, presented in the media as an acceptable solution to the water shortage. This activity invites:

- Examination of the complexity of allocating resources in society.
- Issues of policy making.
- Understanding the need to take steps to save water before turning to technological solutions.

Outline



Israel has managed its water with increasing deficits over several decades. This kind of policy has led to deterioration in the quality of water sources, and to emergency situations in water supply. The increased population, economic development, and globally changing climates only serve to heighten the demands for water. Desalination plants are indeed one safe and quick solution, but they too have advantages and disadvantages.⁴⁰

This activity asks the students: how much water should be desalinated, what consequences arise from the desalination process? Are there other alternatives?

Answering these questions requires searching for solutions to the water shortage in the other 'alternatives' half of the equation, that is: water

conservation economy, including preventing leakage, managing demand, well remediation, recycling (purification and reuse), and more.

Materials

- Internet and speakers to watch the clip
- Media articles (see Appendix 5)

Opening and warm-up

Watch the explanatory clip What is desalination and how does it work?⁴¹ and ask the class the following:

- Is desalination the only solution to Israel's water problem?
- What might some of the advantages and disadvantages be?

As with any discussion there is no single truth, but two sides to every coin.

Main activity session

Analyzing information in groups

Each group watches the clip and reads the articles on desalination and its alternatives. According to the information available, each group must consolidate arguments for and against desalination or water conservation (newspaper and television backup information in Appendix 5).

Taking a stance: "The elevator pitch"

The elevator pitch describes a one-time opportunity to impress someone within a very short time, and persuade that person to support your idea. Each group chooses a speaker who will offer 60 seconds on why the group is for or against desalination or alternatives.

Additional method

Each group writes out its statements for and against desalination. Each statement is written in large letters on a separate page, and the pages are hung around the classroom. Students will use green and red markers, making a green \checkmark on a statement they agree with, and a red X on those they disagree with. When everyone's finished, tally up the claims that gained the most agreement, and those with most disagreement.

⁴⁰ Further reading: http://foeme.org/uploads/Desalinization Position Paper English.pdf

⁴¹ See http://www.youtube.com/watch?v=_3Id7G1IFM8&list=PLB93860A2EDBBAB06

Summary

As with every sphere of life, coping with water shortages in Israel carries no single correct answer but a range of opinions and considerations. These include environment, health, economy and society, which together must lead to sustainable management of natural water resources in Israel.

Water conservation offers an approach that goes beyond cultures and policies that allow and even encourage over-consumption of water, by moving to approaches based on smart consumption, with effective outcomes.

A fuller yet concise explanation of water conservation methods is found in Appendix 5.

The Economy of Water Conservation

FoEME, December 2010

Water, like money, is a precious commodity. Water wastage can be lessened by saving water, drop by drop, until we attain larger scale 'savings' without the need to expand desalination activities.

Let's use a scenario from our daily lives. Alon really wants to buy a new game. Each time he does babysitting or gets pocket money, he puts ten shekels into a kitty. Over a year, by putting aside one 10 shekel piece each time, he's managed to save several hundred shekels. Alon has managed his money carefully, and instead of wasting it all

on unnecessary things, he's saved up for the game he really wants. The same is true for water conservation.

According to FoEME research, Israel's water supply can be increased by using the following methods:

- Reducing water leakages from the general water system. Water leakages account for some 10% of Israel's water supply!
- Decreasing evaporation from water reservoirs with technologies for covering the reservoirs.
- Purifying and recycling water, such as shower or bath water for flushing toilets, treating grey water for home gardening, purifying municipal drainage at high levels for city landscaping and agriculture.
- Focusing on gardening and agriculture that suits local climates.
- Education and explanations at early childhood, geared to changing long term consumption habits.
- Enforcing laws prohibiting wastage of water, such as prohibition of car washing and sidewalks with hoses.
- Installing smart water savers, pressure regulators, and irrigation monitors.
- Storing city surface water accumulating in winter, and increasing penetration of rainwater into the underground aquifer.
- Pricing water according to consumption per person will also help noticeably reduce unnecessary consumption without affecting lower or middle income earners.
- Economic advantages: implementing water conservation methods may create some 5200 green jobs annually.

Summary

Implementing the above actions will add some 316 million cubic meters per year to the water availability by the year 2020. This is an amount of water equivalent to the annual output of two desalination plants.

If our Palestinian and Jordanian neighbors also adopt water conservation methods, we can increase the regional saving in water for everyone's benefit.

Water Trustees touring fish ponds in the Beit Shean Valley, Israel

APPENDICES CHAPTER THREE





Appendix 1: Need, or Consumerism?

How much water do we use at home? Match the different domestic water usages to the amount actually used. Data is correct for 2005-2007, retrieved from the Israel Water Authority: www.water.gov.il



Appendix 2: Test yourself: Are you a water waster?

When you fill a glass with water to drink:

- Water flows a bit before filling the glass and a bit afterwards, too 10 points
- Water goes straight into the cup 2 points

When you wash your face and hands:

- Water keeps flowing the whole time you're busy 10 points
- Water flows only when you rinse your face or hands 2 points

When you shower:

- You turn the water off while you soap yourself 2 points
- The water runs for the whole time you're in the shower 10 points

There are two handles on the toilet at home: one for a full tank, and one for a half tank. Do you use them as they're intended?

- I don't pay much attention which handle I use 10 points
- I use the handles according to what's needed 2 points

When you brush your teeth:

- Water keeps flowing the whole time you're busy 10 points
- You turn the water off until you actually need to rinse your mouth 2 points

When do you water the garden?

- In the evening or night 2 points
- During the day 10 points

While you wait for the hot water to come for your shower:

- You catch the cold water in a bucket and use it for watering 2 points
- You don't do anything. The cold water just runs into the drains 15 points

When you wash dishes:

- Water runs the whole time you're busy 15 points
- You turn the water off while you soap or scrub dishes 2 points

When you use the dishwasher:

- You use it even if it's only half full 15 points
- You make sure it's full before you run it 5 points

When you see a tap or pipe is dripping:

- You just keep busy with what you're doing. Someone will probably come and fix it 20 points
- You try to turn the tap off, but if it keeps dripping, you just ignore it 10 points
- You call someone who can help fix it, like a parent, or plumber 2 points

When you wash the car:

- You use water from a bucket 2 points
- You use the garden hose 10 points
- You take the car to the car wash 20 points

Total your points

- Up to 40 you're great! You pay attention to saving water!
- 40-100 you could try a bit harder, and start helping to save more water!
- 100+ you're in really bad shape, and so are we! You waste a lot of water, and that's a shame. Try to improve!



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Appendix 3: Virtual Water Import - Export Domino

(Domino cards are found after Chapter Five appendices, at end of publication) Summary of information contained on the cards: main areas of import and export by country

Country	Export	Import	
Argentina	Corn	Bananas	
Australia	Beef	Rice	
Brazil	Coffee	Corn	
Brazil	Soy beans	Rice	
Brazil	Chicken	Wheat	
Cameroon	Bananas	Rice	
Cameroon	Cocoa beans	Wheat	
China	Apples	Soy beans	
Egypt	Sugar	Corn	
England	Barley	Wine	
France	Wine	Bananas	
France	Wheat	Tomatoes	
Germany	Cow's milk	Apples	
Germany	Wheat	Pasta	
Holland	Potatoes	Citrus fruit	
India	Rice	Sugar	
Indonesia	Palm oil	Soy beans	
Israel	Citrus fruit	Corn	
Israel	Potatoes	Wheat	
Italy	Pasta	Cow's milk	
Jordan	Tomatoes	Barley	
Malaysia	Palm oil	Rice	
New Zealand	Beef	Sugar	
Palestine	Cucumbers	Rice	
Russia	Wheat	Beef	
South Africa	Sugar	Chicken	
South Africa	Corn	Wheat	
Spain	Tomatoes	Potatoes	
Thailand	Rice	Soy beans	
Ukraine	Barley	Palm oil	
USA	Soy beans	Coffee	
USA	Wheat	Cocoa beans	

Amount of water needed to produce 1 kg of each product below

Source: Water footprint network⁴²

Product	Water footprint – liters per kg		
Apples	822		
Bananas	790		
Barley	1,423		
Beef	15,400		
Chicken	4,325		
Citrus	650		
Cocoa beans	19,928		
Coffee	15,897		
Corn	1,222		
Cow's milk	1,120		
Cucumbers	353		
Palm oil	1,098		
Pasta	1,849		
Potatoes	287		
2,457	Rice		
2,145	Soy beans		
1,728	Sugar		
214	Tomatoes		
1,827	Wheat		
610	Wine		





Appendix 4: Global Water Trading – Israeli Import / Export

The graphs below present the nine leading products in Israel's import and export lists (in 2011). The blue columns indicate the quantity of each product exported or imported. The yellow columns indicate the value: how much Israel profits from export or pays for import, for each 1 ton of that produce. The graphs are taken from the United Nations Food and Agriculture Organization Statistics - FAOSTAT⁴³

Export from Israel



Import to Israel



43 http://faostat.fao.org/site/342/default.aspx

Appendix 5: Desalination – how much, and what's the alternative?



http://foeme.org/uploads/Desalinization_Position_Paper_English.pdf http://www.huffingtonpost.com/yermi-brenner/is-desalination-theanswe b 678968.html

From the newspapers (the following are translations of articles from the lsraeli press, to provide material for thought and discussion):

"FROM THIS WEEK ON, SAY GOODBYE TO THE KINNERET'S BLACK LINE"

By Yael Darel, YNET, 21 December 2009

The Hadera desalination plant, the largest of its kind in the world, is expected to receive Ministry of Health permits fairly soon for directing desalinated sea water into Mekorot's water system. The quantity: about half the amount pumped from the Kinneret. The meaning: the danger of approaching the "black line" will lessen.

The water level goes up, the worry level goes down: in the Water Authority, it is estimated that already the new desalination plant in Hadera, the largest of its kind worldwide, will begin injecting desalinated water into the national water system operated by Mekorot. Final checks on the plant are under way, and all that's left now is to receive the Ministry of Health Water Quality permit. The permit is expected within several days. This will be the third, large-scale desalination plant operating in Israel, in addition to one in Ashkelon, another at Palmahim, and a fourth smaller one operating in Eilat.

The important element that this desalination plant adds is the fact that in several months, possibly already by March 2010 when the plant will be running at full output, Israel's water system will be boosted by an additional annual 127 million cubic meters or so of water.

This means that 2010 will become a safer year for all Israel's water reservoirs, and the first to enjoy the new status will be the Kinneret (Sea of Galilee). The Water Authority estimates that the Hadera desalination plant will finally remove the "black line" danger from the Kinneret's continually dropping water level.

"In 2010 this plant will already lessen the danger of reaching black lines, which is of great importance for the Kinneret," the explanation was offered to YNET by Avraham Tenneh, Director of the Water Authority Desalination Department. However, Tenneh emphasized that even if the level of concern drops, the lake will still be categorized as showing a shortage of water. "This doesn't mean we'll go over the red lines. It just means there's less chance of reaching the black line."

The Water Authority advised that over the past five years, which were particularly dry, with little rainfall, pumping from the Kinneret was reduced from an average of 300 to 350 million cubic meters per year, to some 200 million cubic meters. "The Hadera plant will provide an equivalent of about half of what we pump from the Kinneret."



Optimistic levels? Measuring the Kinneret's water level – photograph: Effi Sarid

However the Kinneret, as is well known, is not the only natural source of water, supplying only about one third of the water needed, alongside the mountain aquifer and the coastal aquifer. Their status has also greatly worsened in recent years. When will these aquifers also get a dash of gratification? The Water Authority sees optimism on the horizon, towards the end of 2013. According to plans, Israel will treat some 550 million metric cubes of water annually from its total desalination plants, those currently in operation in Ashkelon and Palmahim, the plant in Hadera, and additional plants set for Ashdod and Sorek.

This scope of desalination will enable the start of rehabilitation of groundwater, and conserving the Kinneret at full capacity. "By the end of this year the plant at Sorek will also be operating, providing some 150 million cubic meters of water, and will be the largest plant. Another will operate in Ashdod. This means that by the end of 2013, Israel will reach a state of balance between supply and demand for water," Tenneh said.



"DESALINATION: SMART SOLUTION OR HEFTY PRICE TAG"



Dr Raheli Einav, YNET, 20 November 2009

Are the economic and environmental costs of establishing and running desalination plants reasonable? Opinions run both ways. Recently, against the background of the water crisis, calls are being more loudly heard to hasten the desalination system and cries are being registered against the multi-year delays. Since I'm involved in the environmental aspects of desalination, I know that setting up such a plant is far more difficult that preparing an internet presentation, and that desalination plants come with an economic and environmental price.

How much does it cost us?

What does setting up a desalination plant involve? Firstly, an investment of between half a billion to one billion shekels. And even if most of the plants are built on the Build-Operate-Transfer method, where the construction company winning the tender operates the plant for several years and only then transfers it to the government, the government must still commit to buying the water at a preset price, fixed for the entire period. This means that the price of water is passed onto consumers.

The cost of desalinated water is a little less than fifty cents per metric cube; and even though the process improves and becomes more efficient, its price is still very high, much higher than pumping water from bores, for example.

Other than the monetary aspect, setting up a desalination plant takes a long time. The tender, which generally covers two stages, was competed over for a year, following which the winning group plans, tests and seeks funding. Execution begins with an exhausting process of permit seeking. The State, through its representatives, meticulously checks the planning, including the plant's efficacy and its impact on the environment, in a process taking another year. Only once the plans are certified, and construction begins, at least another two years will pass before the first glass of water can be filled.

Two years until water flows. A component from the Palmahim Desalination Plant

...and there's a price tag of a different kind: environmental

The obvious advantage of a desalination plant is water. But that water has, as noted, an environmental cost which, with correct planning, can be reduced, since most of the problem spots are of a local nature. Five main areas of impact on the environment by a desalination plant can be enumerated: damage from ground usage, damaged to the water environment, heightened energy use, damage to groundwater, and detrimental noise effects.

Pipes stretching from the shore into the sea depths damage the water environment

Damaging use of land manifests in uses of shoreline for establishing the desalination plant. Strips of beachfront that could serve tourism and vacationers become industrial centers. The recommendation is therefore to avoid establishing desalination plants adjacent to nature reserves and especially, near rocky beachfronts, and instead prefer setting them up in areas designated for industry or distanced from the shore. In Israel this would focus more on the southern than northern regions.

Pumping installation designed to avoid pumping close to the ground level. Photographed in Larnaka (Photography: Raheli Einav)

Damage to the water environment occurs chiefly at the pipe source. Admittedly the water concentrates (desalination residue) are natural materials as far as the sea is concerned, but their specific gravity is high (double that of sea water) and therefore sink to the sea bed. Additionally, these concentrates include chemicals and there is some fear of causing damage to the marine population. Laying the pipe and activating the system that pumps water into the desalination plant may also cause damage. The degree of impact changes depending upon the nature of the sea, the biological sensitivity of the aquatic habitat, and the plant's technology. In recent years technologies have developed that allow embedding the pipe, which lessens damage to the marine environment.

Increased energy usage damages the environment directly and indirectly. Operating the plant requires large amounts of energy, which involve burning fuels that cause air pollution, increasing greenhouse gases that may be accelerating global warming. By one definition, the desalination plant is an installation that exchanges water for fuel. This is somewhat cynical, but it definitely has a basis.

Groundwater damage may also come about as a result of establishing a desalination plant, a concern particularly relevant for the laying of sea water and concentrates pipes. This situation arouses a dilemma: to avoid using the ground itself (the beach), the plant needs to be distanced from the sea. But this means that lengthier piping is needed, which increases the various risks. The desalination plant draws vast amounts of water through two to three pipes of 1.8 to 2 meters circumference which operate round the clock. A burst pipe resulting from a fault or accident, or sabotage, may pollute the groundwater beneath the pipes.

And finally, there are **noise issues**. A desalination plant which activates reverse osmosis is noisy because of the pumps compressing sea water through membranes. Noise solutions are technological, such as acoustic cladding. Another option is, once again, distancing the plant from populated areas, but that will pose risks to the groundwater.

Large pipes full of seawater pose risks to groundwater if they burst

What alternatives are there to desalination?

FoEME website, December 2010

The Economy of Water Conservation

Water, like money, is an expensive commodity. We can reduce the amount that gets wasted by saving water, one drop at a time, until we achieve major savings on water without the need for expanding desalination activities. We can use an image from daily life. Let's imagine that Alon really wants to buy a new game. Each time he does babysitting or gets pocket money, he puts ten shekels into a kitty. Over a year, by putting aside one 10 shekel piece each time, he's managed to save several hundred shekels. Alon has managed his money carefully, and instead of wasting it all on unnecessary things, he's saved up for the game he really wants.



FoEME research indicates that the supply of water can be increased in Israel in the following ways:

- Reducing water leakages from the general water system. Water leakages account for some 10% of Israel's water supply!
- Decreasing evaporation from water reservoirs with technologies for covering the reservoirs.
- Purifying and recycling water, such as shower or bath water for flushing toilets, treating grey water for home gardening, purifying municipal drainage at high levels for city landscaping and agriculture.
- Focusing on gardening and agriculture that suits local climates.
- Educational explanations in early childhood, geared to changing long-term consumption habits.
- Enforcing laws prohibiting wastage of water, such as prohibition of car washing and sidewalks with hoses.
- Installing smart water savers, pressure regulators, and irrigation monitors.
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- Economic advantages: implementing water conservation methods may create some 5200 green jobs annually.

Summary

Implementing the above actions will add some 316 million cubic meters per year to the water availability by the year 2020. This is an amount of water equivalent to the annual output of two desalination plants!

If all Israeli, Palestinian and Jordanian neighbors also adopt water conservation methods, we can increase the regional saving in water for everyone's benefit.



CHAPTER FOUR WATER AND ECOSYSTEMS





A. 1

Water Trustee cross-border meeting, seasonal pool, Emek Hefer, Israel

INTRODUCTION

The story of a channel (and not from TV!)

It's winter. A flood is on its way. The noise is deafening. A vast amount of water is rolling down the slope, furiously washing over everything in its path, and sweeping away all things that are not well attached to the ground. The roiling water picks up dry branches, rocks large and small, feathers, plastic bags, bits of Styrofoam, empty drink bottles and anything else that happens to be there. And suddenly, there's a silence. The flood is over. The water flows slowly along the channel, reeds and bulrushes along the length of the channel straighten up again, toads take up their leaping once more, and turtles swim happily, while egrets go back to catching other flying creatures, and the stilt plover returns to the muddy bank.

Spring at last. Green and more green fills the area. Tadpoles have grown and are now jumping about along the banks, the grey egret is gathering some of them for a meal, the white-throated kingfisher is plucking insects from the water, and bee-eaters catch bees midway in flight. Multi-hued dragonflies flit and land on reeds. Everywhere there's action, the peak season. And that season's so short...

Summer. The channel is dry. Toads hide. Egrets shake leaves to find hiding insects. Dragonflies fly as far as their wings can take them." Suddenly, a strange flow comes along the channel. It is white, frothy and has an unfamiliar smell. Toads, confused, leave their hiding places and jump into the water. A turtle leaves the bushes and tries to swim. Its ears block up, and it exits the water quickly. The coot takes a dip, but finds its feathers filling with garbage... What's happening here?

Ecology is a field of science that researches reciprocity among components, or resources, found in the environment. In every environment we differentiate between biotic components, which are living things such as bacteria, plants, and animals; and abiotic, or inanimate, components such as moisture, temperature, topography, geology and more.

Water is an abiotic component vital to all biotic components in any environment. This makes water of utmost importance in any ecosystem. Such reciprocity between the differing components can be studied at various scopes, from limited, local aquatic habitats such as a puddle, river bank or cave, to environments of a more generalized nature such as a desert, a forest or the sea, and all the way to the global level.

Like water, pollution is also transboundary. Unfortunate testimony of this fact can be found in many streams in the region: the Kishon, Alexander, Lower Jordan River, Hadera, Kidron and others. The Besor basin is a fascinating example of transboundary pollution: its tributaries drain from the Negev mountains, Hebron, Beer Sheva areas, the Eshkol Regional Council, then cut back to Palestine, and flow into the Mediterranean Sea at the Gaza shore. A creek that should be an intermittent stream, flowing or flooding only in winter, in reality flows year-round due to sewage and industrial runoff which, of course, damages the health and quality of life of all those living along its length.

In this chapter we will understand the role of water in large-scale systems, and we'll map the sources of water pollution. Students will be exposed to concepts of importance in this sphere, including: biological diversity, transboundary pollution, and environmental justice; and they will begin their involvement with environmental activism. This chapter contains seven activities:

- 1. The food web understanding reciprocity among living creatures
- 2. Origins of water pollution the impact of production processes on water resources
- 3. A trip to discover environmental damage in the community
- 4. Experiment the impact of water quality on plant growth and our food sources
- 5. Mapping environmental damage through Google Maps and GIS
- 6. Making environmentally friendly decisions and setting environmental policy
- 7. Managing an environmental campaign



4.1 THE FOOD WEB

Objectives

Experimenting with food web reciprocity in a freshwater protected growth environment, and examining the destructive or disruptive impact of pollution on the web.

Outline

The activity is conducted through role-play which simulates the ecological system. The activity takes the form of a framework narrative relevant to the activity, division of roles among students, playing the role, discussion and summary.

Materials

- Chairs or string to create a circle
- Markers
- Stickers
- A roll of thread

Opening and warm-up

Framework narrative: the event takes place at a freshwater pool/oasis familiar to the participants (e.g.: a nearby creek /spring /swamp /large winter puddle etc.). In and around the water is diverse, natural animal and plant life. Together with the class, sketch out a food web typical of the freshwater ecological system.

A pool of water contains reciprocity between plants and animals. The chart describes part of the food web in pools of water. The arrows indicate the direction of energy exchanges (the fly eaten by the toad is transferring energy to the toad). At the end of the process all the plants and animals rot, which forms the renewal basis of the system.

The chart only shows the main energy transfers. More can be added as deemed suitable. The basic conditions for the existence of the process are light, air and water. Human intervention is not manifested in the illustration.

Now try to add polluting elements to the system, such as pesticides against mosquitoes, oil floating on the water's surface, cutting away plants from the banks, a container of toxic liquid such as pesticide thrown into the water, and other similar elements.



From US Geological Survey: http://pubs.usgs.gov/circ/circ1316/html/circ1316chap14.html

Main activity session

Define the framework "pool" in class by forming a circle using chairs or string. Give every student a role – as an animal, a plant, a human, or a polluting element – and write the role on a sticker that the student sticks to her or his clothing. Try to let the children choose roles; or distribute them randomly.

Every child receives 10 energy points (use sweets, marbles, used matches, or some similar item). The goal of the activity: to survive in the "pool" by guarding the energy points, or by gaining points from students in other roles (as with computer games).

One student enters the pool and begins to behave according to her or his role, e.g.: the toad will jump and croak and swim; a plant will stay in one place but sway in the breeze. The pool slowly fills with animals and plants and an encounter is created among the students. In each such encounter, the students take a decision relative to their roles, mediated by the facilitator when needed. They decide: do they gain energy points, lose energy points or perhaps both gain and lose, and at what scope?

The moment an interesting encounter and discussion develops between two roles, recommend a "freeze" by all other students, to allow them a chance of joining the discussion and decision making over who profits from the encounter and who loses, and why. At the end of each such discussion, the game continues.

For example:

A fish is going about its business swimming in the water, and encounters sewage. Both students understand that the fish comes out the worse from this encounter, so the fish transfers energy points to the pollutants. When the fish's energy points are all used up, it leaves the game and sits around the 'pool'. The student playing the pollutant receives these energy points, which reinforce her or him, and can join up with another student.

Sample list of roles for the food web game:

- Hunter, fuel pollution, construction garbage
- Fox, jackal, mongoose, black adder, viper
- Deer, wild boar, rock hyrax, squirrel, mole, mouse
- Short toed eagle, buzzard, barn owl, eagle
- Tern, dove, bee-eater, sparrow
- Gambusia, catfish
- Crab, worm, mosquito, bee, wasp, dragonfly
- Reed, marigold, flowering rush, water-crowfoot, water lily, sea club-rush, carob tree, oak
- Seaweed, bacteria, fungi

Direct the students' attention to the following topics:

- 1. Specialization versus generalization in nutrition advantages and disadvantages in the environment
- 2. Coexistence in the aquatic habitat: parasites, symbiosis, and the most important topic of all in ecology competition (inter- and intra- species)

Further reading

- Characteristics of Ecosystems, NatureWorks⁴⁴
- Rivers and Streams⁴⁵ the Society for the Protection of Nature in Israel (SPNI) Read "Reviving Streams and Wetlands in Israel" Executive Report

⁴⁵ See http://www.natureisrael.org/EPD/Rivers-and-Streams/Rivers-and-Streams



⁴⁴ See http://www.nhptv.org/natureworks/nwepecosystems.htm

Summary

Seat the students in a circle. Students throw a ball of rope among the role holders in an order that reconstructs the relations in the food web. Whoever the rope reaches catches hold of it. For example, the student playing 'seaweed' would hold onto the rope with one hand, and throw it to 'fish', who holds it and throws it to 'stork', and so on until a web is formed among the students in the circle.

Once the web connects everyone, cut the rope in several places to break connections. Use this status to discuss what this now means for the ecosystem.

Every student participating in this activity will share her or his insights, gained from the learning and information, with fellow students. Use these questions as guidelines:

- Was the food chain affected, and how?
- How does it, or will it, affect the quality of life for humans?
- How does this game demonstrate the current state of the body of water closest to you?
- Are our neighboring communities (Israeli, Palestinian and/or Jordanian) affected by the current status of the body of water closest to them? Do you have the ability to influence the situation?
- What advantages are there to handling the ecosystem in conjunction with our crossborder neighbors?

4.2 SOURCES OF WATER POLLUTION

Objectives

- Identifying and defining the main types of pollutants endangering the groundwater
- Calculating the value of risk to groundwater
- Preparing for a trip to study pollution sources

Outline

vater urces

For this activity, students will categorize different types of environmental pollutants, and learn to evaluate the scope of pollution risk to the groundwater, according to defined criteria.

Background

What is environmental pollution?

This is a general term describing every situation or condition which constitutes a threat to the environment. In other words, this refers to pollution or degeneration or depletion of a natural source (air, land, water). Environmental pollutants are a danger to public health, and many are the outcomes of human activity. The environment is impacted by human actions, which is why all of us also have the ability to make things worse, or make them better.

What's the connection between water and environmental pollutants?

Water is vital for our existence. However, water resources available for human consumption are limited. Pollutants that are present on the land over the aquifer area, such as cumulative garbage which washes down with the rain and seeps underground, or leaks from the sewage system, can spread over large areas and pollute the groundwater in the entire aquifer. Similarly, sewage or solid garbage flushed into the creek at one point will spread with the flow downstream, damaging the quality of the water along the entire stream.

If there's to be an assured supply of water of the appropriate quality for human consumption, and for nature's needs, these demands need to be managed correctly: in other words, waste needs to be prevented, and informed use of water must be encouraged. This involves economizing, on one hand, and effectively managing the water available to us, on the other hand. When surface or underground water sources are contaminated and polluted, they become unsuitable for both humans and nature. As a result, the supply of suitable water diminishes. Handling contaminated water sources is a complex and very expensive process. This is why prevention of pollution as a first step is so essential.

Numerous types of environmental hazards exist, and are related to in greater detail at the end of this activity. The focus in this activity is on two main areas, which constitute the most critical threats to our water supply: sewage, and solid waste.

Materials

- Helmet
- "Dangerous Area" sign
- Table for grading hazards (based on the European Union index in Appendix 2).
- Note cards with the names of different types of pollutants (based on the European Union index in Appendix 2). Card content as below:



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Pile of construction waste

Pile of domestic waste

Quarry

Dairy products factory

Paper products factory

Cement factory

Abattoir

Packing house

Cosmetics factory

Hospital

Landfill

Gas station

Carpentry

Glass shards

Sewage pipe leak

Swimming pool

Fish pond

Road

Pesticide and fertilizer vineyards, orchards, cultivated fields

Cowshed

Poultry coop

Animal pen*

Greenhouses**

Olive press and oils mill

Electrical products

Car mechanic garage

Sewage water treatment plant

Plastic - bottles, bags, etc.

* sources of leachates with high concentration of organic and pathogenic materials which can cause illnesses and deformities, as well as residual medication and hormones ** chiefly garbage comprised of plastic pipes and plastic coverings

Opening and warm-up

Prepare the classroom ahead of time as a danger area: hang the warning sign on the door, attach pictures of pollutants to the walls, scatter the chairs about to create a sense of disorder.

Each student entering the classroom must take a "hazard" card from the helmet.

Main activity session

The facilitator announces a hazard category, and students must arrange themselves in groups based on their "hazard identity" cards:

- Group according to source of hazard: industrial, agricultural, infrastructure (domestic and/or municipal)
- Group according to the nature of the hazard: solid, liquid, gaseous
- Familiarization with hazards: pollutants or hazards the students have seen in their areas of residence compared to those they have never seen

Once a category is called out and the students have divided themselves into appropriate groups, the students of each group should then line up behind or alongside each other by grade of the potential risk of the hazard to water sources, from 10 to 90: for example, glass shards = 10, fuel/petroleum = 90.

Ask the students to be seated in their places and present the booklet⁴⁶ titled Youth Taking Action: leading green change in the community⁴⁷.

Ask the students to leaf through the booklet, and find at least one transboundary environmental hazard, and one environmental hazard that she or he has recently seen where they live. Ask students to think about the degree of danger both represent to the groundwater, based on the following explanation.



Water Trustees observing industrial sewage flowing in the Hebron Stream

46 See http://foeme.org/uploads/13086803591~%5E\$%5E~CGIS_Publication_English.PDF

47 See http://foeme.org/uploads/13086803591~%5E\$%5E~CGIS_Publication_English.PDF



Calculating hazard potential to groundwater

On their day trip, students will collect data from the field, will map the hazard, and present it to the relevant local council authority such as an environmental supervisor, sanitation department, and so on. In preparation for the field trip, hand out the full index of graded environmental hazards to water, and the field report (see Appendix 2).

Calculate the potential risk to groundwater based on weighting these four parameters:

Hazard Weight: indicates the relative risk of various polluting factors. It is set according to the table in Appendix 2 (range: 15 - 80). The higher the grading, the greater the hazard to water sources, and particularly to groundwater.

Hazard Severity: in terms of size and volume. This is set on a scale from 1 to 10, based on the impressions of the person making the report. For example, a small container of diesel fuel next to a home (1) is not of the same grade as a commercial fuel plant (10).

Scope of protection: is measured on a scale of 0.5 to 2. The highest value, of 2, indicates a high level of protection against polluting leakage. Example: a cowshed following the Dairy Reforms⁴⁸ that upholds all the new standards, with no signs of waste or sewage leakage, would receive a grade of 2.

Hydrological sensitivity: the degree of risk that the polluting factor will reach the groundwater. This risk sensitivity is on a scale of 1 to 5, where 1 indicates low risk and 5 is high risk. This value is calculated based on several parameters, including: depth of the groundwater, type of ground, type of rock. For example, rocks with high permeability are calcareous sandstone and limestone, compared to marlstone or chalk which are relatively impermeable. Sandy (light) ground types are more permeable and pollutants seep down faster than through clayey soil which is less permeable.

The total risk to groundwater is calculated according to the following formula:

Hydrological sensitivity	* Hazard Weight *	[•] Hazard Severity	= Potential Pollution

After weighting the four parameters above, we divide the total for "potential pollution" by 80, so that the final figures can be marked on a scale with a range of 1 to 100.

Example: defining the risk to groundwater of a heap of construction waste dumped adjacent to the Hadera Stream:

Sandy ground (5) * severity (2) * weight (35) = Risk potential: 700 points

scope of protection (0.5)

Normalization of 700 points: 700 / 80 = 8.75

The potential polluting grade of a pile of construction waste dumped alongside the Hadera Stream is 8.75 on a scale of 1-100. In other words, this pollutant's risk to groundwater is relatively low.

⁴⁸ The dairy farm reform in Israel took place between 1999-2008. In the reform, dairy farms went through various changes that diminished their pollution to the environment.

Summary

- What are your expectations of the hazards field trip?
- What kinds of hazards do you think you might find?
- How do you feel about the data you've uncovered?
- Were you surprised by the sources of pollution?
- What are the consequences of pollutants leaching into our water? (health, tourism, potable water supply)
- Did you ever think about the idea of transboundary pollution?

Further reading

The two main areas of critical threat to our water sources are: sewage, and solid waste.

Sewage

Sewage is used water containing various pollutants. Sewage can be categorized according to its origin:

- Domestic sewage

Domestic sewage derives from using the toilet, showering, washing dishes and so on. The sewage system drains all private domestic waste, as well as that of public buildings, and collects it in special reservoirs for handling and purification. In Israel, some of the domestic sewage is handled at the highest tertiary level of purification and is then redirected to agriculture. However, sewage of many areas is only partially handled, and allowed to flow into creeks or back to the sea, but these options also allow the sewage to leach into the ground. Some of the sewage from Jerusalem, for example, currently flows into the Kidron Stream.

- Industrial sewage

This derives from various fluids used in production processes, and/or byproducts washed out into the sewage system. Industry uses water in numerous ways: water is a large part of many products, especially in the food industry; it helps with loading and transporting materials during different stages of industrial production; it serves as a cooling and heating agent for production machinery; it's also used to wash unwanted by-products away from the production line.

- Agricultural sewage

This includes animal excretions such as from cowsheds, animal pens and coops for fowl. Animal excretion contains highly concentrated levels of nitrates that dissolve in rain, and eventually can leak down into the groundwater.

The public health hazard

Sewage can become a public health hazard for two main reasons:

- Sewage that leaches into sources of water contains organic and chemical compounds that encourage the development of various diseases. These compounds endanger our health whether by direct contact, or by being dissolved and leaking into our sources of water. Sewage that seeps into the groundwater can contaminate our drinking water.
- Long term accumulation of surface sewage promotes mosquito breeding and breeding of other creatures that carry infectious diseases.



Solid waste

Solid waste refers to any solid or semi-solid materials that do not dissolve in water. It can be divided into four main categories according to its source:

- **Domestic waste** comprises food leftovers, packaging and plastic bags. The main component of things we throw away at home is organic.
- **Industrial waste** comes from factories, and often includes sludge coming from the sewage water treatment plant. This sludge forms while water is being purified, and contains organic and solid waste materials contained in the water that reaches the purification plant.
- Agricultural waste is the result of agricultural activities such as cattle or fowl manure, piles of fertilizer, piles of plastic from greenhouses, and so on.
- **Construction waste** is chiefly comprised of surplus cement. In Israel the problem of construction garbage is severe. This garbage is often thrown anywhere, unsupervised, rather than being sent to organized garbage sites. This kind of garbage may contain carcinogens and may endanger anyone exposed to it.

Solid waste can constitute a public health hazard for three main reasons:

- Organic waste draws germs and disease-carrying creatures
- Organic waste rots over time and creates leachates. These leach into the groundwater and pollute it.
- Serious illnesses can be caused by exposure to waste such as asbestos, which is carcinogenic and is often thrown away in unprotected, haphazard ways.

Further information

The "WaterCare" book pages 80-95⁴⁹ Sources of Water Pollution, the Ministry for Environmental protection⁵⁰



Water Trustees from Baga el Gharbia on a clean-up activity

Further information on the Ministry of Environment's list of laws and regulations regarding water and wastewater: http://www.sviva.gov.il/English/Legislation/Pages/WaterAndWastewater.aspx

⁴⁹ See http://www.watercare.org/WaterCare/textbook/textbook-eng.html

⁵⁰ See http://www.water-pollution.org.uk/causes.html

4.3 ENVIRONMENTAL HAZARDS FIELD TRIP

Objectives

- Locating and documenting environmental hazards and collecting data.
- Applying lessons taught in the classroom about the watershed and types of pollutants.

Outline

This field trip seeks to document and review environmental hazards, turning theoretical lessons taught in the classroom into hands-on practical understanding. The field trip allows students to take their first steps in environmental activism regarding protection of water sources. Additionally, the trip to a water basin demonstrates the transboundary element and the importance of cooperation among neighbors, despite political borders, if we are to protect our water sources.

Materials

- GPS or smartphone
- Camera
- Notepads, pens
- Field trip report form, list of hazards
- Map of the water basin
- The story, "The Giving Stream" (Appendix 3)

Opening and warm-up



Environmental hazards strongly affect the water resources, the landscape, public health and our quality of life. This field trip lets students locate various hazards, grade them, coordinate their data on the map, and present the results to the local councils.

Present the class with a clear map of the field trip area and conduct geographic orientation of the watershed. It's best to hand out several maps so that students can mark out the path they'll take, the watershed's boundaries, main tributaries and so on.

Hand out the report forms to students, as well as the index of hazards, and explain how to use the cellphone GPS app to locate specific places, and the phone's camera.

An app such as "GPS Status" or "Pathway" can be downloaded, for sending coordinates by email.

Teach the students about using the GPS functions, and coordinates.

What is a GPS?

GPS stands for Global Positioning System. It is a worldwide location program. The GPS receives signals broadcast by satellites that surround Earth, calculates the time differences between satellites, and the distance from all the other satellites. With the addition of another calculation, the cellphone or other device can give the precise position of anything on Earth.



Main activity session

- Patrol the areas that are likely candidates for environmental hazards (solid waste, construction waste, fuel leaks, sewage leaks, etc.).
- Find the coordinates of the location using the GPS system.
- Document and photograph the location and the environment.
- Fill in the report form: scale of hazard, severity, and degree of protection from polluting water sources.
- Define the type of ground or rock and estimate the degree of hydrological sensitivity and speed of leaching.
- Using the equation given above, estimate the degree of risk presented by the pollutant to the groundwater.
- Observe the Palestinian/Jordanian/Israeli neighboring community and hold a discussion on transboundary water and transboundary pollution.
- Hold a discussion on different levels of stream rehabilitation: Restoration bringing the stream back to is optimal level; Rehabilitation – handling the main problems; Reclamation – acknowledging the neglect and taking responsibility for restoring it.

Further reading

Roadmap for the Rehabilitation of the Lower Jordan River. FoEME Research Report, 2010.⁵¹

Distribute roles for reading the story "The Giving Stream" (see Appendix 3).

Summary

- Summarize the collected data for types of hazards recorded and their degree of severity.
- Discuss the consequences of each type of hazard for public health and the health of the nearby environment.
- How can a connection with the neighboring community help resolve problems related to environmental hazards?
- Write a message/letter to water trustees in a neighboring community about the transboundary environment.

Examples from the field: Coping with transboundary pollution

Hebron-Besor Stream

The Hebron basin is one of the largest and most polluted watersheds among those crossing through Palestine and Israel. The Hebron Stream flows southwest of the city Hebron, for a length of 43.5 kilometers, until it crosses national boundaries. On the Israeli side, the stream flows west, adjacent to Arab and Jewish communities. From there it flows into the Beer Sheva Stream, crossing the largest metropolis in Israel's south. Beer Sheva Stream flows west, feeds the Besor Stream, and at its western end crosses the border again into the Gaza Strip, making its way westward to the Mediterranean Sea.

The source of the most significant pollution is the upper creek area, in the city of Hebron, in the town of Kiryat Arba, and additional Palestinian villages in the area. The composition of sewage currently flowing in the Hebron Stream is particularly problematic since it mixes domestic sewage with industrial waste. The latter contains a high percentage of solids and toxic materials produced in stone cutting and tannery industries. Lacking a

⁵¹ See http://foeme.org/uploads/13209208250~%5E\$%5E~DHV Full Report 11.2011.pdf

suitable waste water treatment plant, these toxic materials are currently allowed to flow directly into nature.

Establishing "Shocket", the Israeli sewage water treatment plant, is geared at addressing the "pipe outlet" situation, i.e. catching and treating sewage after it has flowed 43 km. However, the plant neither handles the quantities of sewage, nor their components, with any success. This is an example of an absence of coordination and cooperation: in the long run, the attempt to handle sewage fails, including at the technical level of being able to provide a working solution, and at the environmental level, since the current solution is far inferior to one that handles sewage at its source.

As a result of concerted efforts by environmental organizations in these areas, among them FoEME, a consortium of international agencies led by the World Bank have raised some \$45 million to establish the Hebron waste water treatment plant which will handle sewage from the city of Hebron and the town of Kiryat Arba, in addition to sewage from Hebron's industrial zone. Currently the project is in the planning stages, and construction is expected to commence in early 2014.

Upper Hadera Stream – Wadi Abu Nar

Hadera Stream flows from the slopes of the Samarian hills to the Mediterranean Sea. Along its way it crosses between Baka Sharqiyeh on the Palestinian side and Baka Garbiyeh on the Israeli side. Until recently sewage and solid waste were directed to the creek by both these townships. So far, rehabilitation work has been conducted along the lower Hadera Stream area alone, while the upper creek has not been handled.

In the framework of cooperation promoted by FoEME, it was decided to jointly solve the sewage issues of Baka Sharqiyeh and Baka Garbiyeh. In 2009, a sewage water treatment plant was established in Baka Garbiyeh, and in 2010-11, a sewage network was set up in the neighboring Palestinian township of Baka Sharqiyeh, funded by the Japanese agency, JICA, and led by UNDP.

Currently the final stage of connecting the sewage network on the Palestinian side to the transmission line on the Israeli side is underway, enabling sewage to be treated at the Baka Garbiyeh plant. Simultaneously, the organization, in conjunction with the Sharon Drainage Authority, has begun promoting rehabilitative work on the entire creek, including a proposal for a transboundary park.

Lower Jordan River

The Lower Jordan River is the lowest river in the world relative to sea level, and the lon-

gest river in this region. It flows south from the Sea of Galilee for a length of some 200 kilometers, and eventually spills into the Dead Sea. Both sides of the Lower Jordan River Valley have been blessed with natural and cultural sites of universal value, and the river itself is considered sacred to the three monotheistic religions.

Despite its uniqueness, the river suffers from diversion, pollution and unrestrained development. Of the 1.3 billion cubic meters per year of water flow-



ing along the length of the Lower Jordan Valley, until the 1960's 96% was redirected



by the relevant authorities in Syria, Jordan and Israel. Untreated or incompletely treated sewage has been flowing directly into the river over the past 50 years, and city sewage often reaches the river by infiltration into groundwater.

FoEME is taking aggressive action to raise awareness of this holy river's status by conducting transboundary research, promoting community initiatives on both sides of the river, encouraging investment in waste water treatment plants in Jordan and Palestine, and developing a regional prototype program based on guidelines aimed at reviving and preserving the river. After years of public activism by FoEME staff, the first signs of river restoration are beginning to show.

On the Israeli side a waste water treatment plant has been built in Beit Shean and the "Beytaniyeh" waste water treatment plant will be established south of Tiberius, handling Israeli sewage and allowing redirection of quality wastewater for irrigation of local crops rather than freshwater which would do better flowing through the river. On the Jordanian side, a waste water treatment plant exists in Northern Shuna but the villages along the Jordan Valley are not linked to the sewage network, so that sewage is only partially directed to the system. On the Palestinian side a plan is being promoted, using Japanese funding, to construct a waste water treatment plant in the city of Jericho.

Once pollutants are removed from the river, it will be necessary to allow clean water to flow for a sufficient time to promote the ecosystem's rehabilitation. The Israeli Water Authority has currently committed to enabling a relatively small flow, of some 30 million cubic meters, but it is possible that as Israel's water situation stabilizes, greater amounts will be allowed through. Simultaneously, Israel is promoting a program for the physical rehabilitation of the river banks. Since the Lower Jordan River is actually the border, its rehabilitation creates a particular challenge, and rehabilitation plans must be promoted on the basis of agreements and cooperation among representatives of all three peoples living along its banks: Jordanians, Palestinians and Israelis. Under current circumstances, the Palestinians do not receive any allocation from the river, and are completely prevented from approaching it by a fence and landmines. Rehabilitation based on regional inclusivity will bring all people from all three groups the opportunity to enjoy the river banks.

4.4 MAPPING ENVIRONMENTAL HAZARDS

Objectives

Using a mapping program to organize data from the field and present it as a thematic map.

Outline

In this activity, we will prepare a simple geographical layer of information based on Google Maps as described in the main activity session. The exercises for creating a more complex layer in the GIS (geographic information system) appear in a separate section of this guide, and can be received on request from the FoEME community coordinators.

Materials

Excel spreadsheet, internet, links to photographs from the field trip, field trip reports, a Gmail account.

Opening and warm-up

Gather the information from the field reports and transfer it into an Excel table that includes the following fields:

X / Y coordinates	Date	Site description	Hazard description	Weight	Severity

Upload photographs of the hazards you encountered on the field trip into the internet album.

Main activity session

Creating a hazards layer using Google Maps based on the following set of actions: Enter the Gmail account > tool bar – maps > my places > create map > map title and description > edit > right click on location > choose symbol > a window opens where you can describe the hazard, its degree of risk to the water, and copy-paste your photo > save.

Do you want to share your map with other people and let them add more hazard locations? Click **share**, and invite collaborators.

Summary

Now you have location-based data that lets you present the information to decision makers, in order to promote environmental change in your community. Show the various maps to each other and choose the type of environmental hazards that need the most urgent handling. Using the campaign workshop (later in this chapter) decide how you want to take action towards removing the environmental hazard.







4.5 WATER AND GROWTH

The impact of polluted water on agricultural crops.

Objectives

Researching the impact of pollutants in water on plants.

Outline

This activity includes an easily implemented experiment during which students will monitor plants watered with clean water compared to those receiving polluted water.

Materials

- Samples of water from various sources
- Small plots of earth or planters
- Plants
- A ruler
- Excel table or table on the blackboard

Introduction

Ask students to collect various samples of water in bottles and mark each with a sticker on which they write the source of the water, e.g. tap water, water from washing dishes, water from the school laboratory, water with agricultural fertilizers, water from fish ponds, stream water, salt water, water from a garage or factories, etc.

Note: water samples must be collected with adult supervision.

Conducting the experiment

- 1. Mark off sections of land according to the number of water types collected, including clean water. Alternately, use planters, one for each type of water.
- 2. Mark each section or planter with a number or the name of the water type that will be used, e.g. 1 fresh water, 2 dishwashing water, 3 pool water, 4 water used to wash the local gas station, and so on.
- 3. Prepare containers of equal size for measuring water to be used, or make small furrows in the ground.
- 4. Plant or sow an equal number of seeds or plants in each section, at equal intervals and as appropriate to the plants you've chosen. You can also sow a mix of seeds in each of the areas but it is important to ensure that the quantities of each type in the mix are identical in each of the planting areas.
- 5. Water the earth or planters every day, as suited to the type of plants you'll be growing.



It's best to do this at the same time each day. Fill in the table with details that describe how the plants are developing each day.

Note: We recommend conducting this experiment in groups: each group appoints someone responsible for each of its sections, or each group can be responsible for all the sections, on a rotational basis. Safety rules must be followed when exposed to contaminated water.

Daily progress tracking chart

Water Plant type	Clean water	Sewage water	Pool water	Gas station water
Height of plant				
Color				
Number of leaves				
Shape of leaves				

Water-type progress chart

	Plant height	Plant color	Number of leaves	Shape of leaves
Day 1				
Day 2				
Day 3				
Day 4				
Day 5				
Day 6				
Day 7				

Summary

- Analyze the outcomes of the experiment regarding infiltration of polluted water into the groundwater.
- Consolidate the findings.
- Discuss transboundary pollution. How can the situation be improved?




4.6 ENVIRONMENTAL DECISION-MAKING

Multi-participant simulation games

Objectives

- Experiencing environmental dilemmas and familiarization with the concepts "environmental justice" and "the commons"
- Participating in the process of democratic decision making
- Practice in structuring an argument and adopting a stance

Outline

After collecting data about environmental hazards, processing them, and presenting the map, students will participate in a simulation game which will help them understand the depth of the environmental issues in their communities and the transboundary consequences.

Below are two simulation games, which include numerous roles that cope with diverse environmental dilemmas. Choose the game most relevant to the environmental issues that your community is facing. Change the names of locations to local names wherever possible to make the game more actual for the students.

Materials

The games require role cards (see Appendix 4). Background to the concepts of social justice, sustainability and the commons.

Opening and warm-up

Each student prepares for her or his role (role cards in Appendix 4)

Main activity session

Simulation game 1:

A legal discussion – Who's responsible for polluting the water basin?

The court convenes for an emergency hearing about severe pollution in the "Blue Basin", a reservoir that provided water to the entire area for the past 50 years. The court will decide who is responsible for the pollution and will demand that party remove the pollutants and restore and rehabilitate the basin.

The following will give testimony before the court: representatives of the farmers, industrialists, council or municipal representatives, environmentalists, fishermen, public health representatives and doctors, and others.

Representatives of the Ministry of Environment will present the current laws, which will assist the judges and jury panel to reach appropriate decisions.

Simulation game 2:

What's to be done with all this garbage? The local planning authority needs to take a decision on whether to give a business permit to a landfill.

The local planning authority is meeting to decide whether to provide a business permit to the landfill in a hydrologically sensitive area, where pollutants may leach into the groundwater. The committee is faced by several possibilities:

- Canceling the permit
- Renewing the permit
- Setting conditions prior to renewing the permit
- Instructing that the landfill be relocated

Outside the building, during the course of the meeting, a stormy demonstration is being held by angry objectors to continued landfill activity in its current location.

Summary

Conduct a discussion of the terms "environmental justice" and "sustainability".

What is environmental justice?

This term comes to us from the field of social sciences and relates to the ambition to attain social equality relative to consumption of natural resources, and the impact of the individual on the environment and diverse sub-groups in society.

Environmental justice will be attained when people, irrelevant of their origins, culture or income, can enjoy (1) an equal degree of protection from environmental hazards and (2) equal access to natural resources which are part of the commons and include fresh air and clean water.

If we are to assure these rights, we need to be sure that all populations, irrelevant of their origins, color, nationality or income, can access appropriate decision-making processes.

The United States EPA (Environment Protection Agency) defined "environmental justice" in 1993 as follows:

"Environmental Justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies."

"Fair handling" means that no single group within the world population, including ethnic minorities or groups of lower socio-economic status, should have to suffer disproportionate impacts of detrimental environmental outcomes caused by industrialization, local authorities or implementation of policies and plans at the local, regional, national or international levels.

"Meaningful involvement" means:

- 1. Providing a real opportunity to the inhabitants of the affected communities to take part in decision-making relative to actions that detrimentally affect their environment and health.
- 2. Public activism and contribution can impact decision-making.
- 3. Concerns of all involved factors should be given suitable consideration in the decision-making process.
- 4. Decision-makers will support the involvement of those detrimentally affected.

Based on these definitions, ask students to think about situations where industrial activities, local authorities, or plans and programs instituted at the local, regional or national





levels, will disproportionately affect specific populations, for example: the decision to establish a new central bus station in Tel Aviv, in a south Tel Aviv neighborhood. The overall population would enjoy the services provided in one location, but the population living in the immediate vicinity, which is a disadvantaged population and hardly by coincidence suffers from air, dirt and noise pollution. Based on the four points above, how can these south Tel Aviv residents become meaningfully involved in the decisionmaking process?

Using the Tel Aviv Central Bus Station as your example, it's important we direct our attention to the high cost we must pay as a society if groundwater is polluted by fuel; to the high cost to health of poor people in polluted areas who can't afford to buy bottled mineral water; and to the environmental damage we leave to our children and our grandchildren. It is important to encourage an open discussion in the classroom, and explain to students that their personal views carry great weight in defining the potential risk of all types of hazards.

Further reading

Environmental Justice⁵² The Commons⁵³

52 Read the FAQ on the EPA website http://www.epa.gov/region7/ej/definitions.htm

53 Read "The Tragedy of the Commons" by Garett Hardin http://cecs.wright.edu/~swang/cs409/Hardin.pdf or watch short video explanation http://www.youtube.com/watch?v=4RE9PMwwaFc

4.7 BUILDING AN ENVIRONMENTAL CAMPAIGN

Objectives

Adopting a stance, empowering students to understand they have the chance of leading change and making an impact.

Outline

Following study on diverse topics related to water, it's time now to turn talk into action. In the following lessons, we'll plan a community campaign geared at raising awareness about water-related environmental challenges.

Planning and spreading messages and actions that can lead to positive environmental change are a class in activist citizenship. We're no longer observers on the sidelines, like some kind of reality show. Instead, we're going to create the reality we want to live in. Using democratic tools, we have the ability to become involved in our own reality and try to influence it.

Students will choose a campaign topic, consolidate the messages they want conveyed, and decide on courses of action and how to implement them in the field. The workshop is divided into three main stages:

Stage 1 - learning about campaigns as a tool for leading environmental change.

Stage 2 – brainstorming and creative thinking towards consolidating a campaign topic.

Stage 3 – detailed planning of the campaign's implementation and division of roles.

PART 1

Objectives

- Encouraging creative thinking, promoting out of the box thinking, and brainstorming to organize a public campaign.
- Turning the campaign ideas into a consolidated, enjoyable experience.

Opening and warm-up

Sit in a circle and scatter pictures, posters and petitions of other environmental campaigns in its center. Each student will choose one of these as an example, and try to guess the story behind it, what environmental message its producers seek to convey, and which target audience the message is meant to impact.

Examples of graphic material:

- Watch the clip⁵⁴ of 12 year old Severn Suzuki, who amazed the UN at its 1992 Environment Committee. How do our water trustees connect to her statements? What's changed since 1992?⁵⁵



54 See http://www.youtube.com/watch?v=oJJGulZVfLM

55 See Severn Suzuki speak 20 years later at the UN: http://www.youtube.com/watch?v=YtYy AAbLGQ



- Define the term "environmental campaign": planning and spreading a series of messages and actions leading to positive changes in the environment.
- Relative to appropriate examples, discuss the following issues:
 - What advantages or disadvantages are there to each of these activities?
 - Which activities are easier to produce?
 - Which activities can direct influence a larger scope of population?
 - What kinds of actions appeal to you?
 - What additional actions can you suggest for conveying your message?
 - Why do people produce campaigns?
 - What makes a campaign unique compared to other forms of action? (A campaign is public, provocative, can be backed by media communication, wide exposure, recruits people into activism, creates an atmosphere that readies the people for action).
 - What motivates people to take action?
- Group task: it's time to get out of the classroom! Create a flash mob with an environmental message. A flash mob is a public dance or activity of people who seem to be casual passersby, but who have all come to the specific location to mount some kind of public activity, which is performed, and then everyone disappears as though it never happened.
 - Watch the really cool flash mob⁵⁶ activity performed in Jerusalem in 2011
- Expanding activism activities: Appendix 5 contains five Israeli songs that relate to different levels of motivation to take action, from "sitting on the fence" to "you and I will change the world." Listen to the songs, analyze them, and check which level of action the students connect to most strongly.

PART 2

Decide on a water-related topic for the community campaign and define the campaign's purposes. Identify the resources available to the students (within the community, media contacts, budget) and plan the campaign.

Opening and warm-up

- Hold a brainstorming session for campaign ideas. Using a free association circle is a good idea. Examples of topics include: reducing environmental hazards; raising awareness of a specific creek's status and ways to address its rehabilitation; how to save water.
- Decide the campaign's overall goal: what do you want to achieve?
- Make sure the overall goal is specific, measurable and defined by a clear time frame. 90% must be complete by the end of the school year.
 - Example: The goal of our campaign is to reduce the heap of garbage being thrown unsupervised alongside the Harod Stream.



⁵⁶ See http://www.youtube.com/watch?v=0keEMnaKGvk

Main activity session

How to organize a campaign

- On the blackboard, write down the overall goal in the form of a question, e.g. How can we bring about the reduction of the pile of garbage being dumped alongside Harod Stream by the end of the school year?
- Beneath this, list two titles: POPULATION and ACTIVITY
- Think of as many activities and target populations as possible relevant to achieving the campaign goal.

Example:

How can we bring about the reduction of the pile of garbage being dumped alongside Harod Stream by the end of the school year?

Target Population	Activity
Families	Treasure hunt
Families	Showing a film
Children	Activity based on recycled materials
Children	Teaching and recording a song
Parents	Signing a petition
Parents	Lecture
Youth	Facebook
Youth	Creek-side party
Youth	Bike trip along the creek banks
Youth	Photographic exhibition of the garbage
Municipal council	Presenting the petition
Municipal council	Presenting a map of the pollutants
Senior citizens	Recording memories of the creek before its current state
Senior citizens	Field trip with songs
Ministry of Environment	Making a presentation or video clip
All residents	Inviting to a flash mob

To close the brainstorming session, list all the ideas on notes and scatter them in two bowls, one for target population, and one for activity.

Divide the class into groups of four students and instruct each group to draw at least two target population cards and two activity cards from the bowls. The result should be funny combinations like "seniors" and "treasure hunt", etc. This mixing of options will lead to further creative, out of the box ideas.

Each foursome gets 10 minutes to make a detailed plan that somehow coordinates between the target populations and the activities they drew, relevant to the overall goal.

Write each group's ideas down clearly on a large sheet of paper. Then spread these lists around the room. All students should move around reading them, and adding any other ideas they think might work and that focus on the main goal.



Summary

- What have you learned from producing this campaign?
- From the many creative ideas that surfaced in class, which did you like the best, and why?
- Repeat the formulated overall goal.
- Democratically choose two to three activities that the students want to implement. Explain and clarify to the students that they are responsible for planning and implementing the campaign (see part 3).

PART 3

Objectives

Planning the campaign actions and dividing roles.

Background

When youth plan and implement a campaign, added value comes in numerous ways and areas of learning and experience, including:

- Team work
- Creating activism
- Fair division of labor
- Economics resource planning via budgeting
- Developing individual skills and using them to benefit the group
- Changing points of view of youth about themselves, and the points of view of community members about their youth
- An opportunity to advertise and promote positive youth actions for the sake of the greater good
- Creating channels of feedback and evaluation of success
- Encouraging continued motivation and action

Preparing and implementing the activism plan based on the suggested model invites an examination of involvement by all group members. We hope that the **group process** the students undergo will be meaningful for them, revealing social sensitivity towards fellow group members, while conducting work beyond the group aimed at overall improvement for others.

Two guiding principles empower the group process:

- Participants are wholly responsible for all actions taken, from choosing the area of activity to planning to implementation to evaluation. Involvement in the chosen topic obligates full commitment in all areas of activity.
- It is far better that the socio-environmental action taken derives from real interest in an environmental cause, in the other and in everyone's needs, rather than out of a sense of coercion.



Water trustees dancing at the "Emek Hefer" Parade

Main activity session

Campaign planning checklist

Main goal:	Insert title here
Name of action:	Insert action description
Objectives:	Why is this action needed?
Target population:	Who is this action aimed at?
	Where will the action take place?
	Who will participate in it?
Framework: Where, who, what, when, how?	What does the action include?
	Timetable
	Materials needed
	Who could help us?
Panners / resources	If a budget is available, how can we use it best?
	What kinds of difficulties could we discover?
Possible obstacles	Who might cause difficulties?
	Who is responsible for what?
Dividing up tasks (roles	Which action comes first?
Dividing up lasks / loles	What's that action's deadline?
	Filling in a card for each role.
Evaluation (checking success of	How can we check that we have succeeded?
each action once it is completed)	Define three criteria of success.

Checklist for defining roles

Defining the role	E.g. investigator, team manager, PR person, graphic artist
Defining personal goals	E.g. the investigator's role is to collect \Box pictures and \Box narratives about the creek within \Box days \Box
	Who do I have to coordinate my actions with?
Cooperation:	Whose help do I need?
	Who can I ask for advice and assistance?
Timetable:	Coordinate a timetable with the other group members
Materials needed:	
Evaluation:	Did I fulfill my role in the defined time frame?



The Ziglab Dam at FoEME's EcoPark, North Jordan

APPENDICES CHAPTER FOUR



Appendix 1: Map of sewage water treatment plants planned for the mountain aquifer area



Name	0					Date and	d time			
Serial	Coordinate	coordinate	Hazard	Type of	Pollution	Hazard	Hazard	Level of	Estimation of	Other
#	×	>	description	pollution	source	weight	severity*	protection**	hydrological	comments
				source (by the		(by the index)	by personal impression	against pollution	sensitivity	(color, smell, pH,
				index)			(1-10)	leakage		photo)
-										
2										
З										
4										
5										
9										
8										

*Level of severity by personal precession (1-10). 1 = lowest severity. 10 = highest severity

**Level of protection against pollution of leakage (0.5-2). A higher value (2) indicates high level of protection against leakage (for example: a dump site with concrete isolation)

(like lime stone or sandy soil)? Is the height of ground water relatively high? (hydrological sensitivity = 5). Use a geological map or hydrological sensitivity ***Estimation of hydrological sensitivity (1-5). What is the type of soil or rock? Relatively non-permeable (like chalk rock or clay soil = 1) or permeable layers

Calculating the risk value for ground water:

 $\frac{\text{Ground water risk}}{= \frac{\text{hazard weight } *}{\text{protection}}}$

We will divide the result by 80 so that the final ground water risk value will be in a relative scale between 0-100.

Appendix 2: Environmental hazards field trip

Table of thematic potential hazards

This table is divided into three main categories of environmental hazards:

Infrastructure hazards: any hazard deriving from breakdowns or failures of various infrastructure systems, such as sewage leaks, surplus sewage, runoffs.

Industrial hazards: any hazard deriving from direct industrial activities, such as quarries, dangerous chemical waste, various factories.

Agricultural hazards: any hazard deriving from agricultural activities such as animal feces, heaped piles of animal waste.

The 'weighting' is based on the European Union index which has been adapted to this project and is in the range of 15 to 80. The higher the points, the greater the danger to the water source, especially to groundwater. The weighting relates only to the hazard-ous compound's potential to impact groundwater.

Details in the sections do not cover all human activities but only a sampling of them. Should you come across a hazard which is not listed in the table, think about the human activity that could be connected to it, and categorize it based on a similar activity in the list.

1	POTENTIAL GROUNDWATER HAZARDS INFRASTRUCTURE HAZARDS	WEIGHT
1.1	Sewage	
1.1.1	Sewage seepage from the municipal sewage system	60
1.1.2	Urban neighborhoods without sewage infrastructure	80
1.1.3	Sewage cesspits	55
1.1.4	Collection tanks / pools	35
1.1.5	Surplus wastewater (treated sewage) from the sewage treatment plant	40
1.1.6	Sewage runoff into the drainage system during extreme rainfall events	25
1.1.7	Other (any other hazard connected with sewage)	
1.2	Solid waste sites – possible seepage of runoffs from the following sources:	
1.2.1	Large garbage dumpsters	30
1.2.2	Transit stations	40
1.2.3	Garbage landfills	60
1.2.4	Construction waste	35
1.2.5	Dangerous chemicals dumps – such as medical or radioactive waste	80
1.2.6	Dumps for animal / fish carcasses	40
1.2.7	Any other hazard based on waste	

1.3	Fuels	
1.3.1	Above-ground fuel tank (without secondary containment system)	50
1.3.2	Ground level fuel tank	55
1.3.3	Gas station (which constitute a possibly severe source of hazards)	70
1.3.4	Vehicle repair garage	50
1.3.5	Other (any hazard connected to fuels)	
1.4	Transportation	
1.4.1	Road with no runoff system	30
1.4.2	Above-ground parking lot (unroofed)	30
1.5	Military installation runoff	70
1.6	Tourist and leisure installations (potential for intensive use and sewage leakages)	
1.6.1	Hotels	30
1.6.2	Camping sites	30
1.6.3	Restaurants	30
1.6.4	Sports facilities (football fields, golf courses, "Sportech" centers)	35
1.7	Other	
1.7.1	Cemetery	40
1.7.2	Neglected military installations	70
2	INDUSTRIAL HAZARDS	
2.1	Quarries and mines	
2.1.1	Inert quarry waste (not hazardous)	20
2.1.2	Heaps or dumps of hazardous materials (such as radioactive quarry waste)	80
2.1.3	Sand quarries (weight of hazard depends on depth of quarry – reducing the "protective range")	30-40*
2.1.4	Quarry on a creek channel (weight depends on quarry depth)	40-60*
2.1.5.1	Limestone and dolomite quarry (as above: weight also deter- mined by scope of fracture, density and karst effect in the rock)	40-60*
2.1.5.2	Chalk, igneous and metamorphic rock quarrying (hard insoluble rock – as above: weighting depends on depth of fracture and density)	20-40*
2.1.5.3	Open shallow quarrying for salt, clay, limestone, chalk	20-40*



2.1.6	Deep salt or plaster mines	50-60*
2.1.7	Deep coal and metals mines	50-75*
2.1.8	Petroleum, gas and shale drilling	80

* 2.1.3 to 7 – the hazard's weight depends on the depth of quarrying, the thickness of the geological layer remaining before reaching groundwater, and the hydrologic traits of the specific layers; and whether other runoff from polluting sources infiltrate into them.

2.2	Industrial factories	
2.2.1	Metals factories	50
2.2.2	Metal coating	80
2.2.3	Production of oils	75
2.2.4	Rubber and tire factories	40
2.2.5	Paper factories	40
2.2.6	Tanneries	70
2.2.7	Olive presses	70
2.2.8	Factories producing food from livestock – dairy, abattoir, carcass treatment, etc.	60
2.2.9	Factories producing food from plant sources – wineries, juice fac- tory, pickles factory etc.	40
2.2.10	Other (any hazard sourced in industrial production)	
3	AGRICULTURAL HAZARDS	
3 3.1	AGRICULTURAL HAZARDS Livestock based agriculture	
3 3.1 3.1.1	AGRICULTURAL HAZARDS Livestock based agriculture Animal pen, cowshed	50
3 3.1 3.1.1 3.1.2	AGRICULTURAL HAZARDS Livestock based agriculture Animal pen, cowshed Waste dumps of animal feces	50 55
3 3.1 3.1.1 3.1.2 3.1.3	AGRICULTURAL HAZARDSLivestock based agricultureAnimal pen, cowshedWaste dumps of animal fecesSunken tanks for animal feces	50 55 65
3 3.1 3.1.1 3.1.2 3.1.3 3.1.4	AGRICULTURAL HAZARDSLivestock based agricultureAnimal pen, cowshedWaste dumps of animal fecesSunken tanks for animal fecesGrazing land (estimate the intensiveness of use and closeness to streams or springs)	50 55 65 15-30
3 3.1 3.1.1 3.1.2 3.1.3 3.1.4 3.1.5	AGRICULTURAL HAZARDSLivestock based agricultureAnimal pen, cowshedWaste dumps of animal fecesSunken tanks for animal fecesGrazing land (estimate the intensiveness of use and closeness to streams or springs)Poultry coops	50 55 65 15-30 35
3 3.1 3.1.1 3.1.2 3.1.3 3.1.4 3.1.5 3.1.6	AGRICULTURAL HAZARDSLivestock based agricultureAnimal pen, cowshedMaste dumps of animal fecesSunken tanks for animal fecesGrazing land (estimate the intensiveness of use and closeness to streams or springs)Poultry coopsFish ponds – freshwater	50 55 65 15-30 35 40

3.2	Plant based agriculture	
3.2.1	Open farming land worked with conventional agricultural methods	30
3.2.2	Dumps for fertilizers, weed killers and pesticides	55
3.2.3	Greenhouses (estimate the use of fertilizers and pesticides, and types)	40
3.2.4	Irrigation with insufficiently treated sewage or wastewater	60
3.2.5	Irrigation with secondarily level treated wastewater at 20/20 standards **	45
3.2.6	Irrigation with tertiary level treated wastewater at 10/10 standards $**$	30
3.2.7	Irrigation with wastewater of AMBER standards for return to creeks and unlimited irrigation – 5/5 standards **	20
3.2.8	Other (any hazard sources in agricultural activities)	

** These figures relate to two chemical traits: (1) biological oxygen demand – BOD (2) Total suspended solids – TSS





Appendix 3: The Giving Stream

Based on the story "The giving tree" by Shel Silverstein. Reworked by Amy Lipman Avizohar.

Once there was a stream...

Which loved a particular small child.

Every day the child came to play by the stream, paddling his feet in the clear water, jumping across the pebbles,

Making a little dam and floating boats of dry leaves down the stream. And the little child loved the stream very much. And the stream loved the child very, very much.

When the child tired, he rested in the shade, listening to the stream gurgling, watching the insects, gazing at the plants, and all the other creatures that came by. And the little child loved the stream very much. And the stream loved the child very, very much. And both were very happy.

Time passed, and the child grew up. And then, one day the child came to the stream, And the stream said: "Come, child, come and play in the stream! Float your leaf-boats and be happy!"

And the child said: "I'm much too grown now to float leaves down the stream. I want to make money. I want to be an engineer!"

The child turned and went away, and did not return for a very long time. And the stream was very sad.

Then suddenly one day, the child returned.

The stream shivered and shook in joy, and said: "Come, child, come. Play in the stream and be happy!"

And the child answered: "I'm much too busy to play in the stream. Now I'm a mechanical engineer and I want to be a successful industrialist! And for that I need water. Lots of water. Do you have some water to give me?"

"Take my water," answered the stream. "Use my water and be happy." And the child built pumps and pumped lots of water to his factory. And the stream was happy.

And the child went away and did not return for a very long time, and the stream was sad. But when the child returned, the stream was filled with such joy that it could hardly talk.

"Come, child, play in the stream..." it offered, "float dry leaf-boats and be happy!" "I'm much too old and worried to play," said the child, "but to be richer I need more water. Lots more water!"

"Take my water," answered the stream. "Use my water and become even richer." And the child built another factory and set of pumps, and pipes too, and the stream was happy. But not really as happy as before.

And the child went away and did not return for a very long time. And the stream was sad. Much, much later the child came back.

As he stood on the stream's bank, the child heard the stream say: "I'm so sorry. I don't have much to give you. I have such little water now. I'm no more than a trickle in a very small, half-ruined channel. If only I could give you something, child."

"Oh, I don't need much," **the child answered**. "I've already got successful factories, and loads of money. Now all I need is somewhere to pour the runoffs and sewage that flows from my factories. Can I pour my sewage into you?"

The stream was silent.

And the boy connected pipes from his factory to the stream bed, and let all the sewage and dirty polluted water flow into the stream.

And the stream was silent.

And was never happy again.



Appendix 4: Environmental Decision-Making

Role Play Cards

Simulation game 1: Court of law – Who's to blame for the Blue Basin's pollution?

Background

Data from the Water Authority indicates that part of the most important and central water reservoirs in the national supply system are of inferior status as far as quality of their water. This endangers the continued supply of drinking water over the long term. The following act investigates who is responsible for polluting the Blue Basin, and determining the type of treatment needed, in the hope that the reservoir can be rehabilitated. Among those being investigated are: farmers, manufacturers, and holders of important positions in local government and authorities.

Preparation

Each group (farmers/industrialists/local authority representatives) receives a background story explaining the reservoir's pollution. The group members must learn the facts and consolidate several statements which they will use in defense of their stances when being questioned. The victims of the pollution also receive background stories.

- Investigators and jury read all the stories and consolidate 3 questions for each representative. We recommend giving the reading materials out as homework.
- Organize the classroom like a court room and bring in costumes and accessories to create a suitable atmosphere, for example: a policeman's hat for the usher, a hammer for the judge to induce quiet; for investigators, black hats (can be cut from cardboard); for the farmers, green ties (can be made from green crepe); for the industrialists, orange ties; for representatives of local government, purple ties; representing fishermen, a professor of ecology, with a magnifying glass; representing sick people, a doctor specializing in infections, with a stethoscope; for the lawyers and jury, blue ties (symbolizing water, the topic under discussion); and large background pictures of reservoirs.

Course of the simulated hearing

- The usher calls the courtroom to order.
- The judge begins with opening remarks.
- The usher invites representatives of different sectors to give testimony according to a set list and ensures everyone does not go over their allocated time:
 - Each sector representative can talk for 2 minutes
 - Investigation by legal counsel 5 minutes per representative
- The jury then convenes to make its decision and thereafter one of its representatives reads it out
- Summarizing discussion

Role cards

Committee Usher
All those gathered here are requested to maintain absolute silence during the investigation! Rise in honor of the Judge.
The usher will invite each sector's representatives to give testimony, and ensure that they stay within the time limits:

.....

- Representatives of victims of pollution can describe how the pollution has affected them – 2 minutes
- Every sector representative describes her or his sector's background 2 minutes
- Investigation by legal counsel 5 minutes per representative

Declare a recess of 15 minutes for the jury to convene and consolidate its decision. The jury representative reads out the jury's decision.

The judge closes the session.

Judge's opening remarks

I address my remarks to this respectable public. We have gathered here today because of the severe pollution found in the Blue Basin. As you all know well, this reservoir has provided water for the residents of the entire region for the past fifty years. Our neighbors beyond the border also use the reservoir's water. This committee's role is to reveal who is responsible for polluting the Blue Basin and demanding appropriate steps be taken to rectify the situation in the hope that the Basin can be rehabilitated. Among those who will be investigated here today are farmers, producers and members of local government.

Farmers

Your forefathers came to settle here more than 200 years ago and began working this land. We have now become one of the largest suppliers of vegetables in the area. Your leading agricultural products include bananas, avocados, potatoes, cherry tomatoes, and bell peppers, known worldwide for their taste.

For years you used special pesticides adapted to your produce and the climate of this area. The pesticides were bought from a chemicals factory in the nearby industrial zone. Since the containers in which the pesticides are supplied cannot be recycled, your creative solution was to use them for building a fence along the length of the stream. In recent years there is increased demand for organic produce, following which you, too, have reduced the amounts of chemical pesticides being used.

In addition, you found a solution for water saving irrigation and developed a unique strain of sweet peppers. Currently you have no choice but to change the plastic sheeting on your greenhouses. However, to cut costs in plastic recycling, which total some 100,000 shekels annually, you prefer to burn the plastic sheeting on Saturdays because you know that on the Sabbath, the local authority's environmental supervisors do not work. The area's residents have admittedly complained about the smell and the smoke, but they are also the people who enjoy your agricultural produce.

.....

Industrial manufacturers

In your factory, you make paint for diverse uses: painting walls, metals, wood and more. In 2008 you won the "Long Lasting Paint" award from the American Paint Association and you are very proud of your achievement.

Like other production plants in the area, you collect paint residues and dangerous materials in huge tanks positioned in an open field adjacent to the factory. When these tanks are full, you allow the waste to flow into the nearby stream.



Five years ago, as part of an unscheduled examination by the Ministry of Environment representative, cracks were found in these tanks and waste was found to be leaking into the creek. As a result the factory was fined half a million shekels and the factory owner received a warning letter.

Since then, new evacuation containers were purchased and there is ongoing negotiation over evacuating the dangerous waste to the Ramat Hovav special dump. In addition, the factory owner has appointed a research team to develop a type of paint from more ecological and environmentally friendly materials. In the meantime, however,

when it rains in winter, waste still spills into the nearby creek.

Local government representatives

You are the popular head of the local council, Nissim Matzliach, and have been developing education and agriculture in this area for the past 40 years. It is thanks to you that residents enjoy excellent schools and advanced agriculture. But during your term of appointment, not enough of the budget was directed towards developing and improving the sewage infrastructure in the council's jurisdiction. Some of these areas still use cesspits. In towns with sewage infrastructure, the pipes are old and often found to be leaking. Every rainy winter, the system clogs and overflows. In the past, the council was fined NIS 250,000 for mismanagement of this area of council responsibility.

The establishment of a sewage purification and treatment plant is being delayed since the neighboring authorities are not showing any cooperation. Recently you have approached the Ministry of Health and Ministry of Environment's Offices for the Protection of Nature, with a request for financial assistance in establishing the waste water treatment plant.

Representative for fish farmers – Dr. Karp, Professor of Ecology

The Blue Basin has been known since the early 20th century for its diverse fish, and for being part of a prosperous ecosystem. In the past 50 years, the variety of fish has drastically dropped, and some have become extinct following the Basin becoming polluted. As a result, the entire ecosystem is affected: plants have dwindled, and other animals are shifting to other areas.

Representatives of ill patients – Dr. Rofah, specialist in infectious diseases

Over the past 15 years, your work at the local hospital has allowed you to take note of a sharp increase in the number of patients suffering from a rare type of intestinal cancer. All these patients lived near the Blue Basin. Despite your extremely busy schedule, you decided to interview these patients and examine their nutritional habits. You found that most of them drink bottled Blue Basin water, marketed in local shops. The "Blue Basin Water Bottling Company" heard about your activities and its representatives are threat-ening to prevent you from disclosing your findings.

The members of the jury convene to discuss the following issues:

- Who are the people chiefly responsible for polluting the Blue Basin?
- What share of the responsibility for these pollutant outcomes and their consequences must they take upon themselves?
- What can be done to promote cooperation among all parties and prevent repeated acts of pollution?

The law provides that the members of the jury are endowed with the following authority and rights to decide:

- The Water Law provides the authority to issue an **order to repair.** This allows for instructing the polluting party to cease all polluting activities, restore the status to its former level, and avoid repeated polluting events. If the polluting party does not undertake the full instructions of the order to repair, the Water Authority is entitled to undertake this action and bill the polluting party for all expenses.
- The **Water Law** allows for demanding that the polluting party will be penalized in the following ways: one year of imprisonment or a fine of NIS 350,000.
- **The Public Health Ordinance** provides the authority to instruct the holder of any water source, disqualified for use as drinking water, to restore the water to its former quality, making it suitable for drinking once more.
- **The "Polluter Pays" Law** determines that in the event of water pollution resulting in, or which may result in, damage or injury of a significant scope to the environment, the polluting party can be penalized with up to three years imprisonment or a fine of up to twice the cost of rehabilitating the polluted water reservoir, or up to four times the savings or profit that the polluting party earned while polluting the reservoir.
- Any entrepreneur must conduct an **Environmental Impact Survey** before any process of development or construction in order to examine the future environmental consequences of these development or construction activities
- **Public involvement** in the planning process, and in reporting problems, is of utmost importance. It is the public's right to submit opposition to any plan, to voice criticism and indicate existing problems, and to pressure towards having them handled.

Source: Israel Ministry of Environment site⁵⁷

The jury will read out its decision.

Summarizing discussion:

- How did you feel when you presented your stance?
- Can the jury's decision optimally address and resolve the problem of pollution?
- What is each sector responsible for doing in order to prevent repeated incidents of pollution?
- Which groups were not presented in this investigative committee?
- What can the simple citizen do to prevent pollution of water sources?
- In large letters write the terms SUSTAINABILITY and ENVIRONMENTAL JUSTICE on two large sheets of paper. Brainstorm over their meaning, and sketch in a free-association web.

Sustainability: a state in which our activities today will not damage the ability of future generations to provide for their needs.

Environmental justice: can be attained when every individual, irrelevant of her or his origins, culture or income, enjoys (1) the same degree of protection from environmental hazards and (2) equal ability to access natural resources which are part of the commons, such as fresh air and clean water.

- How can water be used in sustainable ways? Formulate rules or a charter.
- Present the FoEME map of communities (in Appendices for chapter 1) and review several examples of shared watersheds and how transboundary pollution is being



⁵⁷ See http://www.sviva.gov.il/English/Pages/HomePage.aspx



coped with, such as establishing joint waste water treatment plants, and more (examples in chapter 4).

Summary

As the community's water trustees, your most important task is to raise awareness of this precious treasure available to us, the resource of water; to prevent it from becoming polluted; and to encourage saving water.

We've got the power to impact!

Further reading

"Renewing Creation: Genesis and Sustainability"⁵⁸ by Dr. Jeremy Benstein Environmental Justice: http://env.gal-soc.org/?LanguageId=1 http://www.adamteva.org.il/?CategoryID=1105&ArticleID=1825

⁵⁸ See http://www.huffingtonpost.com/jeremy-benstein-phd/renewing-creation-genesis-and-sustainability_b_1955433.html

Simulation game 2: What will we do with all this garbage?

The local planning authority must reach a decision on whether to give a permit to the landfill.

Outline

The local planning committee is convening to decide whether to give a permit to the landfill site, a business operating in a hydrologically sensitive area: in other words, pollutants may seep into the groundwater. The committee faces several options: to cancel the business license; to renew the license; to set specific conditions which must be met if the license is renewed; or to instruct that the landfill be relocated.

During the course of the meeting, a wild protest of angry residents opposed to the continued landfill activities in the current location is under way. On the other side of the building, another group of residents is demonstrating in support of the business and claiming that it should not be made to relocate to their area!

Preparation

Present the outlines of the discussion and the story. Divide the class into three groups:

- One group represents the owners of the garbage landfill.
- A second group represents the Ministry of Environment.
- Both groups read the claims of the other in order to prepare and present their own counterclaims.
- Each of these groups chooses a representative speaker who will present these claims on behalf of their group.
- The third group leaves the classroom on a "secret" mission: to protest against the landfill. Some will represent environmentalists opposing the landfill due to fear of water pollution, and others will protest as concerned residents of Beer Sheva opposing the transfer of the landfill to their area.
- In addition, appoint a Committee Chair, committee members, photographer, TV journalist, and police to maintain public order.

Conducting the hearing

Each party receives 5 minutes to present its stance and 2 minutes to respond to the other party's claims.

The Committee Chairperson leads the discussion.

The committee members conduct a vote to decide whether:

- To provide a business permit
- To cancel the business permit
- To provide conditional authorization (and determine those conditions)

Role cards

Position presented by "G.O.L.D. Landfills Ltd."

The G.O.L.D. Landfills Ltd. is a private business that you head and that operates a garbage landfill handling garbage of some million Greater Dan Area residents. The site is located in hilly terrain, above the mountain aquifer. Lately you have completed a site upgrade by spreading a three-leveled protective layer on the ground to prevent seepage of polluting leachates. In light of these preventative measures, you are expecting



the Planning Committee to renew the company's business permit. Your main claims are: The site fulfills the most stringent criteria for garbage landfill. The Greater Dan residents need a waste removal location. When the location was bought 50 years ago, the land's designation was authorized for a landfill and the company received all authorizations needed to operate the site according to law. The area's groundwater is polluted as a result of a plastics factory closed at the time that G.O.L.D. Landfills Ltd. purchased the location. Position of the Ministry of Environment You are in charge of preventing water pollution in the State. From environmental tests of groundwater in the area, some of the pollution is relatively new and not connected with the plastics factory that used to operate there. Although the landfill was updated by the three-leveled ground cover, you still oppose renewing G.O.L.D.'s business permit based on the following claims: Protecting groundwater is a task of the highest priority as far as we're concerned. The three-leveled ground cover will rip or disintegrate over time. In the past decade, new standards have been activated for separating garbage, and these are meant to address toxic leachates developing in the landfill sites. The site does not meet garbage separation standards. Preference is given to transferring the site to the Beer Sheva area since there is no danger of polluting groundwater there. Position presented by protesters You are strongly against the landfill site and have decided to protest. Some of you are protesting as environmentalists opposed to the landfill because you fear that the water will become polluted, and some of you are protesting as concerned residents of Beer Sheva who oppose transferring the site to your area. Prepare signs, think of slogans and ways to create impact and effect.

Summarizing discussion

- Which two vital needs of society are at conflict here?
- Are you familiar with similar conflicts from your areas?
- Were they solved?
- What parameters are needed, in your opinions, to reach decisions concerning garbage landfills? (Guidelines: the severity of impact/degree of short term and long term impact/economic cost of not coping/other).
- Are there any out of the box solutions that might prevent environmental conflicts of this kind? (separating garbage at source/reduction of garbage quantities/recycling that will prevent opening a new landfill).
- In large letters write the words SUSTAINABILITY and ENVIRONMENTAL JUSTICE on two large sheets of paper.
- Brainstorm their meaning and sketch an associative ring. Further details can be found in the activities summary of the court, "Who is responsible for polluting the blue reservoir?"
- Ask the journalists and photographers to prepare a media report and present it in the next class. Alternatively, ask the students to write a composition on whether they agree or disagree with the Committee's decision and why.

Appendix 5: Expansion to the Campaign Workshop

Discussion on social activism through the avenue of 5 songs

Crying shame – Jack Johnson

Written by: D. Schlitz, B. Maher, M. J. Johnson

It's such a tired game Will it ever stop? How will this all play out Out of sight, out of mind

By now we should know How to communicate instead of coming to blows We're on a roll And there ain't no stopping us now We're burning under control Isn't it strange how We're all burning under the same sun?

Buy now and save, it's a war for peace It's the same old game But do we really want to play? We could close our eyes it's still there We could say it's us against them We can try but nobody wins Gravity has got a hold on us all

We try to put it out But it's a growing flame Using fear as fuel Burning down our name And it won't take too long Cause words all burn the same And who we gonna blame now? And oh, it's such a crying crying crying shame It's such a crying crying crying shame, shame, shame

By now, it's beginning to show A number of people are numbers that ain't coming home I could close my eyes it's still there Close my mind be alone I could close my heart and not care But gravity has got a hold on us all

It's a terrific price to pay But in the true sense of the word Are we using what we've learned? In the true sense of the word Are we losing what we were?

It's such a tired game Will it ever stop? It's not for me to say And is it in our blood? Or is it just our fate? And how will this all play out Out of sight, out of mind And who we gonna blame? On and on Just a crying crying crying shame It's such a crying crying crying shame shame shame





Waiting on the world to change - John Mayer

Written by: J. Mayer

Me and all my friends We're all misunderstood They say we stand for nothing And there's no way we ever could

Now we see everything that's going wrong With the world and those who lead it We just feel like we don't have the means To rise above and beat it

So we keep waiting (Waiting) Waiting on the world to change We keep on waiting (Waiting) Waiting on the world to change

It's hard to beat the system When we're standing at a distance So we keep waiting (Waiting) Waiting on the world to change

Now if we had the power To bring our neighbors home from war They would have never missed a Christmas No more ribbons on their door

And when you trust your television What you get is what you got Cause when they own the information Oh, they can bend it all they want

That's why we're waiting (Waiting) Waiting on the world to change We keep on waiting (Waiting) Waiting on the world to change

It's not that we don't care We just know that the fight ain't fair So we keep on waiting (Waiting) Waiting on the world to change

And we're still waiting (Waiting) Waiting on the world to change We keep on waiting (Waiting) Waiting on the world to change

One day our generation Is gonna rule the population So we keep on waiting (Waiting) Waiting on the world to change

No, we keep on waiting (Waiting) Waiting on the world to change We keep on waiting (Waiting) Waiting on the world to change Waiting on the world to change Waiting on the world to change Waiting on the world to change

Animal – Ani Difranco

Written by: A. Difranco

More and more there is this animal	And I think when you grow up surrounded
Looking out through my eyes	By wilful ignorance
At all the traffic on the road to nowhere	You have to believe that mercy has its
At all the shiny stuff around to buy	own country
At all the wires in the air	And that it's round and borderless
At all the people shopping	And then you just grow wings
For the same blank stare	And rise above it all
At America the drastic	Like there, where that hawk is circling
That isolated geographic	Above that strip mall
That's become infested with millionaires	

I think when you grow up surroundedAsk anBy wilful ignoranceHarmYou have to believe that mercy has itsAnd theown countryAnd aAnd that it's round and borderlessIt's a vAnd then you just grow wingsThat icAnd rise above it allAnd theLike there, where that hawk is circlingThat mAbove that strip mallBut it v

Ask any ecosystem Harm here is harm there And there and there And aggression begets aggression It's a very simple lesson That long preceded any king of heaven And there's this brutal imperial power That my passport says I represent But it will never represent where my heart lives Only vaguely where it went

More and more there is this animal	Cause I know when you grow up sur-
Looking out through my eyes	rounded
Seeing that animals only take from this world	By wilful ignorance
What they need to survive	You have to believe that mercy has its
But she is prowling through all the religions of men	own country
Seeing that time and time and time again	And that it's round and borderless
Their gods have made them	And then you just grow wings
Special and above	And rise above it all
Nature's law	Like there, where that hawk is circling
And the respect thereof	Above that strip mall





Revolution – The Beatles

Written by: J. Lennon, P. McCartney

You say you want a revolution Well, you know We all want to change the world You tell me that it's evolution Well, you know We all want to change the world But when you talk about destruction Don't you know that you can count me out

Don't you know it's gonna be all right? All right, all right

You say you got a real solution Well, you know We'd all love to see the plan You ask me for a contribution Well, you know We're all doing what we can But if you want money For people with minds that hate All I can tell is brother you have to wait

Don't you know it's gonna be all right? All right, all right You say you'll change the constitution Well, you know We all want to change your head You tell me it's the institution Well, you know You better free you mind instead But if you go carrying pictures of chairman Mao You ain't going to make it with anyone anyhow Don't you know it's gonna be all right? All right, all right All right, all right, all right All right, all right, all right All right, all right!

Get up, stand up – Bob Marley Written by: B. Marley, P. Tosh

Get up, stand up: stand up for your rights! Get up, stand up: stand up for your rights! Get up, stand up: stand up for your rights! Get up, stand up: don't give up the fight!	Get up, stand up! (get up, stand up!) Don't give up the fight! (life is your right!) Get up, stand up! (so we can't give up the fight!) Stand up for your rights! (lord, lord!) Get up, stand up! (keep on struggling on!) Don't give up the fight! (yeah!)
Preacher man, don't tell me, Heaven is under the earth. I know you don't know What life is really worth. It's not all that glitters is gold; Half the story has never been told: So now you see the light, eh! Stand up for your rights. Come on!	We sick an' tired of your ism-skism game Dyin' an' goin' to heaven in Jesus' name, lord. We know when we understand: Almighty god is a living man. You can fool some people sometimes, But you can't fool all the people all the time. So now we see the light (what you gonna do?) We gonna stand up for our rights! (yeah, yeah, yeah!)
Get up, stand up: stand up for your rights! Get up, stand up: don't give up the fight! Get up, stand up: stand up for your rights! Get up, stand up: don't give up the fight! Most people think, Great god will come from the sky, Take away everything And make everybody feel high. But if you know what life is worth, You will look for yours on earth: And now you see the light, You stand up for your rights. Jah! Get up, stand up! (Jah, Jah!) Stand up for your rights! (oh-hoo!)	So you better: Get up, stand up! (in the morning! get it up!) Stand up for your rights! (stand up for our rights!) Get up, stand up! Don't give up the fight! (don't give it up, don't give it up!) Get up, stand up! (get up, stand up!) Stand up for your rights! (get up, stand up!) Get up, stand up! Don't give up the fight! (get up, stand up!) Get up, stand up! Stand up for your rights! Get up, stand up! Don't give up the fight!



CHAPTER FIVE GOODWATERNEIGHBORS



Youth camp 2013

GOOD WATER NEIGHBORS

INTRODUCTION

Water holds a central role in the lives of all living things in the universe, and addresses existential and emotional needs that do not differentiate between origin, country or culture. In some places on our planet, however, the differences between availability of and accessibility to water are so large that it's not entirely clear how to bridge them.

If this is so, what is the meaning of the phrase "Good Water Neighbors"? How can people live alongside each other, and share the water resource fairly and in a way that satisfies the needs of all parties, while still leaving enough for nature's own needs?

In an era where water usage is on the rise, reservoirs are endangered due to overpumping, infiltrating pollutants, changes in climate, and political disputes which hold water as a negotiating ace card, it would appear that "good water neighbors" is an impossibility. On the other hand, in contrast to common perceptions, worldwide attempts have proven that it is precisely the disputes over water that have unexpectedly led to discussion and greater cooperation rather than increased conflict. This is explained by the United Nations⁵⁹, among others:

Despite the complexity of the problems, records show that water disputes can be handled diplomatically. The last 50 years have seen only 37 acute disputes involving violence, compared to 150 treaties that have been signed. Nations value these agreements because they make international relations over water more stable and predictable. In fact, the history of international water treaties dates as far back as 2500 BC, when the two Sumerian city-states of Lagash and Umma crafted an agreement ending a water dispute along the Tigris River - often said to be the first treaty of any kind. Since then, a large body of water treaties has emerged.

In our case, it seems even more pertinent than ever to "look at the half full part of the glass" and see how we can make that fill to the top. How can conflict or dispute over water, wells, springs, rivers or aquifers be turned into golden opportunities for change, become incentives to become better acquainted with each other, to think of creative joint solutions that address the problems of water, and improve our quality of life and environment, local economy and perhaps even make a first step towards sustainable peace?

The fifth and final chapter of this guide is based on the knowledge and maturity that the students have gained so far, and includes the following activities:

- What is the difference between need, want and right? What rights are there to water and sanitation?
- Understanding the concept "conflict" at the personal level and familiarization with ways of coping.
- Communication and conflict resolution, and aspiring to a Win-Win status.
- Coping with water dilemmas that reflect the Israeli-Arab conflict.
- Preparing for an encounter with the neighboring committee: breaking down stereotypes, a basic lesson in Arabic, guided mediation, releasing fears, adjusting expectations.

The activity closing this guide, as suits a guide bearing the title "Good Water Neighbors", includes ideas for acquaintanceship games between children and youth of different communities who share a common water resource.

Cheers!

59 From http://www.un.org/waterforlifedecade/transboundary waters.shtml



5.1 THE RIGHT TO WATER

Objectives

Analyzing the connection between need, wish and right. Defining the right to water. Familiarization with true cases of inaccessibility to water.

Outline

The Universal Declaration of Human Rights is the fundamental document of the international community as far as the rights of human beings and citizens. The declaration was adopted by the United Nations General Assembly on 10 December 1948, and is described here⁶⁰.

A broad array of international documents relates to the issue of water and sanitation, but only in July 2010 did the UN General Assembly acknowledge the right to water and basic sanitation conditions, emphasizing that clean, safe drinking water and basic sanitation constitute an inextricable part of realizing basic human rights⁶¹.

For this activity, students will dedicate thought to the connection between need, want, right, and obligation, and will specifically examine the right to water and sanitation. They will learn about the central parameters defining the right to water, will be exposed to relevant narratives on lack of access to water, and will try their hand at "copywriting" – composing a convincing message on this issue for the governments of the world.

Further background

The Association for Civil Rights in Israel (ACRI)62

Warm-up

Need – Want – Right

- 1. Divide the class into pairs and ask the students to prepare a list of all their needs as an answer to the question: What will make you happy, healthy and satisfied children?
- 2. Each couple will prepare a poster with two columns: needs, and wishes. They will then write down the items in their lists (a) according to which column they match.
- 3. Each couple will now rate the items in the "needs" column according to their order of importance.
- 4. Questions for discussion: Who is responsible for providing these needs? What is the connection between need and right?

Main activity session

PART 1 - WATER - NEEDS AND RIGHTS

- 1. Divide the students into new groups or pairs and ask them to prepare a list of water needs assist with the question: What do we use water for?
- 2. Ask the students to rate the water needs they listed in order of importance and create a joint list on the blackboard.
- 3. Which of the needs in the list is a right?
- 4. Who decides which need is a right, and who is responsible for ensuring this right is fulfilled?

⁶⁰ See http://www.un.org/en/documents/udhr/

⁶¹ From http://www.un.org/es/comun/docs/?symbol=A/RES/64/292&lang=E

⁶² See http://www.acri.org.il/en/

Questions for discussion

- Should water be declared a human right?
- Why was water only declared a right in 2010, and not earlier than that?
- Are some populations more entitled to water than others? Should the right to water be upheld under all circumstances and for everyone who seeks it?
- Who is entitled to realize the right to water?
- Are there committees or settlements that do not have direct access to clean water?
- Tell the class about an Israeli and/or Palestinian and/or Jordanian city or village where the inhabitants suffer from a shortage of water.

PART 2 - HOW CAN WE DEFINE THE RIGHT TO WATER?

- Ask each pair of students to think about what indicators might define realization of the right to water.
- It is possible to dramatize the four indices, with the rest of the class guessing what they are. These are the indices:
 - Quantity 100 liters of water per day per person are needed to provide for her or his basic needs.
 - Quality water for personal or domestic use must be clean of microorganisms, chemical and



- radioactive traces and/or any other pollutant that may damage health.
- Access the source of water must be no more than 1000 meters from the home, and the time it takes to collect or pump them should be no more than 30 minutes.
- Price the cost of water should be no more than 3% of total domestic income.

Pictures from around the world can be shown to demonstrate each index, and the students will explain whether for each index the right to water is realized, or not.

PART 3 – CAMPAIGN GEARED TO RAISING AWARENESS ABOUT: THE RIGHT TO WATER AND SANITATION

The right to water and basic sanitation was only declared in recent years, and therefore aware-

ness about it must be raised and governments worldwide must be persuaded to implement it.

The group is the "Creative" Advertising Company, which won the tender advertised by the UN. "Creative" must raise awareness throughout the world of "the right to water" according to the information it holds which include facts about water accessibility worldwide and relevant articles (see Appendix 1). The group will compose an advertisement in



the form of a jingle/video clip/dance/poster/Facebook questionnaire or any other avenue that will publicize the right to water.


Stories from life about water shortages

My dream is that water will flow in our taps all the time without us needing to have containers on the roof that have to be filled, and without fearing water stoppages. I also really want us to have a swim - ming pool, so that we can go swimming in the hot summer months.

Marhaba! My name is Nisrin, and I live in Wadi Fukin, a small village west of Bethlehem, south of Jerusalem. I'm in 9th grade and the youngest of four siblings. I have two sisters and one brother.

Our village buys water from Israel's Mekorot Company, and every month my family pays about NIS 150 for the supply of water, which is about 6% of my father's salary.

We have containers on the roof of our house, and my family fills them with water each week. But in the summer months there's always a shortage of water and we need to wait for between two to three weeks to fill the containers again. During these months we need to be really aware of the water supply coming to the taps, because if the water comes to the taps in the middle of the night, we'll miss the chance to fill the containers. That's why in summer we miss a lot of sleep time, because of our worry over the water supply.

Throughout the year we use water very carefully. We also have a rain collection system and we use grey water for the garden.

The biggest problem we face during the hot summer months is that we can't shower more than once a week, or sometimes twice at the most. Imagine that!

My dream is that water will flow in our taps all the time without us needing to have containers on the roof that have to be filled, and without fearing water stoppages. I also really want us to have a swimming pool, so that we can go swimming in the hot summer months.



Ahlan, my name is Sali, and I live in a small Jordanian village called Creimeh, in the north Jordan Valley. The story of my village and water, which comes to us from wells, is long and sad.

We get drinking water once a week from the local council and we store it in special tanks. Water is distributed once a week for the entire neighborhood and every family stores its water in its tanks when its turn comes. In my house we call this "the water day." We have two tanks that hold 2 metric cubes of water each, and that amount is supposed to last us the week, until our turn comes again. By the way, my father pays about 10% of his monthly income for water.

It's happened frequently enough that I've turned on the tap and not even one drop came out. Imagine how hard it is for a family of ten people to shower no more than once a week, because there simply isn't enough water. That's why we always try to shower on "water day."

During the long hot summer, which sometimes lasts for seven months, our water usage goes up and the number of tanks isn't enough for all our needs.

It worries me to see how so many people in our community waste water every day, by not paying attention, and by lack of awareness of the importance of saving water and recycling it. Water is a blessing from Allah, and we have to understand how vital and important it is to everyday life. If we lose water, we'll also lose life.

My dream is to see everyone aware of the importance of saving water, by using special water saving attachments on taps, being careful about closing the water while brushing teeth or when soaping dishes or hands until it's time to rinse. I dream of the day when every house will install a grey water recycling system and a rainwater collection system for various uses such as gardening and house cleaning.

Water is a blessing from Allah and the Prophet Muhammad of blessed memory forbade us from wasting water even in times of plenty:

"Do not waste water, even for purification purposes, even if you are near a flowing river."

5.2 CONFLICT AS AN OPPORTUNITY FOR CHANGE

Source: Elad Vaizana, Havayati website63

Objectives

- 1. Familiarization with conflict and ways of coping on the personal level
- 2. Familiarization with the concept that conflict is also an opportunity for change

Outline

The following two activities connect students to the significance of conflict in their personal lives, so that they can project the same principles on conflict resolution vis-a-vis water.

The first activity lets students examine ways of coping with conflict, and thinking about how to transform dispute into opportunity.

The second activity lets students practice how to reach a win-win status. They practice communication under challenging circumstances and end by learning the speech "Peace between the Courageous" by Yitzhak Rabin at the time of signing the Peace Treaty with Jordan in 1994.

Opening

What does the word "conflict" mean to me?

Bring to the classroom: sheets of paper, writing tools, colors – possibly also pictures and magazines for collaging.

Ask each student to produce a page on which she or he described the meaning of the word "conflict."

Ask the students to place their work in the center of a circle and prompt any of them who want to talk about her or his work: What do we see in this work? What does it express? What is conflict, in my opinion? Allow others participating to ask questions.

Questions for discussion

- What have we learned about the way each student perceives the concept of "conflict"? It is highly probable that a great many negative responses will be heard, such as: it's bad, it's undesirable, it's difficult and problematic.
- Why are there differences among the perceptions of conflict among the students?
- Which things recurred in the students' works?
- What unique things surfaced from these works?
- Why do we perceive conflict this way? Can conflict be perceived differently, for example as a chance for change and growth?

The main activity

Ways of coping with conflict

Present 5 ways of coping with conflict to the class:

- 1. Avoidance
- 2. Conceding (foregoing)
- 3. Competition (clashing, confrontation)
- 4. Compromise
- 5. Cooperation



⁶³ See http://www.havayati.co.il/about_en.html

Which coping strategies appeared in the works produced by the class?

Ask each student to write a description of a conflict she or he has recently coped with. What were the advantages and disadvantages of the coping method each student chose?

Questions for discussion

- Did the way you coped with the conflict allow you to progress, or block you? Will you choose this way of coping in the future?
- Did your method of coping with the conflict turn it into an opportunity for change?
- Advise your friends how they can turn the conflict into a chance to create a new situation.

Conflict as opportunity

Write the phrase CONFLICT AS OPPORTUNITY on the blackboard.

The word "conflict" in Chinese has two meanings: danger, and opportunity. How can conflict be used as opportunity? If we don't react automatically by fleeing, clashing or conceding, and we try to look at the opportunities that can be found in this natural, human situation, we can see that conflict offers a chance for:

- Familiarization
- Change
- Learning about the self and the other
- Understanding needs and wants
- Coping with challenges
- Finding creative solutions
- Improving the quality of life

Write these things on the blackboard, or on large sheets of paper that you hang around the classroom.

Summary question

How can conflicts over water between countries serve as opportunities for change?



Water Trustees at youth camp in the SHE EcoPark in North Jordan⁶⁴

5.3 COMMUNICATION AND CREATING A WIN-WIN SITUATION

Objective

Practicing communication and creating a win-win status using three exercises.

Outline

Three different exercises demonstrate different challenges in communication and enable students to think out of the box about conflict situations, directing them to finding solutions that are acceptable to both sides.

Exercise 1 Back-to-back

Students are divided into pairs and sit back-to-back in a long line. One student receives an image and the other receives a blank page and pencil. Students holding the pictures describe it to their friend without letting the friend see the picture. The friend needs to sketch the image as described on the blank page. Five minutes later, check the outcomes. See Appendices for full picture.



Questions for discussion

In what ways do we communicate with each other? Is it difficult to communicate without words? Is it difficult to communicate without seeing the other person's face? What happens when two sides don't understand each other?

Exercise 2 – The Story of the Orange

Prepare two notes:

Your mother is very sick (God forbid) and the doctor explains to you that the only way to save her is to drink orange juice. In the center of the room lies the last orange left in the whole world.

Your mother is very sick (God forbid) and the doctor explains to you that the only way to save her is to eat the orange peel. In the center of the room lies the last orange left in the whole world.





Conducting this activity

- Choose two volunteers and ask them to leave the room.
- The group remains in the room seated in a circle.
- Explain to the group that each volunteer is about to receive a note listing a task that lets him or her get the orange. Read both notes to the group, and point out that the volunteers don't know what is written in the note they didn't get.
- Explain that the group's role is ONLY to observe and pay attention to the dynamics developing between the two volunteers, and that the group must not intervene.
- Put an orange in the center of the room and then go to the volunteers waiting outside and give each of them separately one of the two notes. Explain to each separately what the task is, without letting the other one hear.
- The volunteers return to the classroom and sit in a circle. From this moment on, the volunteers are invited to commence their task. A dynamic will develop. It may be that they will try to snatch the orange away, or perhaps conduct a negotiation. After several minutes, the facilitator will limit the volunteers in order to create pressure.
- At the end of the set time, the game is stopped. Open a sharing session, where every person in the group, except the volunteers, is asked to talk about how she or he perceived and understood the dynamic between the two volunteers. You can help with guiding questions such as: Was there conflict here? What coping method did each volunteer use? How can the problem be solved?
- After everyone has spoken, the volunteers share their own experiences.

Summary

Reflect to the class that reality is sometimes complex. The basis for finding a solution is attentiveness, respect, consideration, and developing reciprocity. Examples can be given from nature, or think of examples from the students' lives and conflicts arising as a result of lack of communication.

To reach the win-win status, we need to move from stances of demanding, to understanding the needs, and checking interests. Honest exposure of needs on each side's part can help reach solutions and compromises that take both sides into account.

Exercise 3: O – X game

Divide the class into pairs and ask each student to prepare two cards: one card marked X and the other marked O. The students sit facing each other and simultaneously choose one card and place it face up on the table.

Points system

- X-X both students lose one point
- **X-O** X gets two points, O gets nothing
- **O-O** both students get one point

After three rounds, stop the game and ask the pairs of students if they have come to an agreement amongst themselves on the points accumulation. Play another three rounds.

Questions for discussion

What can be learned from the game? What was the interest of each participant? Can there be a sure win in this game? What can we learn from this game about life? Is life black and white, as in the X-O game? In real life, how can each side win (in her or his own way) to reach a win-win situation?

Summary of exercises

The three exercises showed us three stages of conflict resolution. Write them on the board or a large sheet of paper.

- 1. Building communication and trust between the sides.
- 2. What's your need? Revealing interests and honest exposure of needs; avoidance of accumulating stances or accusations.
- 3. Finding creative solutions that will meet the needs of both sides.

To reach a real win-win status in life, each side must be open and flexible to change. It may be that the solution requires concession, which might not be the solution we're dreaming of, but it's still sufficient.

Let's go back to personal conflicts that the students described in the exercise book. Guide the students to use the three stages of conflict resolution and advise their friends on how to turn conflict into opportunity and a win-win status.

A conflict experienced by one of the students can also be acted out, and a mediating student invited to solve the conflict in three stages.

What links the three exercises to water?

Water is a precious commodity that we all need, so we must share it in an intelligent way. Fair division comes about by listening to the needs of each side and progressing towards win-win where both sides are satisfied, and nature benefits.

Peace between the brave

In July 1994, King Hussein of Jordan met with Yitzhak Rabin, Prime Minister of Israel, at the White House, initiated by the President of the USA at the time, Bill Clinton. After a week of discussion, the meeting ended with signing the "Washington Declaration"⁶⁵ in which both leaders declared the end of the state of war and hostilities between Israel and Jordan: "After generations of hostility, bloodshed and tears and in the wake of years of pain and wars, His Majesty King Hussein and Prime Minister Yitzhak Rabin are determined to bring an end to bloodshed and sorrow."

The Washington Declaration served as the basis for formulating the peace agreement signed four months later in the Arava Valley. The declaration earned broad support in Israel and its parliament, the Knesset: 105 members of parliament supported it and only 3, from the "Moledet" party, voted against.

In the Washington Declaration signing ceremony that preceded the peace agreement, Yitzhak Rabin, Israel's Prime Minister of the time, spoke at the American Congress. His speech greatly moved those who heard it, in Congress and in Israel. Here is an excerpt from that speech⁶⁶:

"Your Majesty, we live on the same stretch of land. The same rain nourishes our soil; the same hot wind parches our fields. We find shade under the same fig tree, and savor the fruit of the same green vine. We drink from the same well, and the laughter of a baby in Amman can wake the sleeping citizens of Jerusalem. Only a 70-minute journey separates these cities. Seventy minutes—and 46 years. And just as we have been great enemies, so can we be good neighbors...

Your Majesty, we have both seen a lot in our lifetime. We have both seen too much suffering. What will you leave to your children? What will I leave to my grandchildren? I don't

⁶⁶ From http://www.rabincenter.org.il/Items/01099/RabinAddresstoU.S.Congress.pdf



⁶⁵ http://www.kinghussein.gov.jo/w-declaration.html

have any assets. I have only dreams: to build a better world -- a world of understanding and harmony, a world in which it is a joy to live. This is not asking for too much.

Your Majesty, the State of Israel thanks you – for accepting our hand in peace; for your political wisdom and courage; for planting new hope in our hearts, in the hearts of your subjects, and the hearts of all peace-loving people. And I know that you enjoy the highest esteem of the United States – this great America which is helping the bold to make a peace of the brave.

Your Majesty, tomorrow I shall return to Jerusalem, the capital of the State of Israel and the heart of the Jewish people. Lining the road to Jerusalem are rusting hulks of metal – burnt out, silent, cold. They are the remains of convoys which brought food and medicine to the war-torn and besieged city of Jerusalem 46 years ago. For many of Israel's citizens, their story is one of heroism, part of a national legend.

For me and for my comrades-in-arms, every scrap of cold metal lying there by the wayside is a bitter memory. I remember, as though it were just yesterday, the youngsters who died inside those metal heaps...I remember them. I was their commander in war. For them this ceremony has come too late. What endures are their children, their comrades, their legacy.

And I, I.D. Number 30743, Retired Lieutenant-General Yitzhak Rabin, a soldier in the Israel Defense Forces, and a soldier in the army of peace; I, who sent regiments into the fire and soldiers to their deaths, I say to you, Your Majesty, the King of Jordan, and I say to you, American friends: Today we are embarking on a battle that has no dead and no wounded, no blood and no anguish. This is the only battle that is a pleasure to wage – the battle for peace.

Tomorrow, on the way up to Jerusalem, thousands of flowers will cover the remains of those rusting armored vehicles, the ones that never made it to the city. Tomorrow, from those silent metal heaps, thousands of flowers will smile to us – "Shalom," peace."

Discussion and Analysis of text

- Raising the issue of water (rain, wells) in the first paragraph as the most basic common denominator among neighbors. Highlighting similarities and further emphasizing the common interest (future of our children and grandchildren, etc.).
- Arriving at a state of win-win requires courage, compromise and concession.
- Presenting the cost of war, humility, respect, and preference of gain over loss.
- The conflict turned into an opportunity for acquaintance, improvement of quality of life, and the building of peaceful relations.



Hand shake between Prime Minister Yitzhak Rabin and King Hussein, President Bill Clinton looking on, 1994

5.4 THE WATER DILEMMA

Objectives

Raising awareness of the disparities between Israel and Palestine relative to water supply and needs.

"Stepping into the shoes" of the other side, and acquaintance with the complexity of the water dilemma.

Outline

This activity deals with the encounter between the Palestinian and Israeli communities relative to the dispute on water and sewage. Through role-playing, students can familiarize with the main claims of each side, the Palestinian and the Israeli. The process of both sides meeting, revealing their needs and searching for win-win solutions that serve the interests of both sides should reflect the



modes of action recommended by FoEME for shared water resource management.

Materials

- Picture of a house with water tanks
- Tables of water usage in Israel and Palestine
- Role cards (in Appendix 3)

Opening and warm-up

The average Israeli consumption is 160 liters per person per day (showers, bathroom, cooking, laundry).

Imagine that you live in the house shown in the picture with a mother, father, sister and two brothers. The family totals 6 persons.

Exercise 1

On the roof of your house are 2 water tanks, each of them holding 2 metric cubes of water. Each of the family members uses 160 liters per day. Calculate how many days the water from both tanks on the roof will last.

Answer:

 $\frac{2 \text{ tanks x } 2 \text{ cube x } 1000 \text{ liters per tank}}{(140)^{11}} = 4 \text{ days}$

(160 liters x 6 persons)

Explain to the students that the house in the picture is in Bethlehem, in Palestine. Unlike the Israeli home, where water flows from the taps all the time, when the tanks empty out at the house in Palestine, there's no water. Tanks are usually filled once every ten days. In other words, if the Bethlehem family would use water in the same way that an Israeli family does, at the rate of 160 liters per person per day, the water in the Bethlehem family's house would run out on the fifth day.





Exercise 2

Now calculate the allocation of water in reality per person per day in the house where 6 people live with two water tanks on their roof. Each tank holds 2 cubic meters, which is 2000 liters. The tank is filled every ten days on average.

Answer:

2 tanks x 2 cubic meters x 1000 liters per tank = 666.6 liters per person

6 people

666.6 liters = 66.6 liters per person per day

10 days

In the summer months, the water supply sometimes comes only once in three weeks.

Explain to the students that this activity deals with fairly distributing the water between Israelis and Palestinians. Remind them that the main source of water for both peoples is the mountain aquifer (see map of mountain aquifer in activities under 2.3).

On the board, present a table with data of average needs in Israel and Palestine. Go over the data in a general way only because we will come back to them in the summary activity.

	Average home consumption	Municipal con- sumption	Leaking from pipes	Organized sewage collection	Wastewater treat- ment and recycling for irrigation (% of total wastewater)
Israel	166 liters per person per day	80 liters per person per day	10%	90%	80%
PA	70- 80 liters per (oerson per day	30%	In cities, more than 50%; in villages much less	Less than 50%

Source: www.foeme.org

Main activity session

Divide the class into two groups and let each one read one side of the story concerning an Israeli and a Palestinian delegation meeting to discuss the water dilemma. Roleplaying game cards are in Appendix 3.

Later lead the students in thinking about how to resolve the dilemma.

For the first stage, each group should:

- Define the problem
- Define its needs
- Think of as many solutions as possible to the problem
- Choose players to fill the roles of the delegation members

For the second stage, the delegations return to the assembly and demonstrate the "hot chair" method to the students:

- Place the same number of chairs as delegates in an outer circle
- In the inner circle, position four chairs
- The first two players, representing farmers, sit in the inner circle in order to act out the dilemma and remain there throughout the game
- A member of each delegation enters, contributes to the discussion, and is then replaced by another delegation member. Once delegation members can't be replaced, declare a "freeze" and ask students to swap places
- Explain the need to find a solution that's acceptable to both delegations within the allocated time frame
- If the discussion is not moving forward, remind the students about the stages of conflict resolution (win-win actions)
- If the students reach a solution, analyze together what helped them reach it. If they didn't succeed in reaching a solution, analyze what the obstructions were.

Summary

Conduct a debate of principles on the topic: Israelis and Palestinians drink from the same source: the mountain aquifer. Is the allocation fair and ethical or should it be changed? What's the best way to resolve this issue?

Water is a unique resource. It flows through and under and over political borders and can be repeatedly utilized. Therefore, it is vital to find a unique solution, one that is creative and flexible, and unlike the division of other resources such as land.

But since water is also a limited resource, our challenge is to arrive at an agreement for managing water that is acceptable to all parties. Reaching a long lasting solution requires consolidating the shared interest, locating the needs of both sides, and allowing equal representation. This approach is procedural and ongoing and requires a great deal of patience and mutual respect.

An innovative approach to joint Israeli-Palestinian water management⁶⁷

Transboundary water agreements are usually conceived as allocation agreements. In other words, water is treated as if it were a pie to be divided among the riparian states. This approach works for land, which is stable, but not for water, which not only moves along, across and under political boundaries but can be used over and over from the time it originates as precipitation until it eventually finds its way back to the sea or evaporates or seeps into a deep aquifer.

Though a fixed allocation — that is, specific amounts or percentage shares to each of the parties — is sometimes useful to avoid conflict and solve short-term problems, it is not appropriate as a way to ensure efficient, equitable, and sustainable management of shared water over the long term.

Flexibility, not rigidity, is what is needed for effective joint management of shared water. The FoEME Proposal first defines those bodies of water that are shared by the two parties and establishes equal rights to that water. The Proposal then provides for continuous,

⁶⁷ From the publication, "An agreement to share water between Israelis and Palestinians: The FoEME Proposal", Brooks, D.B., Trottier, J. March 2012. http://foeme.org/uploads/13411307571~%5E\$%5E~Water_Agreement_FINAL.pdf



cooperative water management based on agreed-upon rights and responsibilities as well as ongoing monitoring of the aquifers and dispute resolution mechanisms. That approach is consistent with the thrust of international water law as it has developed over the past 100 years. The proposed model manifests attempts at negating politics when making decisions concerning water usage: while any decision concerning water requires relating to politics, this is a different mode of thinking than bestowing a political nature to the decision based on nationalism, religion or ethnicity. In other words, water usage is given consideration by applying rules intended to protect the ecosystem for the sake of everyone's benefit, and the water is allocated to the parties involved in ways that fulfill their needs and allow each party's development without arousing disputes over national security or one party's development at the expense of another.

The proposal relates to the Palestinian / Israeli dispute over water as an issue involving a large number of institutions and stakeholders which currently implement their policies without regard for the other parties. Joint water management is not an easy operation to run, and for the Israelis and Palestinians it is particularly complex as a result of the long term hostility between the two peoples, the disparity in their rates and norms of economic development, and their almost oppositional approaches, where Israel supports a centralized approach (top to bottom) and the Palestinians support a decentralized approach (bottom to top).

Rather than trying to define fixed water allocations for both sides, this proposal seeks to incorporate the various institutions and stakeholders using water into a flexible framework that will allow fair and sustainable management of the resource. In the final run, the biggest problem facing both sides is not the division of water as a resource, but how to use the joint resource fairly and sustainably.

Over and above the obvious advantages of larger amounts of clean water, this project constitutes a trust-building activity which can prove that joint management is not only feasible, but practically implementable. It has been proven that joint management of water creates a positive dynamic of its own and leads to cooperation in additional areas on the way to peace.

This new approach to sharing water by two sovereign peoples is based on an extended process of mediation upheld at appropriate levels of management in regard of water. The process would be based only on a parallel need for equality and sustainability, and would be subject to review of applicability and implementability to be managed by the relevant stakeholders in Israel and Palestine. The full proposal includes an organizational structure for the parties comprising the institution that would implement the FoEME proposal, as well as a flow chart of activities and information between these parties.

5.5 BREAKING THE STEREOTYPE

Objectives

Familiarization with the concept of "stereotype" and its impact on our behavior.

Materials

- The two questions appearing further down, written onto large sheets of paper
- Colored round stickers on which various characteristics are written
- ID cards, and empty "ID cards"
- Writing materials

Opening and warm-up

Associative game

Seat the students in a circle and say a word. The student sitting to your right will say the first word that comes into her or his head on hearing your word. Continue round the circle this way, each student saying the first thing that comes to mind on hearing the last word that is spoken.

Ask the students the following questions:

- A mother has 8 children. Three are deaf, two are blind and one is mentally challenged. She is now pregnant again. Additionally, she herself is not in great health, and her chances of giving birth to a healthy child are poor. What would you recommend she should do?
- It's time to choose a new world president: who would you vote for?
 - Candidate 1 is known for his connections with corrupt politicians, consults with astrologists, has two lovers, smokes heavily, and drinks 8 to 10 martinis a day.
 - Candidate 2 used to take drugs as a student, was fired twice from his place of work, sleeps every day until the afternoon, and drinks at least a quarter-liter of whiskey each night.
 - Candidate 3 is a military hero honored with numerous awards and medals, drinks liquor occasionally, is a vegetarian, and has never had an extramarital relationship.

Conduct an anonymous vote and write the results on a note.

Additional activities

- Prepare cards in advance with pictures of people who have significantly influenced the world. Make sure they include women, politicians, scientists, criminals, and more.
- Each student takes an empty ID card which has spaces for first name, family name, profession and place of residence. You'll need a large number of empty ID cards.
- Present a picture of a figure to the class, and each student fills in the ID card for that person. Ask each student to read out what she or he wrote. In the next stage, present to the class the real facts concerning each figure.
- Finally, hold a discussion that examines how our brains work, and what our sources of perception are when it comes to categorizing people.



Main activity session

Who are you?

Place a large sticker with one stereotype on each student's back. Students will walk around the room and will talk to each other based on the stereotype-sticker, without revealing what the sticker says.

For example: if a female student's sticker says "Blonde", the student talking to her might ask stereotypical questions, such as "Where are your high heels?", "What's your IQ?" and so on. Once this activity has run for several minutes and all students have experienced numerous encounters and questions, have the students return to the circle, and each of them will try to guess the stereotype written on the sticker on their own backs.

Examples of stereotypes could be: blonde, ultra-Orthodox, Moroccan, kibbutznik, secular Jewish, Arab, Persian, religious, left wing, pimp, homosexual, right wing, alcoholic, Russian, and any others you may wish to add.

Ask each student what is helping her or him to guess the stereotype on her or his sticker, and question the other students about why they related to each particular person in one or another specific way. Link concepts for each stereotype – e.g. blonde = stupid, Persian = miserly, etc. – and try to clarify the degree to which the stereotype is relevant and whether it's really appropriate to relate to an entire group of people using a stereotype. Emphasize the importance of difference among individuals comprising the group.

Task

- Pair students off.
- Each pair is given a card with an ID that you have filled out in advance with the first and family name of a real person that the students are less likely to know, from all spheres of life. Choose names that make the students think in clearly stereotypical terms.
- The ID cards have spaces for filling in the following categories: name, profession, place of residence, family status (single / married), number of children, hobbies, and so on. Ask the students to fill in these details based only on the clue of the name appearing on the card.
- Once the cards are filled in, ask each pair in turn to read theirs out. Then give the truthful factual information for each name. The idea, of course, is to break stigmas and stereotypes. For example: Muhammad Ibn Raul who lives in Tel Aviv and is a specialist heart surgeon.

Discussion and Summary

Raise questions in the classroom following this activity and clarify the students' approaches to stereotypes. Do they feel there is a stereotype relative to themselves as a group, and/or relative to each of them as individuals? Has this activity made them think differently about certain people? Hold a discussion on the question of whether it is appropriate to judge someone and assume character traits based only on the group that individual belongs to, or based on external appearance alone?

Project the discussion results on the forthcoming encounter with the neighboring community: can existing stereotypes be broken relative to the groups the students are going to be meeting? Ask: what do you think they assume about you?

Lastly, remind the students of the two questions that started this activity and offer these facts: - The world president:

- Candidate 1 was actually Franklin Roosevelt, the 35th president of the USA
- Candidate 2 was Winston Churchill, Prime Minister of the United Kingdom, a novelist and historian
 - Candidate 3 was Adolf Hitler
- And the woman pregnant for the ninth time was the mother of Ludwig van Beethoven, the genius musician and composer.

5.6 PREPARING FOR THE REGIONAL MEETING

Objectives

To coordinate expectations and cope with fears prior to the encounter with neighbors.

Outline

It is reasonable to assume that before the meeting with the neighboring community, questions, expectations and uncertainty will arise among the participants. It is important to process these feelings and thoughts in order to arrive as well prepared and openminded as possible for this intercultural experience at the youth camp.

1. Explain the Objectives of the camp to the students, as well as content, and who they will be meeting.

Goal of the meeting:

- Familiarization with the water reality of our region and the hazards endangering the water sources
- Consolidating an idea for joint action to prevent the main environmental hazard to the region's water source
- Acquaintance of youth from neighboring communities, and sharing learning activities and experiences
- 2. Hold a meeting with parents and students in attendance, and explain the goals of the camp and anticipated program.
- 3. Invite an older student who participated in the previous camp to talk about the experience and answer questions. Screen the presentation of photos from previous years.
- 4. Look at the pictures or clips that the neighboring community prepared.
- 5. Check the equipment list and guide the participants as far as dressing relatively modestly (T-shirt with decent length sleeve rather than sleeveless or tank tops; at least knee length or longer pants rather than shorts).
- 6. Check that all students have handed in parental permission; and a photocopy of their passports if the camp is in Jordan.
- 7. Prepare a poster or presentation together about your community: photos from school, the environment, samples of local environmental hazards, and more.

Expressing and coordinating group and personal expectations

Group activity: the facilitator will prepare questions in advance (samples offered below) on notes or cards which are folded and placed in a hat. Hand the hat to a participant who takes a note, reads the question and chooses another participant to address the question. The hat is passed to the student who answered, and so forth.

Sample questions:

- What do you think will happen at the camp?
- What concerns do you have about the camp?
- What are you most curious to know about the participants from the neighboring communities?
- What do you feel is important for your neighbors to know about you?
- What do you think the cross border neighboring community will think about your group?
- What do you think your contribution to the group will be?

Prepare sufficient questions to cover one per group member.

The personal perspective:



Each participant takes two notes: on one, each writes down one concern or cause for hesitation over the upcoming camp with other youth, and on the other, one characteristic that she or he feels will help in coping with that concern.

- Concerns can be: boredom, being hated, they won't like the presentation, and so on.
- Coping characteristics can be: I'm funny, I connect easily to people, I understand Arabic, I have patience, and so on.

Have the participants put their notes into two separate hats, one for concerns and the other for character traits. Mix them and then carry the hats around to the students and let each pick one note from each hat, and read out the content. The student can then describe whether she or he identifies with the two notes, and can be assisted by the ideas, or identifies with just one of them, or with neither. The most important element here is to get the students talking freely about diverse aspects of the upcoming meeting. At the end of the session, invite the students to collect all the notes, find an interesting way to link them, and produce a presentation about strengths and weaknesses.

Summary

- Ask the students what they think the Jordanians and Palestinians might write down as concerns.
- Think of three factors that could cause the camp to fail, such as language barriers, and ways of coping with these factors.
- Think of three components that are success related, and how to achieve them, for example through initiative and openness when creating connections.

In this activity's summary, emphasize that even though each of us needs to cope with different concerns, as a group we can share our strengths and abilities to help each through moments of difficulty or crisis. Reflect to the group that just as each of them is different and special, and has her or his own particular strengths, the same is true relative to the groups from neighboring communities, where we'll meet a diverse selection of people and we need to stay open to familiarizing with and respecting the differences among us.



Water trustees who recorded "A Local Love Song"

5.7 IMAGINING A WORLD WITH NO BORDERS

Objectives

- Dreaming about a reality of peace among neighbors
- Conveying a message of peace to the children and youth on "the other side" and a willingness to familiarize, through drawings

Outline

This activity was written up by one of the facilitators from the Eshkol Regional Council in 2012, as Kassam rockets were being shot into Israel from the direction of Gaza. The facilitator wished to encourage her students to dream about a different reality than the one they knew by talking about how things used to be when the security situation was better, when there was a connection with the people who are so close yet so far, and especially about children beyond the border.

The guided imagery creates a space that allows dreaming about a peaceful reality, friends on both sides of the border meeting at the beach during vacations, having a good time, sharing festive occasions together, and knowing how to speak the two primary languages of Hebrew and Arabic.

At the end of the guided imagery, the students produce drawings for the children on the other side.

Notes:

- This act admittedly relates to the connection between the Eshkol area and Gaza but can be reproduced and adapted for other geographical areas.
- The activity is suited to relatively small and consolidated groups, with good relationships of trust between the group members and the facilitator.
- The guided imagery section can be skipped and only the artistic element activated, following an open discussion on guiding questions such as "How did it used to be?", "If only we could...", "What's the optimal scenario?" and so on.

Materials

Gentle meditative music for the guided imagery, mats, colored pages and cards, colored pencils/crayons/markers and so on.

Opening and warm-up

Sit in a circle and encourage discussion about the connection that used to exist between the Gaza Strip and the Eshkol region from several angles:

- Geography: Besor Stream passes through the Eshkol region, continues onto Gaza and spills into the Mediterranean Sea. Ask leading questions such as:
 - How does that impact our relationship?
 - Who's responsible for keeping the creek clean and preserving it?
- Local employment and economy: people from Gaza used to work in agriculture and construction throughout the area and now don't. Israelis used to do a lot of shopping in Gaza markets and stores but now they don't.
- Vacation: the beach was a place where everyone used to come people from the Eshkol region and from Gaza.



- Peaceful relations: the border used to be open and people would pass through. There didn't used to be fear and terror attacks. People were happy to familiarize with each other's cultures and cooperate together.

Main activity session

Guided imagery must be conducted in a pleasant, comfortable atmosphere. Students can sit in a circle on the floor, with their eyes closed; or lie on mats or the lawn. Gentle background music can be played. Once everyone is calm and breathing smoothly, begin:

Close your eyes, take two deep breaths.

Now breathe out in one shot all the bad thoughts and fears.

Breathe in clean air and good thoughts.

Let the air flow all the way to your toes.

Relax your head, your shoulders, let your hands and legs feel free.

Imagine it's the summer holidays, and everyone's going to the beach in Gaza.

The sea is fresh and clean, and the sand is so pleasant when you walk on it.

Your friends from Gaza are waiting for you.

You've really missed each other a lot because a whole year has passed since you last got together at the beach for some fun.

Now you're playing football or volleyball together.

You all understand each other because you and your friend speak both Arabic and Hebrew. You tell each other about movies you've seen, and other experiences you've had over the year.

You turn on some music and everyone dances.

Afterwards you all eat a meal together.

You've had a great time.

Everyone's happy.

You take some funny photographs together and promise to post them to Facebook. It's getting late.

You get on the bus to go home and tell your parents what a fantastic day it was, and that next summer you'll meet your friends again.

Summary

Once the guided imagery is complete, ask students to draw pictures related to it as a message of peace and a wish to become acquainted. Collect the pictures and send them to the facilitator beyond the border, in the hope that pictures from the neighboring group will be sent back.

Youth artwork from a cross border camp at the Alexander River, Emek Hefer



5.8 ICE-BREAKING GAMES Objectives

- Social: breaking the ice among participants
- Cognitive: learning names
- Emotional: tightening connections among participants

These goals are achieved by:

- Name games
- In-depth familiarization games
- Trust building games
- Sports activities

1. Funny familiarization and consolidation games

Fruit Salad

on games

Object of the game: consolidating children into mixed groups by creating personal connections and the sense of belonging to multiple diverse groups.

Redefine the characteristic of the groups each time so that students will quickly need to repositions themselves. Here are some ideas:

- Boys / girls
- Tall / short
- Like sweet food best / like salty food best
- Right handed / left handed
- Wearing a light colored top / dark colored
- Prefer winter / summer
- Dark hair / light
- Wearing shoes / sandals
- Position in the family: oldest / youngest / middle
- Long hair / short
- Ask the children to come up with additional ideas: Vegetarian/Carnival, Like sunner/Winter etc.

Each time the groups consolidate, you can integrate clapping as a way for the children to appreciate each other's similarities and differences.

Sinking ship

Participants stand on chairs arranged in a circle and begin walking on them. Facilitators are the "sharks". Periodically remove a chair from the circle. This challenges the group to cope with less and less chairs. A student who falls "drowns" and is out of the game.

Three noses, four ears

Participants move around the room and form groups according to the facilitators' instructions, for example: 3 hands, 5 legs, 3 blue tops, and so on.

The wind is blowing on anyone who...

Have enough chairs arranged in a circle for all the participants minus one. One participant stands in the middle and says the following: "The wind is blowing on anyone who..." and adds some kind of ending, for example: "...has 4 or more brothers and sisters." Everyone who matches the statement stands up and must leave her or his chair and look for a different place to sit, but explain to the children that the trick is for the speaker in the middle to make a statement that allows him or her to find somewhere to sit as the



others get up and change places.

The person left standing now takes the position of the speaker in the center. Ideas for statements can be based on height, shoe size, age, clothing color or type, favorite snacks, and more (see also "Fruit Salad", above).

Hand and finger

Participants stand in a circle and hold out their

right hand with the palm down. Then they place a finger of their left hand on the outstretched hand of the person next to them. The facilitator tells a story and every time a certain word is mentioned, such as "water", the participants try to catch their neighbor's finger by flicking their right hand quickly around (see picture).



Playing "Hand – Finger" at youth camp in Lotan, Arava Valley

2. Name games

Shlaflaf

Sit in a circle. The facilitator stands, holding an empty bottle and points with it to a participant, saying "shlaflaf." The child immediately has to answer with her or his name. The facilitator can alternate by saying the child's name and the child must answer "shlaflaf." The idea is for the facilitator to do this quickly and confuse the kids into giving the wrong answer. For example: if the facilitator says "Tomer shlaflaf Tomer" then Tomer must answer in the right order, "shlaflaf Tomer shlaflaf" – no other combination is correct.

When the facilitator works at the right tempo, the children will make mistakes that get everyone laughing.

Name and movement

Participants stand in a circle. Each one says her or his name and makes a movement. Everyone repeats the name and copies the movement. For example, if Yael says her name and makes swimming movement, everyone does the movement and says "Yael." This game is reinforced by being followed up with "Name ball."

Name ball

A participant throws a ball at someone else and says her or his own name as she or he throws. Once everyone has thrown the ball and said their names, reverse the play: the thrower needs to say the catcher's name.

Name and gift

The group sits in a circle. Each participant says her or his name and offers a 'gift' to the group or the universe that begins with the same letter as her or his name. Later the facilitator can lead a "gift sale" and students can "choose" the three nicest gifts they'd like.

Name song

Every participant says her or his name and hobby or favorite interest. The facilitator divides the group into smaller groups, and each team turns its team's names and hobbies into a song linked to a melody.

Who's hiding behind the curtain?

The facilitator prepares a hiding place by using a blanket hung as a curtain. After all the group members have given their names in different games, the facilitator asks one child to volunteer and leave the room for a few moments. The group chooses one participant to hide behind the curtain, and the facilitator can choose any number of children to swap places with each other, including to the seat left empty by the participant waiting outside. The volunteer is called back in and needs to discover in just one minute who's missing from the group. If the volunteer can't remember the missing person's name, she or he has to repeat it 5 times.

Name market

Each participant receives 4 notes and writes down her or his name in English on them. The notes are jumbled into a hat, and each participant is then given – or can choose – 4 notes. The children now need to "trade" with each other to get their own 4 notes back, but the holder of any name note can only give it back to its owner if the owner can return a note with the recipient's name on it.

Name market

Split the group into pairs of one Hebrew speaker and one Arabic speaker. Give each "partnership" 8 notes, 4 each. On each note, the child writes down a word she or he would like to learn in the partner's language. The words need to be in transliterated English. Then the partners swap notes and fill in the words in their own language so that word pairs are formed, e.g.:

Jamil = Yaffeh Yam = Bachar

Collect all the notes, mix them, and hand 4 out to each child. The children now need to work as pairs and trade with each other until they have their own 8 notes back.

3. In-depth familiarization games

The clock game

Each participant receives an empty clock (see Appendix 4) and sets four meetings (round hours only) with other participants for different times. The facilitator calls out a time and topic for discussion, e.g.:

- An activity or action you did that you're proud of and that helps the environment
- A hobby you enjoy
- A dream you want to work towards coming true in the future
- A goal you want to achieve in the current year

Coffee shop (45-60 minutes)

Arrange and design the room like a coffee shop. Participants sit in small mixed groups around the coffee shop tables and order snacks and drinks from the facilitators-servers.



The menu should also include snacks with interesting names such as fortune cookies, Curious Cola, roasted sport seeds, musical chocolate, futuristic Bisli and so on. The menu names arouse ideas for discussion and from there, the way is open to endless topics. Every ten minutes, renew the mix of students at the tables.

Pictures, Postcards, Objects

Scatter objects, pictures and postcards in the center of the circle. Each participant chooses one that interests her or him, and in turns, explains to the group about her or his choice.

Carousel

Participants create a circle within a circle, so that when seated, the students of the outer circle are facing those of the inner circle. The facilitator announces two minutes for a familiarization discussion on a specific topic, e.g.

- What's your favorite place?
- Who has influenced you in a special way?
- What drives you crazy?
- What is the most important value in your life?

When the two minutes are up, the inner circle rises and moves one place around so that the children are all facing new partners now, and the facilitator asks a new question. You'll need a minimum of as many topics as half the number of children.

Team work

Divide the group into smaller groups and emphasize a mix of participants to prevent students from remaining in their own source group. Conduct a quiz among the groups, or give out team tasks that could have some connection with the camp's Objectives, or can just be fun, such as:

- Constructing a model of some kind (e.g. a tower of recycled paper)
- Composing new lyrics for a well-known tune
- Dramatizing an event

Pandora's Box (materials in Appendix 5)

The group sits in a circle and the facilitator places a box in the center. The box contains several notes with sentences in both languages. Participants clap the entire time but need to stop momentarily in order to pass the box around the circle from child to child. When the facilitator calls out "STOP", the child holding the box opens it, removes a note, and reads the sentence in her or his own language. Another child reads the translation. Then the child who first read has to act out the instructions on the note.

Another option is to add an element of the "Truth or Dare" game. Once STOP has been called, a bottle is spun in the center of the circle. The person facing the lid has to either answer or fulfill the instructions on the note.

4. Trust building games

The hoops game

- 1. Participants join hands in a circle and pass a hoop from neck/head to the next person's neck/head without letting it fall and without using their hands.
- 2. Participants sit in a small circle and hold a finger out. The facilitator places the hoop on their fingers. Now the group must try to stand up without letting the hoop fall.

Guide dog game

Participants split into pairs of one Arabic speaker with one Hebrew speaker. One child is blindfolded and the other needs to lead her or him through an obstacle course which involves also touching things in the environment, such as tree trunks, bending to sniff a flower, and so on. The leader can hold the other child's hand but the challenge is more interesting when leading is only verbal.

Then ask the children to swap roles.

When the game is over, gather everyone and ask them to describe how they felt and what they learned from the game.

The falling log game

Have the participants form a fairly small circle. One child stands in the center, wraps her or his arms about her- or himself, so that the child is like a tree log. Now the child has to fall any direction she or he wants and the children closest must catch the child and gently "push" the child in another direction, to be caught again, and so on. The child in the center must not move her or his feet or undo his or her arms but must put complete faith in the catchers.

At a later stage the children can be paired and take turns at falling backwards like a log and being caught by her or his partner.

Rope games

Participants stand in a circle, holding a rope. Have the children perform different actions without letting go of the rope, e.g.:

- Sit and stand to called out commands
- Realign into shapes such as triangle, star or square
- Organize by ascending height, or t-shirt color
- Take off their left shoe

One option is not to allow them to let go and move along the rope. This causes some funny complications.

Another option allows them to let go and move to a different part of the rope, but this requires clever cooperation and coordination to prevent the rope falling.

21

Participants stand in a circle and quickly count to 21 in turns but without two children saying their number simultaneously. Both languages can be used. As soon as two children speak at the same time, the third one down starts from 1 all over again.

Sports activities

- Football / basketball
- Dodgeball
- Simon Says
- Tag
- Land / sea
- Forward, backward, left, right. For this game everyone stands in a circle and does the opposite of the facilitator's instructions, e.g. if the facilitator calls out forward, everyone starts jumping backwards; and so on.



Water Trustees at youth camp in Jizrael Valley, Gilboa area



Youth camp 2011, Yardenit, Lower Jordan River, Israel

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רוב-רו

APPENDICES CHAPTER FIVE



Appendix 1: The right to water

Relevant articles on the right to water in Israel: Zarhin, Tomer. "Court rules water a basic human right". Haaretz, 6 June 2011.68

The Association for Civil Rights in Israel (ACRI). "ACRI petitions court to stop water corporations from disconnecting poor families". 29 January 2013.⁶⁹

Murthy, S.L., Williams, M., & Baskin, E. (2013). The Human Right to Water in Israel: A Case Study of the Unrecognized Bedouin Villages in the Negev. Israel Law Review 46(1): 25-59.⁷⁰

Worldwide facts on the right to water

- The average daily per capita water consumption in most European countries is 200 to 300 liters. By contrast, countries such as Mozambique in Africa have an average daily per capita consumption of 10 liters.
- About half of the population of developing countries suffers from health issues due to lack of water and sanitation, or poor quality water. This is the second largest factor in child mortality.
- Almost 1 in every 5 cases of death worldwide of children under 5 years old is caused by an illness related to poor water quality.
- People living in disadvantaged neighborhoods in Jakarta, Manila and Nairobi pay 5 to 10 times more for water than people in affluent neighborhoods of the same cities, and more than people in London or New York.
- According to the World Health Organization (WHO), every \$1 invested in water and sanitation systems returns \$3 to \$34!
- Some 70% of worldwide water consumption is for agriculture and only some 10% for domestic use.

Sources:

Human Development Report 2006. Beyond scarcity: Power, poverty and the global water crisis. UNDP, 2006

(The) Right to Water, Fact Sheet No. 35. United Nations, OHCHR, UN-HABITAT, WHO, 2010 http://thewaterproject.org/water_stats.asp#.UTsVqxyLCqc

⁶⁸ From http://www.haaretz.com/print-edition/news/court-rules-water-a-basic-human-right-1.366194

⁶⁹ From http://www.acri.org.il/en/2013/01/29/disconnecting-water/

⁷⁰ From http://www.hks.harvard.edu/centers/carr/programs/human-rights-to-water-sanitation/resources

Appendix 2: Communication and creating a win-win status

Sit back-to-back. Explain to your partner how to draw the picture, without actually showing your partner the picture.





Appendix 3: Water dilemmas

Tips for negotiation and reaching a compromise

In setting public policy, each side has its own considerations and needs. But if each holds onto them without allowing for any flexibility, no agreement can be reached. If each succeeds in putting itself in the other's shoes, it becomes more possible to adjust stances and reach a compromise.

Compromise means moving towards the other's stance, and negotiation is the art of reaching that point. Negotiation requires discussion and willingness to give, not just take. Often it seems that disparities between parties' stances can't be bridged but at some point, compromise is the most logical resolution, far preferable to digging one's heels in and both sides coming out of negotiation exhausted and spiraling downwards towards a worsening situation.

The Palestinian delegation

Your name is Hassan Menserra and you live in an agricultural community in Palestine. The settlement is not linked to the water and sewage systems. There are water wells that your great grandfather dug and they provide your water needs most of the year. In recent years the population has grown and the amount of water in the wells has lessened.

You want to enlarge your family's olive orchards, and make even more olive oil in the traditional olive press. But you don't have enough water to cover the family's needs, plant saplings, and increase the amount of oil. From your home's window you can see dunams of fruit orchards on the Israeli side, as well as greenhouses that don't lack for water. You want to find out how you can increase the amount of water available to you.

That's why you've organized a delegation that includes the Mukhtar who is the head of your village, your son who is an engineer, and the school principal.

- The Mukhtar. It's been years now that we're not being given permits for new water drilling and there's no budget to establish a water and sewage network. We live just a few kilometers from you but live in a constant state of insufficient water.
- The engineer. I recently finished my studies with honors, and I'm looking for work. I wrote my final paper on sewage treatment plants and I want to work in my village but I have no experience yet.
- The school principal. When there's no water in the toilets, parents refuse to send their daughters to school. We want all our children to receive a good education, but it's very hard to study and teach under the existing conditions.
- 1. Define the problem
- 2. Define your needs
- 3. Think of as many solutions to the problem that you can
- 4. Each group chooses actors to fill the roles of delegates

.....

The Israeli delegation

Your name is Yael Levi. You live in a well-groomed Israeli neighborhood linked to the water, sewage and electricity infrastructure. There are expansive lawns and a sports center with a football field. The municipal rates you pay serve, among other things, to

maintain all of these.

Your family has citrus orchards alongside the wadi. In recent years waste is being spilled into the wadi. It's sourced in an olive press on the Palestinian side. This waste literally floods the orchards and causes huge damage, and outbreaks of mosquitoes. You're wondering whether to report all this to the water supervisor, or make direct contact with the people who own the olive press to try and reach a conflict resolution direct with them. Eventually you organize a delegation that includes the mayor, the nature reserves supervisor, and the manager of the local waste water treatment plant.

- Mayor. The regional council must win the "Israel's Greenest Municipality" prize so that I can be reelected for another period of tenure as mayor. Therefore, I want to solve the problem of pollution in the wadi.
- Nature reserves supervisor. The wadi tortoise is becoming increasingly scarce and close to extinct. You have got to stop allowing your waste to flow into the wadi immediately.
- Waste water treatment plant manager. I'm interested in handling additional waste in order to sell purified water to farmers for irrigation, and thereby also increasing the waste water treatment plant's income. The trouble is that the plant is almost at full capacity.
- 1. Define the problem
- 2. Define your needs
- 3. Think of as many solutions to the problem that you can
- 4. Each group chooses actors to fill the roles of delegates

.....



Appendix 4: Clock Game

Draw a very large, simple clock face on a large sheet of paper for setting appointments.



Appendix 5: Ice-breaker games

Pandora's Box – sentences to cut into strips

Choose a partner from the cross border neighboring community and teach her or him a word in your language (Hebrew or Arabic). Ask your partner to repeat the word 5 times without mistakes – and that includes accent!

Repeat your first name and family name for one full minute without making mistakes.

Say the colors of traffic lights from top to bottom and say them quickly 7 times without mistakes.

Stand on one foot for 90 seconds.

Run around the whole group 3 times and then go back to your place.

Sit next to the person who you think is the quietest in the group.

Take one jump forwards and one jump backwards 10 times quickly.

Put your finger on the floor and run around it 12 times.

Sing part of a song you really love.

Make a movement or face that will make everyone laugh.

Collect everyone's watches, run around the group once, and then give all the watches back to the right person.

Say "Leonardo da Vinci" 5 times quickly without mistakes.

Collect all the girls' rings, call out each one's name, and return them all.

Call out the names of everyone that starts with M, and ask them to swap places with each other.

Call out the names of everyone that starts with D, and ask them to swap places with each other.

Collect the cellphones of everyone whose name starts with A, ask them to swap places with each other, and then give back the phones to the right people.





Virtual Water Import – Export Domino Cards (Chapter Three) Cut and Save



BRAZIL
BRAZIL

IMPORT: Corn
EXPORT: Coffee

Import: Corn
Import: Corn

Import: Co









BRAZIL	BRAZIL EXPORT: Soybeans		
IMPORT: Rice			
	3.455		
To produce 1 kg of Rice, 2457 L of water are necessary	To produce 1 kg of Soybeans, 2145 L of water		










































































































































	COUNTRY	COUNTRY
	IMPORT:	EXPORT:
٠	To produce 1 kg of L of water are necessary	To produce 1 kg of L of water are necessary

COUNTRY	COUNTRY
IMPORT:	EXPORT:
To produce 1 kg of L of water are necessary	To produce 1 kg of L of water are necessary











"Your beliefs become your thoughts. Your thoughts become your words. Your words become your actions. Your actions become your habits. Your habits become your values. Your values become your destiny."

Mahatma Gandhi







Resource Guide for Environmental Educators

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