Friends of the Earth Middle East

Community GIS Project

Youth Taking Action: Identifying Environmental Hazards in Jordan, Palestine, and Israel

October 2010

EcoPeace/ Friends of the Earth Middle East
Amman, Bethlehem and Tel Aviv
www.foeme.org

ESRI

EcoPeace/ Friends of the Earth Middle East (FoEME) is a unique organization at the forefront of the environmental peacemaking movement. As a tri-lateral 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. FoEME is a member of Friends of the Earth International, the largest grassroots environmental organization in the world.

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www.foeme.org

Amman Office
PO Box 840252 - Amman, Jordan, 11181
Tel: 962 6 5866602/3
Fax: 962 6 5866604
Email: info@foeme.org

Bethlehem Office
PO Box 421 – Bethlehem, Palestine
Tel: 972 2 2747948
Fax: 972 2 2745968
Email: info@foeme.org

Tel Aviv Office
8 Negev Street, Third Floor – Tel Aviv, 66186 Israel
Tel: 972 3 5605383
Fax: 972 3 5604693
Email: info@foeme.org

Note of Gratitude

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Contributing Authors:

Amany Mansour, Jordanian CGIS & Education Coordinator
Amy Lipman-Avizohar, Israeli CGIS & Education Coordinator
Fida Sarasra, Palestinian Youth Coordinator
Iyad Aburdeineh, Palestinian Deputy Director and Good Water Neighbors Project Coordinator
Alessandro Barni, FoEME Intern, Amman
Jessica Marx, FoEME Intern, Tel Aviv

FoEME Project Team:
Gidon Bromberg, Israeli Director
Nader Khateeb, Palestinian Director
***Munqeth* Mehyar**, Jordanian Director
Abdel Rahman Sultan, Jordanian Deputy Director and Good Water Neighbors Project Coordinator
Michal Sagive, Israeli Good Water Neighbors Project Coordinator
Hadeel Samara, Jordanian Good Water Neighbors Project Coordinator
Youval Arbel, Israeli Deputy Director
Mira Edelstein, Resource Development
Chava Haber, Financial Management
Tamar Ariel, FoEME Intern, Tel Aviv
Efrath Silver, FoEME Intern, Tel Aviv

Graphic Design and community GIS Layout:

Ahmad Abu Gharbieh*, Graphic Designer, Jordan*

FoEME Community Coordinators:

Mohammad* Taref Al Ali**, Muaz Bin Jabal Municipality / ***Hagai Oz, Jordan Valley RC
Mohammad Al Nawasra , Tabkat Fahal Municipality / ***Sami Alfasi***, Beit She'an
Mohammad Saideh, Auja / ***Baker Barakat***, Deir Alla / ***Mohammad Haddad***, Jericho
Fathi al Hweimel, South Ghor Municipality / ***Gundi Shahal***, Tamar Regional Council
Dr. Yousef Sadeq, Baka Sharkia / ***Muhammad Biadsi***, Baka Gharbia-Jat/
Mohammed, Tulkarem / ***Ayelet Tapiro***, Emek Hefer Regional Counci
Netanel Silverman, Tzur Hadassah / ***Fida Laham***, Wadi Fuki
Tal Shamir, Eshkol Regional Council / ***Basil Yasin***, Abassan

Front Cover Photo: Water Trustees at C-GIS camp in Sharhabil Bin Hasnah EcoPark, Jordan, 2010
Back Cover Photo: Water Trustees at C- GIS camp in Biet Shean, Israel, 2009


Good Water Neighbor Communities
Haifa
Nazareth
Sea of Galilee
Mediterranean Sea
Hima
Jordan Valley RC
Muaz Bin Jabal
Beit Shean
Tabkat Fahal
Baka al Gharbiya-Jat
Wadi Abu Nar
Alexander / Tomar River
Sharhabil bin Hassneh
Baka al Sharkiya
Emek Hefer
Tulkarem
Nablus
Jordan River
Deir Alla
Tel Aviv
Salt
Amman
Ramallah
Auja
Jericho
South Shouneh
Jerusalem
Tzur Hadassah
Bethlehem
Fukin Springs
Wadi Fukin
Hebron
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Eshkol RC
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Introduction

EcoPeace/Friends of the Earth Middle East (FoEME) launched the Community Geographical Information System (CGIS) project in January 2009, adding a new level of youth activities to the Good Water Neighbors (GWN) project. The GWN project is based on sets of Palestinian, Israeli and/or Jordanian partnering communities that share a common water source promoting environmental awareness and peacebuilding. This publication highlights the accomplishments of the CGIS project by the Youth "Water Trustees", Field Staff, and other community members as to transboundary water issues and related health risks derived from environmental hazards. The CGIS project is unique in that it provided an opportunity for youth to actively engage in some of the most pressing environmental problems in the region. This publication illustrates the power of youth in GWN communities to impact and promote change in their own communities.

As with many of FoEME's initiatives, this project is focused on increasing awareness about shared water issues in Jordan, Israel and Palestine and creating shared strategies to address environmental challenges. The CGIS project is an educational initiative, aimed at giving high school students from participating GWN communities the capacity to identify, assess and promote shared solutions to environmental hazards in their communities.

A shared problem or a shared treasure?

Project Summary: The CGIS project was operational in 17 out of the 25 Good Water Neighbors communities in Palestine, Israel and Jordan during 2009-2010. The project trained youth "Water Trustees" to collect field data about environmental hazards that endanger water sources in their own communities by using GIS computer software to map and analyze the data. Youth Water Trustees then met their peers in a youth camp to compare their findings and take joint action on preventing the hazards. The CGIS Project was instrumental in building awareness among the youth participants that environmental issues have no borders or barriers, that streams and groundwater are shared, thus cross-border communities share an interest in their preservation. The project allowed youth to learn and experience what sustainability and environmentalism is really all about – and how to take action within their own communities

Students collected data by filling in hazards reports, making videos or taking pictures. The data they collected provided the basis for recommendations to resolve local environmental challenges. In some communities the student's recommendations were even adopted by the local municipality! This publication provides a look at the types of hazards the students discovered in their communities as well as the recommendations that they developed to resolve these challenges.

Project Rationale: Due to pedagogical priorities, politics and regulations, the formal educational system's ability to develop and foster environmental peace-building practices is greatly limited. FoEME tackled this educational challenge by creating the Community Geographic Information Systems project, a "hands on" project for high school students in GWN communities. The Community GIS project empowered youth to engage with GIS technology and learn about environmental hazards in order to bring their local municipalities together to develop sustainable policies for environmental management. Shared objectives enabled youth to come together for a common goal and cooperate using the same technology. Through these findings, similarities in data collection also revealed shared environmental hazards throughout the various regions. Through this environmental peacemaking youth activity, the CGIS project demonstrated how youth water trustees become empowered to promote changes in their own communities - and this project allowed them to do so.

Youth Leading a Change

Project Results: The CGIS project has created a model for advanced environmental education in the region. For the first time, students and participating teachers have been trained in the use of GIS and GPS technology, empowering them to go out of the classroom and document environmental challenges in their own communities. Students are trained to recognize environmental threats originating from infrastructure, industry and agriculture, to collect the data, document the hazard and map the hazards using advanced software.

The importance and uniqueness of this project is not only in the innovative methodology of data collection, but is based on the participation of the cross border communities in the advancement of solutions to minimize or avoid the environmental impact of human activities on the region's shared water resources. The CGIS project clearly reached its goal of increasing environmental awareness among youth. This document, which will also be published in Arabic and Hebrew, goes beyond that goal, bringing the recommendations made by youth to policy makers and public administrations alike, while effectively presenting local concerns for their environment and the people's will to implement more sustainable and effective environmental policies. The publications will have the same information regarding shared hazards, but will also highlight each community's respective sources of contamination, so the communities can act together to solve cross border water and health problems.

Furthermore, the project demonstrates the potential of dealing with environmental issues to build bridges between the three nations; as Tuval, a 16 year old Israeli water trustee said:
"*I learned that you can cooperate with other people, even when there isn›t a common language and that a lot can be achieved if only we try.*"

We hope the publication before you reflects the inspiring work FoEME Youth Water Trustees are doing in their communities and look forward to them leading us into a sustainable future.

Muaz Bin Jabal Municipality, Jordan

General Overview

Muaz Bin Jabal Municipality is a medium sized cluster of towns and villages including the communities of North Shuneh, Adassieh, Al Amnshieh, Waqas, Bakoura, Murshid and Al Fadain totaling 25,000 residents.
Muaz Bin Jabal is located in the northernmost part of Jordan, near the intersection of the Yarmouk and Jordan rivers, in the heart of the valley, 215-150 meters below sea level.
The residents in Muaz bin Jabal depend mainly on agriculture as a source of income.

Students from the Muaz Bin Jabal Municipality, under the guidance of FoEME field staff Mr. Mohammad Taref Al Ali and teacher Mr. Issam Beshtawi, carried out five field surveys in their respective communities in order to discover the main pollution sources of the local water reserves. During the research they located and quantified the hazards, giving the municipality a useful tool to advance environmental policies.

North Shoneh Municipality Orthophoto

Environmental Hazards Map, Muaz Bin Jabal Municipality, Jordan, 2009-2010

ENVIRONMENTAL THREATS

Septic tanks:
Muaz Bin Jabal Municipality does not have a sewage collection or treatment system. Households rely primarily on open cesspits to dispose of wastewater. These cesspits however are not lined and therefore allow the wastewater to seep into the ground. The geological characteristics of this area provide the ideal conditions for infiltration of liquids through rocks and soil directly into some of the most important aquifers of the watershed. The environmental damage of sewage infiltration is not only limited to groundwater quality; in fact, organic matter contained in the waste can bond to soil particles, changing its characteristics. In the long term, and in high concentration, this can reduce the fertility of the soil with a serious impact on agriculture.

Contamination from fertilizers:
Agriculture is a source of income for the residents of the area. However excessive use of fertilizers causes an accumulation of nutrients in the soil. Excess fertilizers dissolve in water and find their way underground to the aquifers or, through run off, to the surface water bodies. This creates a number of problems concerning water quality, as a high concentration of nutrients in the water represents a hazard for human health as well as for aquatic ecosystems.

Gas tanks:
Insufficient insulation of fuel tanks can result in underground seepage of gasoline into the soil and aquifers with dire consequences for water quality. Moreover, car service stations produce a high number of pollutants (exhaust oils, acids, lubricants etc.) that often accidentally or carelessly spill on the ground and find their way to the water resources, rapidly degrading their quality.

Solid waste:
Muaz Bin Jabal lacks a proper solid waste collection system. Because of this, local residents tend to dump their garbage in random sites. This constitutes a visual nuisance as well as a serious environmental threat. In fact, the random dumping sites are often located in recharge areas of the aquifer, or directly in the river bed. Pollutants can easily dissolve in water and leak into the ground, seeping into the reservoirs and degrading freshwater quality.

Rahaf , Student from Muaz Bin Jabal, Jordan

My name is Rahaf, I and many students from my community worked with Friends of the Earth Middle East in the CGIS project to locate the sources of pollutant in our community like: livestock waste and agriculture fertilizers which pollute the ground water aquifers and surface water, the waste water which come from houses and goes directly to the surface water and ground water, and other pollutants that affect our water resources and our environment. During our work we used the GPS devises to locate the coordinates for the points of the pollutant and to download it to the map of the community using GIS software. It was very useful experience for us to work with the GPS and to have a complete idea about GIS and how we can benefit from it.

When we finish our work we participated in one big workshop in Beit Shean in Israel and we met many other students from Palestine and Israel we had a lot of fun together.

Rahaf with her friends

RECOMMENDATIONS

The participating students presented their findings and recommendations in a poster at their school, and additionally, took part in Earth Day activities at the Sharhabil Bin Hassneh Ecopark in Jordan. Similar to other communities, recommendations included proper infrastructure for, and disposal of, sewage wastewater, in addition to management of agricultural waste. Other recommendations include:

1. Illegal/random dumping issue:

The municipality should allocate safe areas to collect solid waste, while at the same time, find an environmentally sound option for waste disposal. The municipality should also work on a regular basis to empty trash bins in order to spare the community the eyesore as well as the public health hazards associated with solid waste in domestic areas.

2. Gas stations leaks:

Fuel tanks should be properly sealed and maintained in order to prevent dangerous leakages into the soil. At the same time, waste from car maintenance should be properly collected and disposed of in an environmentally sound way. Empty car batteries contain relatively large amounts of sulfuric acid, an extremely aggressive and toxic compound, harmful for aquatic ecosystems and very toxic to humans.

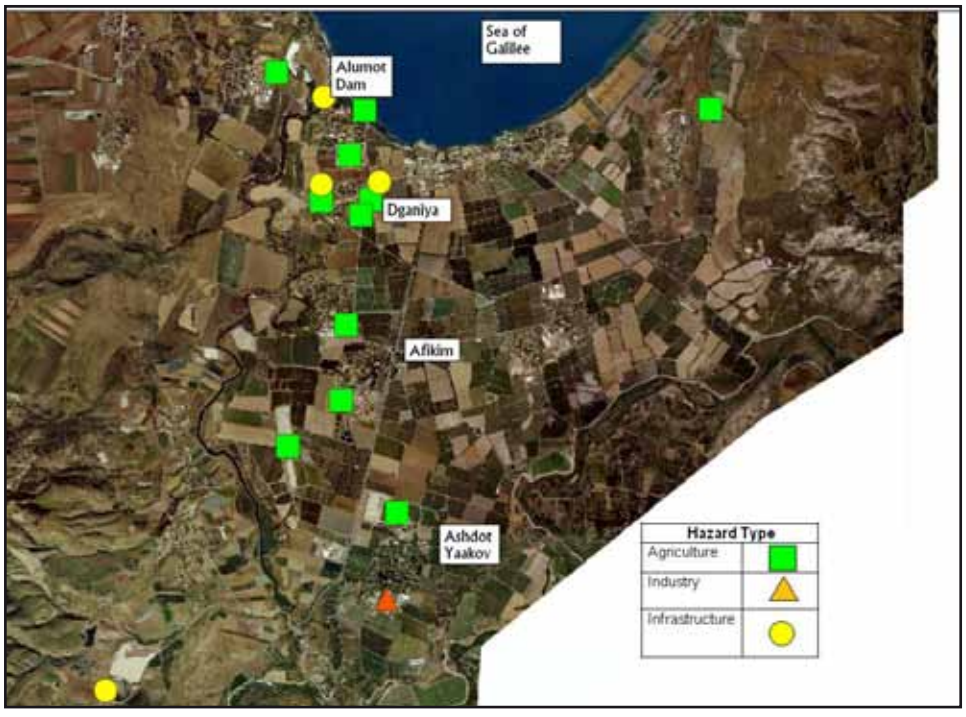
Students at Earth Day 2010

Jordan Valley Regional Council, Israel

General Overview

The Jordan Valley Regional Council consists of small rural communities along the Jordan River, between the Sea of Galilee and the entrance of the Yarmouk River into the Jordan River, the only section where the river flows entirely in Israeli territory. This area played a major role in Israeli's history, with the foundation of the first Kibbutz in Deganya and the creation of Rotenberg's hydroelectric power station. Rapid development of this area led to several major projects whose environmental impacts were not considered at the time, playing a major role in the ongoing degradation of the Jordan River.

Eleventh grade students from the Beit Yerach High School, under the guidance of FoEME field staff Mr. Hagai Oz and teachers Ms. Ella Sela and Ms. Esti Agami, identified 21 environmental hazards in their community that threaten the Lower Jordan River ecosystem. Their findings and public awareness campaigns coincide with the ongoing trend of recognition of environment problems in the region at the municipal level. The Jordan Valley Regional Council has recognized the public health risks of untreated sewage being discharged into the Jordan River at the Alumot Dam and consequently made this a priority issue by allocating funds to build a wastewater treatment center which will halt the flow of sewage into the Lower Jordan River.



Environmental Hazards Map, Jordan Valley Regional Council Community, Israel, 2009-2010

ENVIRONMENTAL THREATS

Fresh water diversion:

The chief cause of degradation of the Jordan River is the diversion of the river's natural freshwater flow. During the British mandate the Deganya Dam was constructed at the southern exit of the river from the Sea of Galilee. In the 1960s, with the creation of the Israeli National Water Carrier and the King Abdullah Canal, all the water flowing south of the lake was reduced to nearly zero, with the exception of sewage and saline springs diverted into the river. In addition, dams were constructed on both sides of the river catching the flow of side tributaries before they reach the Jordan River. The wide scale diversion of the Jordan River's natural fresh water coupled with the discharge of sewage has reduced the Jordan River to a barely moving sewage canal with only 20-30 million cubic meters (mcm) of discharge, as compared to its historical flow of 1,300 mcm.

Alumot Dam marks the end of the naturally flowing Jordan River.

Raw or partially treated sewage:

The small remaining flow of the Jordan is primarily made up of untreated wastewater from communities along its banks, saline springs diverted from around the Sea of Galilee to the Lower Jordan River, and agricultural runoff. While these inflows do increase the water quantity of the river, they drastically reduce the water quality of the river.

Sewage flowing into the Lower Jordan River at Alumot Dam

Animal manure:

Manure from cowsheds and chicken coops constitute a source of nitrogen pollution for both ground and surface water. Fermented manure can serve as an alternative to chemical fertilizers, but if left untreated and improperly dumped it is a health hazard and a source of water pollution.

Esti Agami, Teacher
Beit Yerach School, Israel

In October 2009 students from Beit Yerach's Environmental Class joined together with other Israeli, Palestinian and Jordanian students from FoEME's communities at a 3 day Community-GIS youth camp to advance their transboundary project aiming to locate and map environmental hazards in their shared water basin.
Meeting other students from neighboring communities was a unique and special experience for all the students. They discovered the commonalities between them, formed personal connections, bridged gaps and broke down stereotypes.
Also the accompanying teachers took the opportunity to meet educators from across our borders to discuss environmental issues in the area we live and we found we were involved in many similar environmental activities.
During one of the tours there was a request that deeply moved me: the teachers and students wanted to see the Sea of Galilee from up close and not just from atop the mountain range in Jordan.
I have no doubt meetings and cross border activities like this one are a way to draw people closer and reach real peace with our neighbors. I sincerely hope that FoEME will continue these projects in the future.

Esti (third on left) with her students at the CGIS camp 2009

RECOMMENDATIONS

1. Treating sewage:

The CGIS students visited the site allocated for the establishment of the Bitaniya wastewater treatment center, located adjacent to Alumot Dam, which will halt the flow of untreated sewage into the Lower Jordan River. The Bitaniya wastewater treatment plant is scheduled to become operational by the end of 2011, and will treat all of the area's domestic sewage for use in agricultural (it will not return the treated water to the Lower Jordan River). While the building of this treatment plant is a big success - it will remove the Israeli sewage from the River - if it is not coupled with the allocation of fresh water resources in its place, long stretches of the Jordan River will likely run dry in the next year. The students then presented, at a local ecological fair, the importance of the new wastewater plant using the slogan: "Together we will give life back to the Lower Jordan River."

2. Animal manure:

Following their findings, the students plan to map all the cow and poultry sheds in the area, and attempt to measure their environmental impact. This map will help the municipality gauge the extent of this problem and influence the municipal leader's decision making process on this issue.

3. "The Big Jump 2010"

In August 2010 youth from the Jordan Valley community, together with youth and mayors from other Palestinian, Israeli and Jordanian communities in the Jordan River area, participated in the 3rd "Big Jump" to raise awareness of the sad state of their shared river. They built rafts and sailed it down a short part of the river, calling for its urgent rehabilitation.

The Big Jump, August 2010

Local ecological fair 2010

Tabkat Fahal, Jordan

General Overview

The municipality of Tabkat Fahal is a medium sized cluster of towns and villages incorporating the communities of Al Masharea and Sheik Hussein, in addition to the small villages of Tel Arbain, Gleaat, Al Harawieh, Al Jessoura, Sheikh Mohammed, Zumalieh, Busseleh and Azaba, totaling approximately 25,000 residents.
The area is home to the archeological site of Pella, one of the Roman Decapolis cities. In addition, the Sheik Hussein border crossing, the northern border crossing between Jordan and Israel is located in this area. FoEME's Sharhabil Bin Hassneh Ecopark is located within walking distance from the community of Sheikh Hussein, next to the Ziglab water reservoir.

A team of students from the Tabkat Fahal municipality, under the guidance of FoEME field staff Mr. Mohammad Al Nawasra and teacher Mr. Hazem Abo Zaytoun, carried out several field surveys within the community area identifying a number of environmental hazards and pollution sources, especially concerning surface and groundwater resources. During the survey they classified and located the pollution hotspots, in order to help the municipality find solutions to protect the freshwater sources and increase the area's environmental health.

Environmental Hazards Map, Al Masharea Community, Jordan, 2009-2010

ENVIRONMENTAL THREATS

Septic tanks:

Similar to most of the rural communities on the Jordanian side of the valley, the lack of adequate sewage collection and treatment systems represents a serious problem. Many houses rely on septic tanks and open cesspits to collect domestic wastewater. This provides an ideal breeding ground for bacteria, with serious health consequences for residents.

Contamination from fertilizers:

The use of untreated manure as a fertilizer constitutes a nitrogen and bacterial source of pollution, and agricultural runoff and infiltration bring pollutants into the aquifers and surface water bodies. Agriculture represents the main source of revenues for the inhabitants of the valley, but also the main source of environmental degradation, especially regarding the quality of water resources.

Livestock waste:

Animal husbandry within the residential centers constitutes an environmental issue as it creates unpleasant smells and promotes the spread of mosquitoes and various insects, with potential health hazards for the population. Moreover, the high concentration of animal waste can provide an additional source of water pollution because of infiltration and runoff.

Solid waste:

Random dumping sites scattered throughout the community represent both a visual eyesore as well as a threat to groundwater. In fact, random dumping sites often appear in recharge areas of the aquifer, allowing chemicals to leak into the aquifer, lowering the quality of the reservoir.

Tayseer Nawasrah, Student from Tabkat Fahal Municipality

My name is Tayseer, I'm 15 years old. I worked with Friends of the Earth Middle East in the Community GIS project with other students from Tabket Fahal community in 2009 together with 4 other local Jordanian communities.
At the beginning of this project we took training courses in GIS software and the GPS devise, then we were able to use the GPS devise and use the main tools in GIS to get a complete idea about the maps and how to work with them.
We implemented many field surveys with our field researcher in our community to locate – with GPS - the main hazards which pollute the water resources in the wadis, and with cooperation from FoEME we downloaded these points to our community map. We will give the municipality the map with the hazard points to find solutions for our water problems. We need to have a sewage network and a treatment plant to reuse the waste water in irrigation that will reduce the pressure on water resources in Jordan. Also we need more attention from the decision makers to have good environment without pollution sources in Tabket Fahal.

Tayseer presenting his community's GIS map at the Mayors Conference, Amman 2009

RECOMMENDATIONS

Tabkat Fahal students met their neighbors from Beit She'an at the youth camp and worked on a poster demonstrating the damage that pollution has on their shared water sources. The students also presented their work at FoEME's Regional Mayor's Conference in Amman, 2009, in front of the mayors, stakeholders and many other conference participants. They talked about their experiences and their requests for environmental improvement in their communities, which included proper disposal of animal and agricultural waste. They also proposed the following:

1. Lack of infrastructure/septic tanks:

Residents should build concrete lined cesspits in order to avoid leakages and seepage of sewage wastewater into the soil and groundwater. In addition, the municipality should provide tanks to frequently pump out the wastewater in order to avoid overflow, and then carry the collected wastewater to the nearest treatment plant. In fact, the municipality has started planning for a treatment plant in the Al Masharea community that will collect sewage from all the houses, treat the waste water and reuse it in agriculture.

Beit She'an, Israel

General Overview

Throughout history the fertile agricultural land and abundant waters in the Beit She'an Valley have drawn nations to settle in this picturesque area along the Jordan River. Located in Israel, Beit She'an was the capital of the great Roman Decapolis cities. Still blessed with natural beauty, the 16,000 residents of the Beit She'an area confront a wide variety of environmental challenges, most significantly wastewater management and the rehabilitation of the area's rivers and streams, particularly the Harod Stream, one of the Jordan River's main tributaries and the Jordan River itself. Beit She'an area residents involved in the Good Water Neighbors project believe that the "paradise" of the past can be restored through building community awareness and cross border cooperation.

Eighth and ninth grade students from Orth Beit She'an High School, under the guidance of Mr. Sami Alfasi and teacher Ms. Yael Arama, identified 24 environmental hazards affecting the Beit She'an community and surrounding waterways. The Beit She'an region suffers from domestic and agricultural sewage pollution, flowing into the Harod and Jordan rivers. Local residents and tourists suffer from mosquitoes, and swimming or even touching the water in the rivers is prohibited. Students also found many illegal dumpsites on the outskirts of the city.

Map of environmental hazards, Beit She'an, Israel, 2009-2010

ENVIRONMENTAL THREATS

Pollution in the Harod Stream:

Currently the Harod Stream is no more than a dumping site for wastewaters from different sources, both from Beit She'an city, nearby fish ponds and industries. The area has great potential for ecotourism, potential that will remain largely untapped unless pollution sources are removed from the stream.

Domestic sewage:

During the winter, sewage often overflows and affects areas in the city. The sewage creates a bad smell, and attracts insects that contribute to the spread of diseases. Moreover, it contaminates groundwater and the Jordan River.

Agricultural runoff:

Agricultural runoff is a main contributor of pollutants for the entire Jordan Valley region. Run-off water from the fields is rich in nutrients and pesticides that increase eutrophication and destroys aquatic ecosystems. Livestock waste also constitutes a water pollutant rich in nitrogen, a perfect catalyst for the proliferation of bacteria and insects, contributing to the spread of diseases and bad odors.

Domestic and construction waste:

Improper collection and disposal of domestic and construction waste constitutes a threat to surface and groundwater, while further contributing to aesthetical degradation and to the spread of bad smells and diseases. Sadly, this no doubt reduces ecotourism potential in the area.

Shuval Hariv, Student from Beit She'an, Israel

Kids from my class and I joined the GIS project. In order to understand the subject we attended training sessions in Baka Gharbia and we learned what GIS is and what we can do with it. We learned how to use the software in order to identify pollution sources and to add them to the city's map. After we returned from the training we showed our class what we are supposed to do and we went out for a hike around the town. In groups, we filled out a report about the pollution sources in town and we mapped them. We came up with solutions about how to conserve water and reduce air pollution and what every person can do in order to conserve water.

This year eight of my classmates and I went to Beit Alpha where we met Palestinian and Jordanian kids. Together we created a campaign against water pollution in the Jordan River which included designing a poster against water pollution in the Jordan River.

Three weeks after the meeting in Beit Alpha I went with my father to Jordan where we participated in an international conference where every city presented its environmental problems, what it did to solve them, and what it will do in the future. For me, it was a truly fun experience. This experience was unforgettable.

For anyone that joins the GIS project I tell that this is an unforgettable experience and that the people that work on this project are warm and funny. This project enables people like me to meet others from different cities and countries.

Shuval (center) at Earth Day activity in EcoPark, Jordan 2010

RECOMMENDATIONS

At the GIS youth camp, Beit She'an students found that they share common environmental problems with their Jordanian neighbors such as illegal dumping of waste and untreated sewage. Since March 2010 a new Wastewater Treatment Plant has begun treating about 60% of Beit Shean's sewage and part of the Spring Valley Regional council's sewage. The Gilboa Regional council is slated to connect to the new plant in the coming year as well. Following the students work, the Beit She'an Municipality decided to incorporate a GIS system for environmental management. Students developed the following recommendations for rehabilitation of the Harod Stream:

1. Rehabilitation of Harod Stream:

The first step towards the rehabilitation of the Harod stream should be the proper collection of domestic wastewater that could be treated and purified to an extent that could be useful for use in agriculture. Fresh water should be allowed to flow naturally into the stream. Fish pond effluents should be treated in artificial wetlands; this would provide a cost effective purification system while, at the same time, would attract the millions of birds that fly over the Jordan Valley as it is one of most important migration corridors in the region. The rehabilitation of the Harod stream should proceed along with that of the Ziglab and Jurum streams on the eastern side of the river, contributing all together to the rehabilitation of the Jordan River.

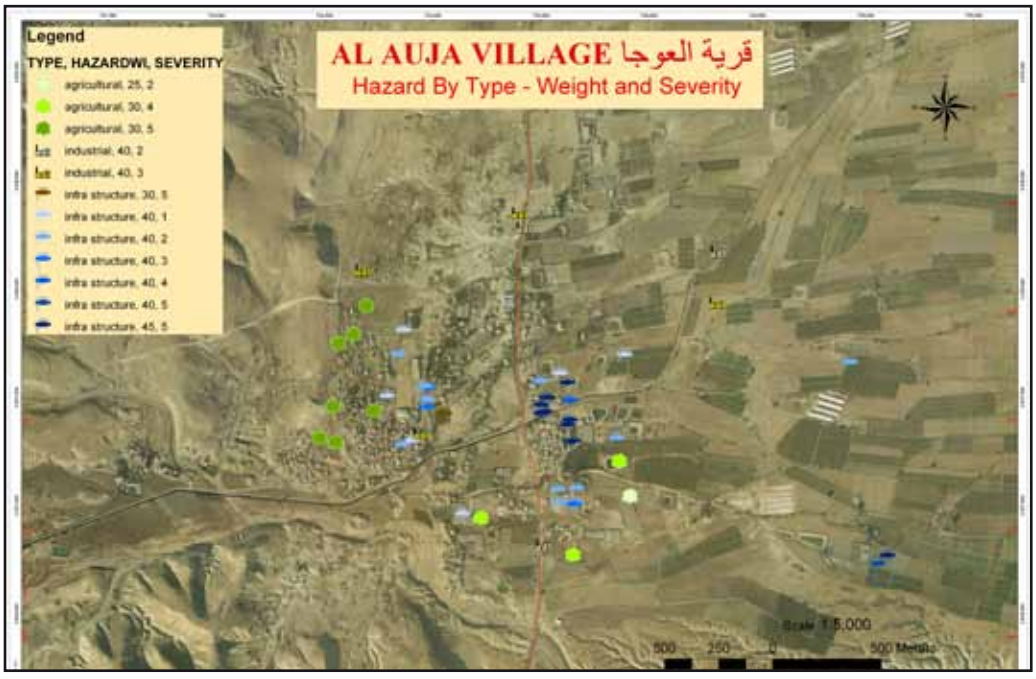
Designing posters

Auja, Palestine

General Overview

The village of Auja is located in the Jordan Valley, 12 kilometers north of Jericho and along the valley's main road. The town dates back to the Roman period, when it was part of the city of Archillas. The population in the area is approximately 4500 people, including the original residents of Auja, refugees displaced in 1948 and 1967 and Bedouins living in the outskirts of the village. The area is famous for its water springs, banana fields and moderate winter climate. Local tourists are drawn by the stunning beauty of the landscape, as well as the water springs, suggesting the great potential for local eco-tourism.

A group of students from the Auja Boys Secondary School conducted a field survey in order to determine and locate the main environmental hazards in their area, under the guidance of FoEME community coordinator Mr. Mohammad Saideh and local field staff Mr. Muhanad Saideh. They identified a total of 24 hazard spots: 15 from infrastructure, 2 from industry, and 7 from agriculture. The students were then asked to choose, in their opinion, the most urgent environmental threats for their community and for the watershed that they share with their partner communities of Deir Alla and Jericho.



Environmental Hazards Map, Auja, Palestine, 2009-2010

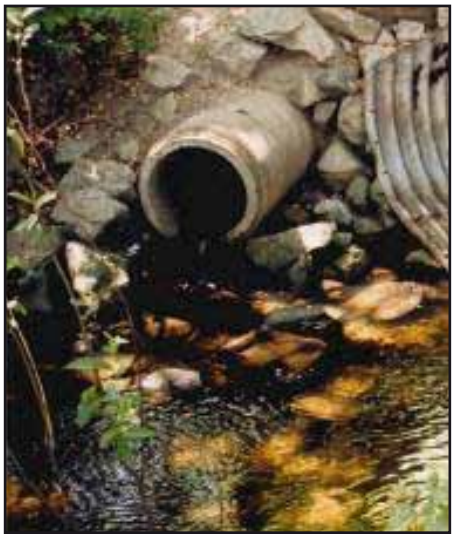
ENVIRONMENTAL THREATS

Solid waste:

The students acknowledged the hazards of improper solid waste dumping. Dumping sites attract rodents and insects, reduce air quality, and create foul odors, all leading to repercussions on public health. On a broader scale, leaching of pollutants end up affecting the Jordan River, the Eastern Aquifer and ultimately, the Dead Sea.

Sewage network:

Lack of proper sewage services constitutes a big problem both for the local residents as well as for the shared watershed. Infiltration and runoff from the leaking septic tanks of wastewaters rich in nitrogen, various chemicals and other pollutants affect the local freshwater reserve as well as contaminating the aquifer and the Jordan River. It also reduces the attractiveness of Wadi Auja, lowering its eco tourism potential. In addition, wastewater from the Israeli settlement of Yitav is disposed of directly into the groundwater recharge area, contributing to the degradation of freshwater resources.



Auja students working on the GIS picture with FoEME staff

Yazan Fakhier Njom, Student from Al-Auja Secondary School

I benefited greatly from my participation in the Community GIS Project. I learned how to use a special device, GIS, and I learned how to maintain environmentally clean public spaces through environmental sanitation. We also learned how the equipment was made, and how it can be used in different ways to measure environmental hazards.

After the meetings, I felt like I gained a lot of information that I did not know before, such as the use of modern appliances in measuring things in daily life. I also learned how to use the GIS equipment in select locations through understanding longitude and latitude. The equipment can be very useful on tours and travel expeditions.

I transferred the knowledge I gained to my home and school so that everybody could learn about my experience with the Community GIS Project.

Yazan explaining about the GIS project in Auja for a documentary film

RECOMMENDATIONS

Auja youth are taking an important role in the establishment of the Auja Environmental Center which will be a focal point for environmental education in the area. At the cross border GIS Youth Camp, Israeli, Palestinian and Jordanian students from communities on both sides of the Jordan Valley came together and created posters (see below) encouraging people from all sides to make an effort to save the river and win back the lost ecosystem. Participating students from Auja also recommended the following for their municipality:

1. Solid waste treatment:

Solid waste should be collected and properly dumped in an authorized landfill, in order to minimize the scattering of waste within the watershed. Also, the designated dumpsite should be positioned and constructed in a way that would reduce to a minimum the infiltration of pollutants in order to safeguard the mountain aquifer, the most important water source in the region. Collecting solid waste would also have the beneficial effect of preventing dumping into Wadi Auja, a main tributary to the Lower Jordan River, increasing its potential in recreational value and opening the door for ecotourism in the region.

2. Wastewater management:

The Environmental Education Center in Auja will showcase a model wetland for residents and visitors to see the benefits of biological waste water treatment.

With the upgrade of the Al Bireh Waste Water Treatment Plant near Ramallah, it is proposed to reuse the treated wastewater also for irrigation purposed in Auja.

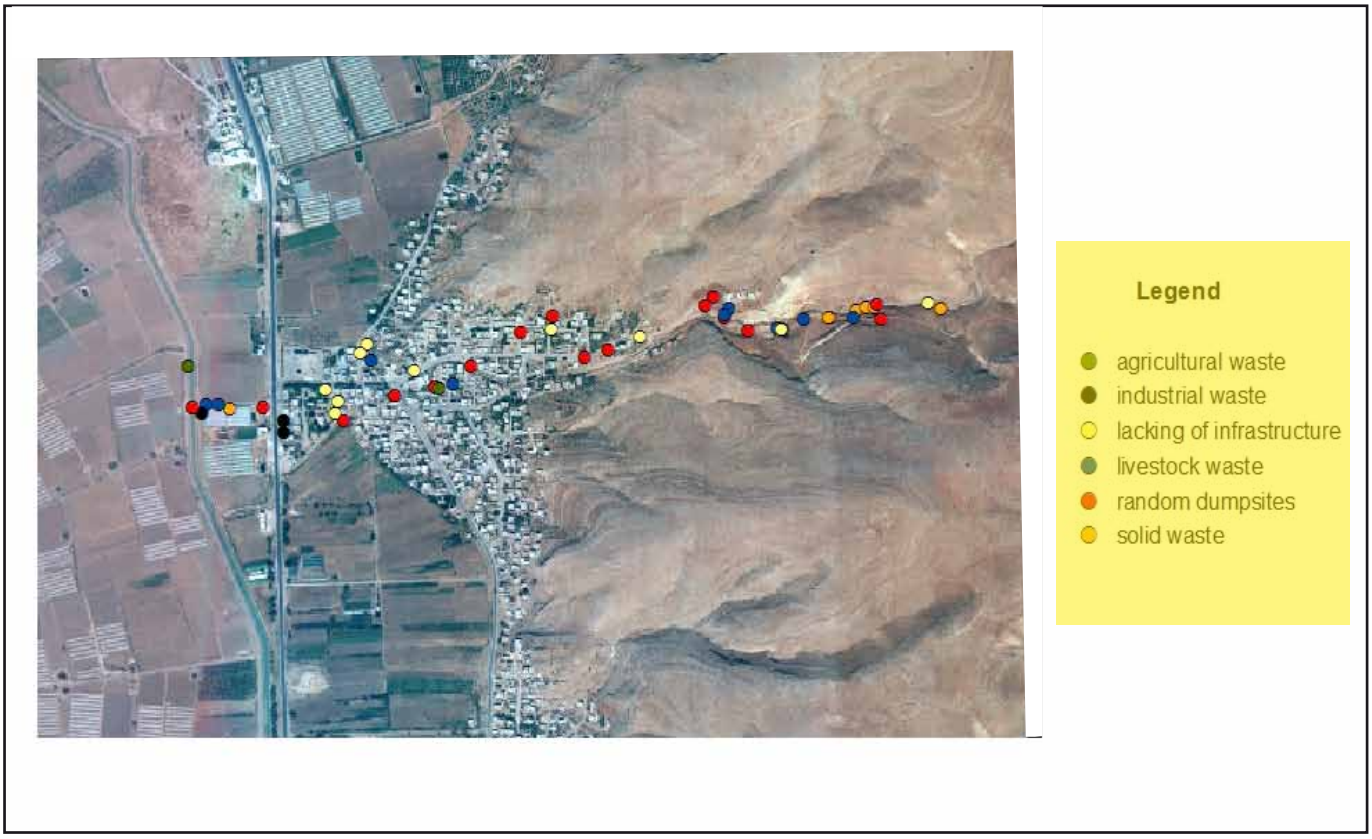
Creating posters about rehabilitation of Jordan River at GIS youth camp

Deir Alla, Jordan

General Overview

Deir Alla municipality is composed of several communities including Abu Obideh, Al Balawneh, Khzmah Dirar, Twal Al Shamali and Twal Al Janoubi. The population in the whole area is approximately 25 000 inhabitants.
Similar to most of the Jordanian communities of the Jordan Valley, Deir Alla relies on agriculture for a living. Because of this, residential and farming areas are intertwined, giving rise to a number of environmental concerns.

A team of eight students from the Khazma School worked together with the field researcher Mr. Baker Barakat from FoEME and the teacher Mr. Mustafa Abaedeh. The students conducted several field surveys within the community, where they identified a broad number of hazard points and sources of pollutants on water resources. They then marked these points on their maps in order to help the municipality locate and protect the threats to their water resources.



Environmental Hazards Map, Deir Alla, Jordan, 2009-2010

ENVIRONMENTAL THREATS

Septic tanks:

Many houses in the Deir Alla community depend on septic tanks and cesspits to collect domestic wastewaters. This results in surface and underground pollution. It must be noted that Deir Alla is the only community with a wastewater treatment plant, however, it still lacks a connection system, leaving the residents dependent on cesspits for sewage collection. Moreover, it is the families themselves that must pay for the cost of pumping water to the treatment plant, constituting an additional economic burden.

Contamination by fertilizers:

Most of the community members of Deir Alla depend on agriculture for a living. The landscape of the area is therefore characterized by farms and fields that require large amounts of fertilizers for the production of crops. Many farmers in the area use raw manure instead of processed (fermented) manure, which contains potentially dangerous organic pollutants soluble in water. With irrigation, these pollutants are able to infiltrate underground until they reach the groundwater aquifers or reach the surface water bodies through agricultural runoff.

Livestock waste:

Along with agriculture, animal husbandry is one of the main economic activities of the Deir Alla's residents. It is common to build small shelters for animals such as goats, horses and donkeys adjacent to houses in the residential area. This results in the spreading of mosquitoes, flies and other potentially disease-carrying insects. In addition, animal waste produces bad odors and is simply unattractive.

Solid waste:

The Deir Alla community lacks a designated dumping place for domestic solid waste such as paper, plastic, metal, glass, etc. Therefore, local residents tend to dump their garbage in undesignated sites. Illegal dumpsites attract rodents, insects and other pests with obvious health hazards for the local population. Moreover, the dumpsites are often located within the recharge area of the underground aquifers or sometimes directly in the streams.

Motasem, Deir Alla, Jordan

My name is Motasem from Deir Alla, when I was working with FoEME on Community GIS project I learned more about our water situation here in Jordan and I become more familiar with the pollution sources that pollute our water resources which are very few in Jordan. Unfortunately all the sources of pollutants are created by people.

We implement many field surveys in our community to identify the main pollution sources we took its coordinates by using the GPS device and we wrote some brief for the hazards that causing from these sources then the points added to the map of the community.

During our survey we met many people from our community and we talked about the pollution and about the environment and how we can prevent the pollution to protect our water resources.

We participated in a workshop in Wadi Rum, Jordan we met many students from Palestine and discussed our water problems and we tried to find small solution to solve the environmental problems in all our communities.

Motasem (3rd from left)

RECOMMENDATIONS

Following the GIS camp in Wadi Rum, Jordan, GIS students decided to raise awareness of environmental issues amongst the students at school by presenting their posters and describing next steps of the project. They also wrote letters to residents of the community explaining the causes of pollution and suggesting solutions. The students highlighted the responsibility and tools people have in protecting their close environment. In parallel to the students' work, Deir Alla's municipality staff completed GIS training with FoEME and decided to start building a GIS unit at the municipality for which they submitted a funding request to the EU. Important recommendations proposed by students include the following:

1. Lack of infrastructure/septic tanks:

To reduce the environmental impact and related health hazards from the use of septic tanks, residents should build concrete cesspits in order to avoid leakages and seepage of sewage wastewater into the soil and groundwater. In the meantime, the municipality should provide tanks to frequently pump out the wastewater in order to avoid overflow, and build infrastructure to transport the wastewater to Tal Al Mantah treatment plant.

2. Contamination by fertilizers issue:

Awareness should be raised among the farmers about the adverse consequences on surface and groundwater of using raw manure as fertilizer. Emphasis should be put on the use of fermented compost in order to preserve water quality - for them and for the environment.

3. Illegal/random dumping issue:

The municipality should allocate safe areas to collect solid waste while, at the same time, find an environmentally sound option for definitive disposal. The municipality should also regularly empty trash bins in order to spare the community the ugly sight of trash in the streets.

GIS camp in Wadi Rum, Jordan

Jericho, Palestine

General Overview

Jericho is located in the Jordan Rift Valley, approximately 8 km west of the Jordan River and 10 km north of the Dead Sea. It lies 250 meters below sea level and is therefore the lowest city in the world! It is also one of the world's oldest cities, at 10,000 years old.
The region relies exclusively on subterranean wells and springs for drinking and irrigation due to low levels of rainfall. The spring of Ein Al-Sultan is the main source of water. In addition to its historic and tourist sites, Jericho is considered to be an important area for agriculture. It is famous for its citrus fruits, dates, bananas, flowers and winter vegetables.

Students from the Terra Santa School in Jericho High School with the guidance of FoEME field staff Mr. Mohammad Haddad and teacher Mr. Luay Abdel-Al identified over 15 hazards in the school area that threaten water sources and litter the landscape. Most hazards they found are connected to improper wastewater disposal and improper solid waste disposal – both from domestic and agricultural sources.

Environmental Hazards Map, Jericho, Palestine, 2009-2010

ENVIRONMENTAL THREATS

Domestic wastewater discharge:

The improper disposal of domestic wastewater adversely affects both groundwater and surface water. Polluted wastewater can seep into water sources such as the Jordan River, which is a risk to public health and contributes to the spread of disease in the area.

Solid waste dumping:

The improper disposal of solid waste also contributes to the spread of disease if left untreated. Solid waste can pollute both groundwater and surface water, which not only has an unpleasant smell but poses a health risk to those who drink water from the polluted source.

Agricultural pesticide and plastic waste:

Agriculture is the primary economic opportunity in Jericho. Farmers heavily use pesticides to increase crop production. Not only do pesticides pollute air and groundwater, but plastic waste from agricultural farming is harmful to communities as well. Agricultural plastic waste is not only visually unpleasant, but is also non bio-degradable.

Farah Halteh,
Terra Sancta school, Jericho

Hi, my name is Farah Halteh, I learn in the 10th grade at the Terra Sancta school in Jericho. My class went with our teacher Luay for a meeting in Auja village to learn about the GPS and GIS system, which was our first time to learn about this subject. Later we went with our teacher to Jericho city to spot environmental hazards and to identify their type. At last, we went to Bethlehem to do some advanced training and to have a "hands on" session the software and to map our points in relation to our city.

Following our field research, we joined the rest of the groups in a joint camp, in

Givat Haviva- Baqa Gharbieh area, where we visited many of the historic areas along with other Palestinian kids, Israeli, and Jordanian kids as well. We did a lot of ice breaking and social games, which helped a lot to get to know one another. In this activity we were not only excited to know about the other kids but also to present our own town to the rest of the groups and to learn about hazards from nearby communities as well.

Farah, 3rd on right, presenting at GIS youth camp

RECOMMENDATIONS

1. Treating sewage:

Improper wastewater and solid waste disposal is a common problem in Jericho. The wastewater should be brought into a central collection system and then treated. The solid waste is already disposed of in a sanitary landfill, yet some waste is still dumped randomly, which calls for immediate clean-up.

2. Public awareness campaigns

10th grade students from the Terra Santa school met at the GIS youth camp with their neighbors in the Jordan Valley from Ein Gedi, Auja, Biet She'an and Muaz Bin Jabal. Together they created slogans for an awareness campaign and drawings about water conservation and will begin working on a cross border student film about the Jordan River.

Here are some of the slogans:

- Water you polluted today is tomorrow's rain in your cup
- Mine, yours, ours – your grandchildren's future is in your hands
- Don't spit into the well you drink from
- You and I will change the world
- Think Green – Get Far

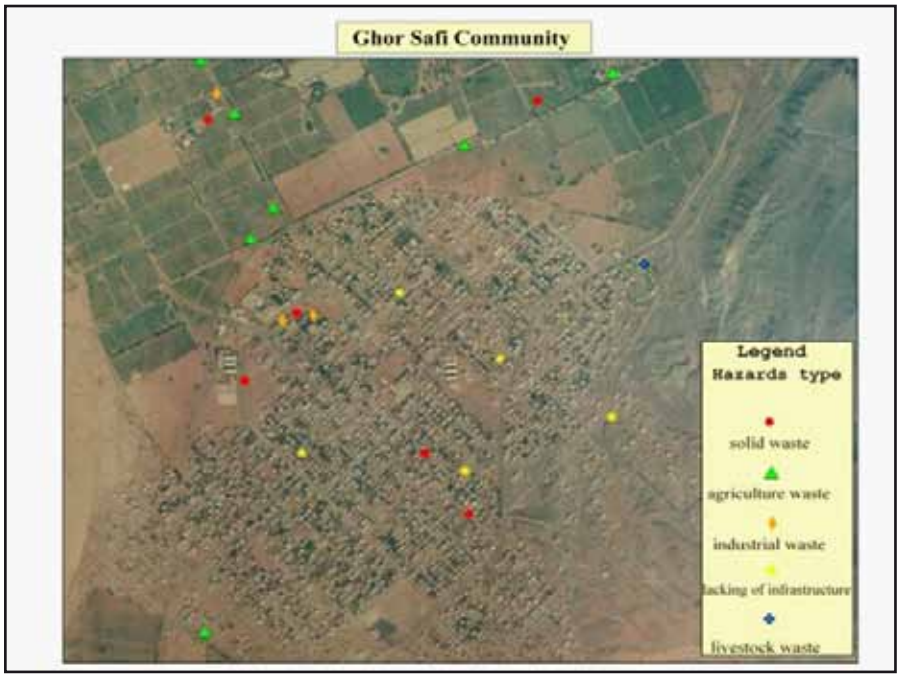
GIS camp in Israel

Ghor Safi- South Ghors Municipality, Jordan

General Overview

The community of Ghor Safi is part of the south Ghors municipality located on the south eastern Dead Sea shores, in proximity to the industrial mining plants. The municipality includes Ghor Safi, Ghor Mazraa, Ghor Haditheh and Ghor Fifa, totaling approximately 40,000 residents.
The area is characterized by a desert landscape and an arid climate. The abuse of the Jordan's water is evident here, whereby receding waters of the Dead Sea causes sinkholes, rendering agricultural land unusable and threatening tourism. Although the mining industry contributes to the problem, they are also affected by sinkholes by its danger to infrastructure.

A team of students from Ghor Safi and Ghor Mazra'a carried out several field surveys, under the guidance of Mr. Fathi Hwaimel (researcher) and Mr. Awad Nawasra (teacher). During the survey they discovered and measured several pollution sources that together, contribute to the contamination of freshwater resources in the area. The outcome of this research will facilitate the municipality in the search for solutions to the numerous environmental issues in this region.



Environmental Hazards Map, Ghor Safi Community, Jordan, 2009-2010

ENVIRONMENTAL THREATS

Septic tanks / sewage water:

Like the majority of rural communities in this area, households in South Ghors lack a proper sewage system and have to rely on cesspits and septic tanks for wastewater collection. Wastewater can then infiltrate the soil and reach groundwater due to improper insulation or can simply flood/overflow into the residential streets. This creates an ideal habitat for insects and bacteria, especially given the extremely warm conditions of the Dead Sea, exposing the population to a number of health hazards.

Contamination by fertilizers:

Agriculture is an important source of income for the residents of South Ghors, but it also represents a major source of environmental pollution. Excessive use of fertilizers and the subsequent infiltration and runoff can lead to the contamination of aquifers and freshwater sources. Synthetic and organic fertilizers alike constitute a potential threat to freshwater due to eutrophication, or simply because of a reduction in water quality, especially when misused.

Livestock waste:

A common problem in many rural Jordanian communities is the practice of animal husbandry within the residential area, with consequent spreading of mosquitoes, unpleasant smells and potential pollution of water resources due to infiltration and runoff of animal waste.

Solid waste:

Lacking a proper collection system and dumping site, the residents of South Ghors often dump their solid waste in random sites scattered within the watershed of the area. These sites are uncontrolled and are not subject to any environmental and hydrological evaluation. They often appear in recharge areas of the aquifer or in stream beds, contaminating the groundwater through leaching of chemicals.

Industrial Waste:

The gas station and numerous car service workshops in the various communities are a significant source of pollution in the area, especially on groundwater. Leakages of fuel, accidental spills of oil and various chemicals involved in engine maintenance (as well as car cleaning products), inevitably infiltrate the soil before they manage to evaporate, constituting an additional pollution source to the groundwater reserves.

Raed Khlefat, Ghor Safi, Jordan

My name is Raed, I am 14 Years old. Last year, I worked with Friend of the Earth organization in identifying the problems of water resources in our community through the Community GIS project.

I and other students from my community worked to locate the sources of pollutant which affect the environment and the water resources in our region. We implement many field surveys in Ghor Safi, with using GPS devices we took the X and Y coordination's for the pollution sources and we filled out a table with the coordinates of the pollutant point and a small description for its impact on the environment and on the water resources, also we take a photo for this point. Then we download the points on the map of the community by using ArcGIS software and give the map to the decision makers at the municipality of South Ghors to work to prevent the pollution sources at our community.

Then the points that we took, and the photos are to the Google Earth then all people over the world can see the hazards that we suffered from.

Raed with GIS team from Ghor Safi

RECOMMENDATIONS

Students from the South Ghors communities found that they face similar problems with their northern counterparts. This is mostly due to a lack of infrastructure and environmental awareness, both from the population and the administration.

1. Illegal/random dumping issue:

To solve the random dumping sites problem in south Ghor municipalities; students met the Mayor to discuss the issue and its negative impacts the residents of the region. FoEME also helped the students in contacting the Amman Great Municipality and make an official request to supply the community with waste collection containers. The students are happy to report that the Municipality responded positively and distributed several containers throughout the community!

2. Animal waste issue:

As in other communities, the municipality should designate a specific area for animal husbandry, away from the residential centers, and provide a system for collection and fermentation of animal waste to be used as fertilizer in agriculture.

3. Contamination by fertilizers issue:

Overuse of fertilizers, either synthetic or of animal origins, leads to water pollution and eutrophication. The municipality should indentify a sustainable limit of fertilizer use, and then make sure to enforce that limit. Moreover, the municipality should monitor the usage of animal fertilizers, banning the use of raw manure, and opting for fermented manure, whose environmental impact is less severe.

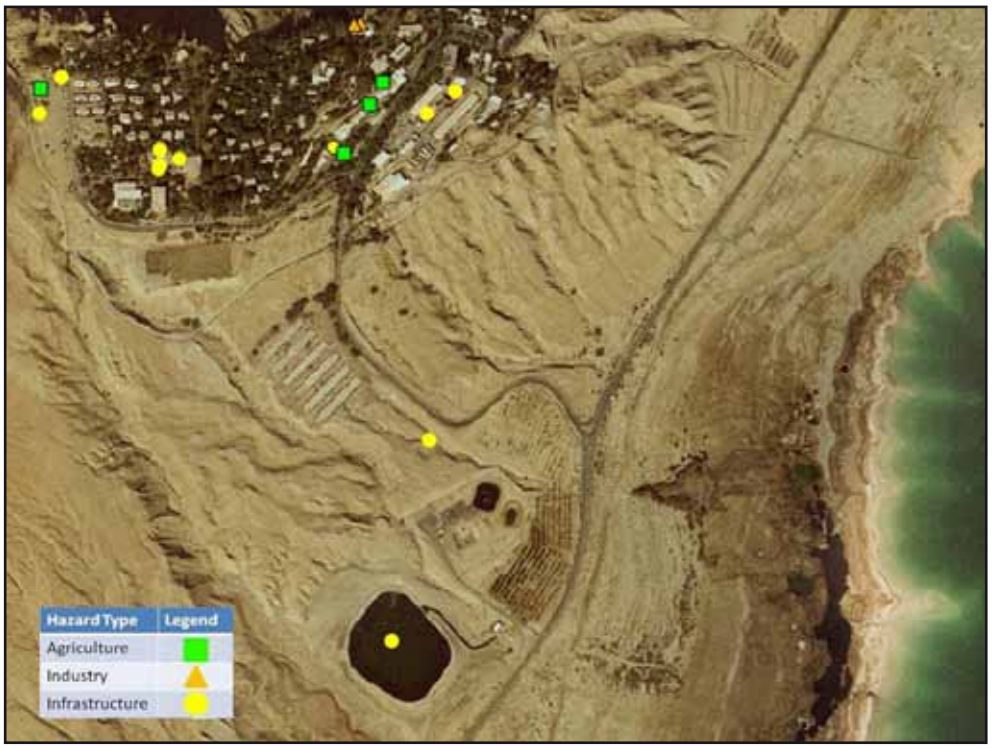
Meeting between Ghor Safi students

Tamar Regional Council, Israel

General Overview

The Tamar Regional Council is a cluster of communities including Kibbuz Ein Gedi, Neve Zohar, Neot Hakikar and Ein Tamar, totaling approximately 1,200 residents.
These communities are located near the shores of the Dead Sea, where the receding waters create the dangerous phenomenon of sinkholes. Improper waste collection and disposal constitutes the main areas of environmental concern in the region.

Students from the Ein Gedi High School identified 41 hazards in their area that threaten public health, and contaminate ground water and the Dead Sea, under the guidance of FoEME field staff Ms. Gundi Shahal and teacher Ms. Revital Sabag. The most severe hazards include an illegal asbestos dump site outside the Kibbutz and cosmetic waste from the hotels on the western shore of the Dead Sea. These hazards, whether in direct contact with people, or when dissolved in water, threaten our health. In addition, they are prone to be washed into the Dead Sea by flash floods.



Environmental Hazards Map, Tamar, Israel, 2009-2010

ENVIRONMENTAL THREATS

Domestic waste:

Lack of environmental awareness and disregard for pollution consequences, as well as a general lack of disposal facilities, has resulted in random dumping sites scattered around the area. Due to percolation, infiltration and runoff of soluble pollutants, these sites represent a threat to groundwater resources as well as to the Dead Sea.

Asbestos dumping:

A serious consequence of indiscriminate construction, the students of the CGIS programme discovered an asbestos dumping site on the outskirts of Kibbutz Ein Gedi. Asbestos is a known carcinogen, and even a single exposure to asbestos dust can result in lung cancer. Asbestos fibers are extremely dangerous and volatile, and an open dump of this material, in a dry area prone to dust transportation, constitutes a severe danger for the local population.

Cosmetic waste:

Chemicals contained in cosmetics and in the byproducts of their production can easily find their way underground contaminating groundwater and surface water bodies, with negative consequences on the ecosystem.

Emiliano Grinblat , Ein Gedi High School

My first encounter with GIS was last year when a guide from Friends of the Earth Middle East gave us a 2 day course on the Quantum GIS software. Quantum GIS (QGIS) is an Open Source Geographic Information System which I found user friendly and quite easy to learn. A few months after learning the program I collected the field reports my friends had made on environmental hazards in our area and entered the data to the system. By doing so I combined my knowledge from the QGIS course and local information. I received from the FoEME guide aerial photos of our area so it made it easier to map the data and see everything from a bird's angle.

I especially enjoyed travelling to the C-GIS camp in Wadi Rum in Jordan and meeting Jordanian and Palestinian kids. The trip was quite long and tiring, but definitely worth it!

I hope to continue working with FoEME, even when I finish my role in the C-GIS project.

Emiliano explaining his work at the GIS camp in Wadi Rum

RECOMMENDATIONS

1. Asbestos dumping:

The students from Tamar R.C. will address local decision makers in order to ask for a safe and final solution to the asbestos threat. Additionally, they will contact the local newspapers in an effort to raise awareness and to enlist the support of the local population in this struggle.
The issue of littering and random dumping can easily be reduced or eliminated by awareness campaigns and fines, as it is rooted in individual behavior. Public condemnation of such activities can prevent this type of behavior.

2. Reuse of solid waste:

Tamar 'Water Trustees' are nearly experts on building with reused materials. In the Ecological Center in Ein Gedi they have constructed benches, fences and other facilities to demonstrate different uses of building with waste.

3. Research on wetland:

Students at the Ein Gedi High School researched the quality of the filtered water from the constructed wetland model built in the ecological garden. In their end-of- year presentations, they recommended the construction of bigger scale wetlands.

GIS students from Ein Gedi at the youth camp

Baka Sharkia, Palestine

General Overview

The community of Baka Sharkia is located about 16 kilometers north of Tulkarem, directly on the Green Line. It borders to the west with Nazla Al-Sharqia and to the east with Baqa Gharbiya-Jat, its partner community in the GWN project, on the other side of the Separation Barrier.
The Village has approximately 5,000 residents in an area of 4,200 dunums. The community is physically separated from its Israeli neighbor by the wall.

The students of the CGIS project discovered, located, and measured 15 pollution sources that all contribute to the degradation of their extremely scarce water sources. They were guided by FoEME field staff Dr. Yousef Sadeq and teacher Mr. Abu Hani. There are four privately owned artesian wells in the village that are used for irrigation and domestic purposes. Following the construction of the Security Barrier and the isolation of the community from trading with neighboring communities, more than 70% of the residents now depend solely on agricultural revenues for their livelihood.

Environmental Hazards Map, Baka Sharkia, Palestine, 2009-2010

ENVIRONMENTAL THREATS

Wadi Abu Nar:

The main water source in the area is now reduced to a waste disposal canal, polluted with sewage wastewater and randomly dumped solid waste. Moreover, the main wastewater dumping sites are located next to two of the four wells of the village, posing a great threat for the villager's health. In addition, the Wadi is prone to devastating flash floods that flush away everything in its path, carrying pollutants further downstream during the rainy season. The destructive power of the Wadi was known even back in the Crusader times, who referred to it as "the Valley of Death".

Olive mills:

During the olive oil production season, the olive mills create a fluid byproduct known as "Zeebar", high in organic content and nutrients, that is then dumped in open areas or into the Wadi. Oily substances have a deleterious effect on aquatic ecosystems, lowering the oxygen content of the water and reducing its capacity to regenerate, hence the Zeebar poses an extremely dangerous environmental threat.

Students from Baqa Al-Sharqia

Hani Saead Nasralah, Student from Baka Sharkia, Palestine

I am an 11th grade student part of the Youth Water Trustees in Baqa Al-Sharqia. The CGIS project allowed us to use one of the most used software in environmental matters to identify polluted places in order to find out the severity of the pollution. We learned how to use a GPS device to monitor various sites for environmental hazards. This information is then gathered in a program to display the collected data in order to create map of the place as a whole.
What I consider to be the most important thing from these courses is that I learned how to create an environmental map for my town, Baqa Al-Sharqia, and to understand the interdependent reality of shared water sources, and shared environmental risks from environmental hazards, with our neighbors.

Hani next to a tree he planted and holding the "Water Care book" in Arabic

RECOMMENDATIONS

Students participating in the CGIS project plan to raise awareness of their findings through environmental education within their communities. Participants plan to show the hazard points discovered through GIS and GPS technology, and explain the situation to local residents in an attempt to raise awareness of the human-induced environmental degradation. Students also proposed recommendations for wastewater management (see below). At present, the United National Development Project (UNDP) is planning and executing a project with the Municipal Alliance for Peace (MAP) program, to construct wastewater collection systems in the three towns of Baka Sharkia, Habla and Barta'a. It is agreed that this sewage will then be treated in Israel - in Baka Gharbia's new Waste Water Treatment Plant.

1. Wastewater management:

In the framework of the GWN project, a Memorandum of Understanding (MoU) was signed in 2005 between the mayors of Baka Sharkia and Baka Gharbia, its Israeli neighbor. In the MoU, the mayors declared their agreement to connect their sewage networks to the new treatment plant in Baka el Gharbia-Jat. This is an excellent example of how cross border understanding can lead to initiatives that safeguard shared water resources, benefiting the local population on both sides of the border.

2. Lack of public green spaces

At the GIS camp, together with their neighbors from Baka Gharbia, students discussed ideas regarding the rehabilitation of Wadi Abu Nar and developing a public park on both sides of the Green Line, a park that would provide recreation and ecosystem services to the area.

Baka Sharkia youth on environmental hazard tour

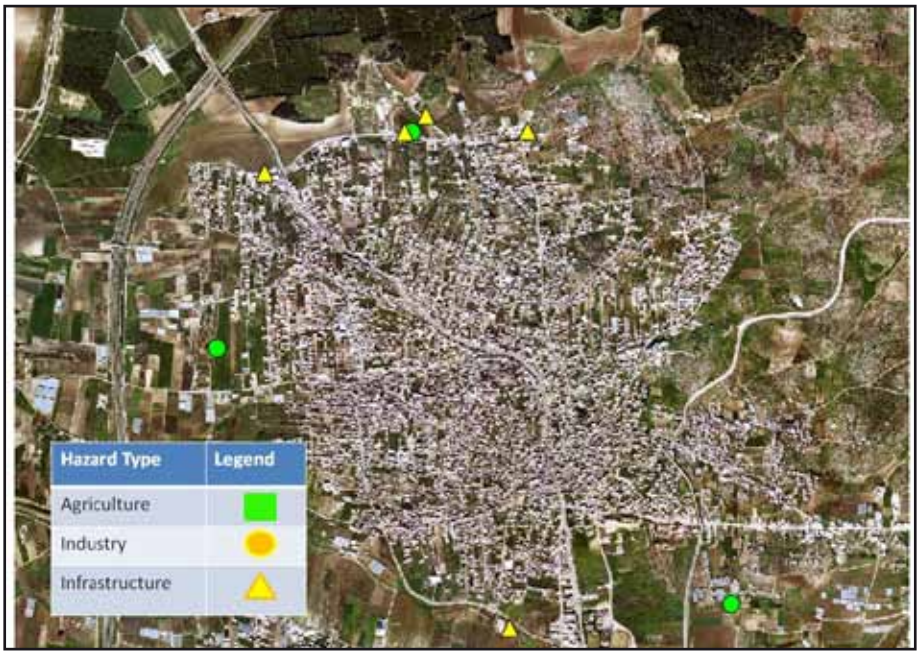
Baka Gharbia-Jat, Israel

General Overview

Baka Gharbia-Jat is located in Israel, on the foothills of the Shomron Mountains, west of the Separation Barrier, and has a population of approximately 33,000 people. Land use is divided between agriculture (55%), housing (30%), public buildings and other uses (15%).

The main environmental challenges facing the city are: establishing a full sewage collection network; dealing with illegal dumping of solid waste; and the pollution of Wadi Abu Nar/Hadera which flows from the Palestinian Authority, through Baka Gharbia-Jat and into the Mediterranean Sea.

Eleventh grade students from Al Kasimi High School identified 65 hazards in their area that threaten water sources and litter the landscape. They were guided by FoEME field staff Mr. Mohammed Biadsi and teacher Mr. Mubarak Wated. Most hazards are from agriculture and domestic sources, the most severe ones being sewage flowing into Wadi Abu Nar and piles of animal carcasses on the outskirts of the town. These hazards affect resident's health, pollute ground water and create a very unpleasant environment.



Environmental Hazards Map, Baka Gharbia-Jat, Israel, 2009-2010

ENVIRONMENTAL THREATS

Sewage flows into the Abu Nar stream:

Although many households (approximately 40%) in the community are connected to the municipal network, raw sewage is still dumped directly into Wadi Abu Nar. A treatment plant was established this year (2010) and is likely to improve the situation. However, the majority of residential homes still rely upon cesspits for wastewater collection. This allows pollutants to seep directly into the Mountain Aquifer and, occasionally, to overflow into the stream.

Solid waste:

Over the last several years, there has been a pronounced reduction in illegal waste piles, thanks to the establishment of a local waste transfer station. However, domestic, construction and agricultural waste is still dumped extensively outside the residential area, in forested and agricultural areas. This constitutes a threat to freshwater, as pollutants can easily seep into the vulnerable Mountain Aquifer. Moreover, regular burning of the waste contributes to air pollution, including the emission of harmful toxins such as PM10 and dioxins.

Animal waste:

As in many agricultural communities, animal waste constitutes an environmental threat. Additionally, decomposition of animal carcasses can attract insects and other animals, and pollute the groundwater reserves as raw manure infiltrates the soil.

Ibrahim Abu Husien, Student, Baka Gharbia-Jat, Israel

My name is Ibrahim Abu Husien. I am an 11th grader at El Kasimi School in Baka Gharbia – Jat Community, Israel.

For me the environment project is the most important project I have participated in because we were taught and guided as to the importance of the environment and the cleanliness of our village.

Before participating in the project I thought that the sanitation hazards in our village were only garbage and it isn't harmful for the human health and for the environment, but when I joined this project with Friends of the Earth Middle East, my vision toward these sanitation hazards changed and I began to realize the degree of danger it inflicts upon humans and environment.

It is important to say that the object of the project was to raise the awareness of the people as to the degree of danger that waste inflicts on every person in the village.

Through this project I got to meet new friends, which I had not known before. The project enabled this friendship to take place.

Ibrahim (standing, 3rd from the left) with friends at GIS youth camp 2009

RECOMMENDATIONS

Youth Water Trustees in Baka Gharbia have conducted an "environmental revolution" in the city over the last five years. With activities ranging from publication of brochures to participating in bike rides, they have succeeded in bringing environmental issues to the forefront of their community. Following their findings in the GIS project, they know, however, that much work still lies ahead in order to create a strong public and municipal commitment to environmental preservation.

1. Sewage flow:

Progress has been made this past year in the treatment of sewage in Baka Gharbia-Jat: In January 2010, a new Waste Water Treatment Plant (WWTP) was inaugurated, at a cost of 28 million NIS. The WWTP has the capacity to treat 100% of the sewage in Baka Gharbia-Jat, yet today it only treats 10% of the city's sewage, as only a small portion of city households are connected to the system. Additional investment is needed to connect the remaining households to the sewage system. The municipality has not been able to mobilize necessary funding due to the water incorporation law. Youth urge the municipality to find a solution to the ongoing deadlock, and in the future, to connect Baka Al Sharkia to the same network.

2. Solid waste:

The current waste transfer site still lacks a complete infrastructural system to minimize its environmental impact. Proposed solutions rank from upgrading the collection system, modernizing the actual transfer site, or relocating it to a better site.

3. Livestock waste:

Raw manure constitutes a problem for groundwater as it tends to percolate and contaminate the groundwater with bacteria and nutrients. However, manure can be fermented and composted in order to be used as organic fertilizer, a less harmful alternative to chemical fertilizers currently used.

Students from Baqa Al-Gharbiya conducting field research

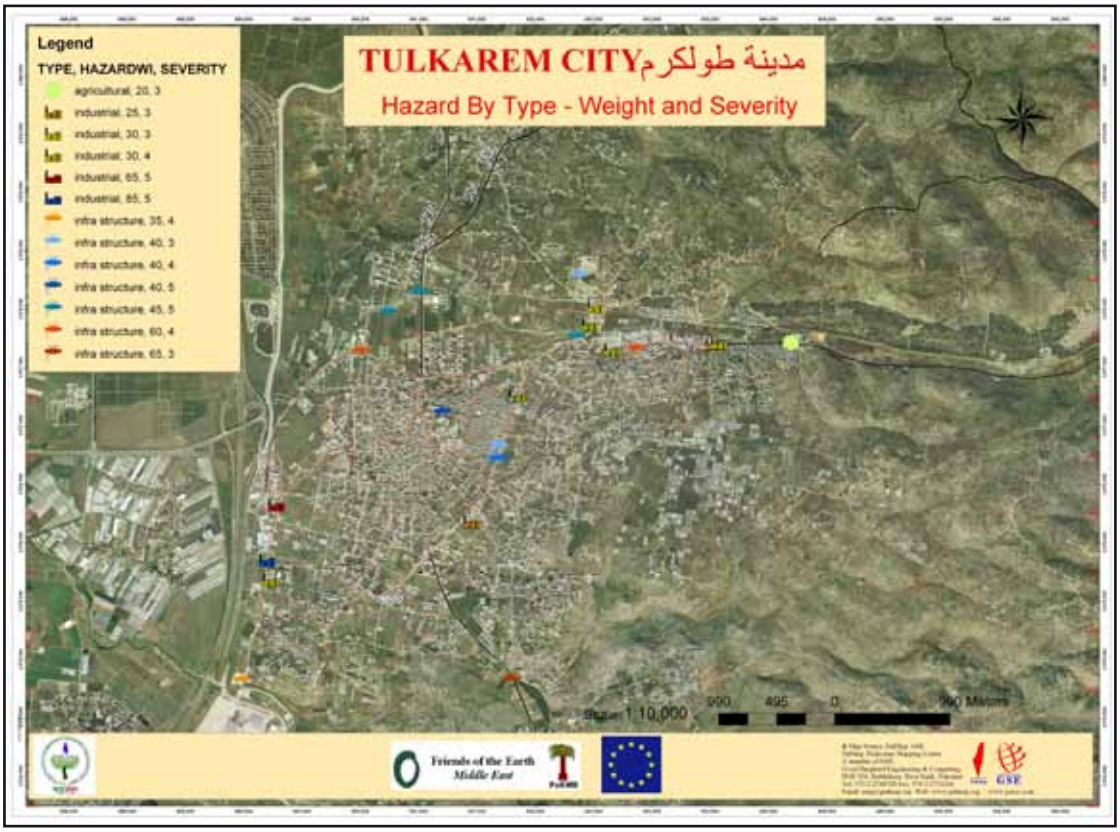
Tulkarem, Palestine

General Overview

Tulkarem is a Palestinian city located in the north western part of the West Bank, on the Western Mountain aquifer. The Mountain Aquifer is the most important water resource for West Bank Palestinians and supplies water to major population centers in Israel as well.
The city is known for its fertile land and for its agricultural production, hence is particularly sensitive to water quality degradation. It is partnered with the Israeli community of Emek Hefer regional council.

A group of students from the Irtah Secondary School for Boys conducted a survey in the area, identifying the following two areas as major concerns: (1) the Nitzanei Shalom Industrial area / Gishori chemical factory and (2) dumping of waste in Wadi Zomar. The CGIS survey located and measured 26 different environmental hazards in this ecologically important area. They were guided by FoEME field staff and teacher Mr. Hashem Ashqar.

Environmental Hazards Map, Tulkarem City, Palestine, 2009-2010



ENVIRONMENTAL THREATS

Gishori chemical factory:

"Nizanei Shalom", an Industrial Zone that was built during the 1980's between Tulkarem and Emek Hefer, is comprised of 7 factories, operating at low environmental standards. Located in close proximity to the densely populated neighborhoods of Tulkarem, air pollution and foul odors emanating from the Industrial Zone have lowered the quality of living in the area and has led to the evacuation of an entire neighborhood.

Zomar Valley:

Wadi Zomar flows through Tulkarem, continues to the neighboring community of Emek Hefer and ends its course in the Mediterranean Sea. The dumping of sewage and industrial waste in Wadi Zomar heavily pollutes the stream, contributing to the pollution of the Mountain Aquifer and its freshwater resource. Moreover, the polluted stream attracts insects that contribute to the spread of diseases.

Improper disposal of solid waste:

Along with these environmental threats, Tulkarem is affected by open dump sites and improper solid waste management. Waste is simply piled up and burned, releasing toxic pollutants, such as dioxins, that can accumulate into the fat tissues of animals and find their way into the food chain. It should be noted that dioxins are one of the most toxic compounds known to man, and are produced mostly by the burning of organic compounds (such as PVC), often contained in regular domestic waste.

The Environmental Group in the School of Irtah, Tulkarem

By using the GIS technology, we learned many ways how to represent our world, in addition to a new way to learn about our geography in Tulkarem. We now have a different view of our city from participating in this project.
At the GIS camp, it was a great experience to meet new people who are just across the border line.

This project let us learn about new technology and share our data with our neighbors.

The environmental group from Tulkarem Abdel Rahman Takrouri, Khaled Takrouri, Haytham Faraj , and Mamoun Irqi

RECOMMENDATIONS

At the GIS Youth Camp, students from Tulkarem and Emek Hefer prepared a play in which they acted out the role of the owner of the Gishori Chemical Factory, and had to answer to the community that was being affected by pollution. This role playing exercise mimicked an actual meeting that took place - where it was decided that the factory owner would visit the communities to understand the adverse effects of air pollution. Following FoEME's appeal to the Ministry of Environment, an air quality monitoring test will be conducted in the industrial zone during November 2010. Furthermore, the Israeli Civil Administration has committed itself to prepare an environmental master plan for the Nitzanei Shalom Industrial Zone in order to ensure improvement of environmental practices.

1. Public Awareness:

Both neighboring communities lack awareness of the environmental impact of human activities, nor do they have the knowledge of how to minimize its impact, particularly concerning shared water resources. The students of the CGIS project believe that this situation can be curbed by organizing field trips to pollution sites; raise public awareness and public concern; and eventually develop a comprehensive action plan.

2. Wastewater treatment:

Thanks to the German Development Bank (KFW) which has allocated € 30.6 million towards the building of a waste water treatment plant and sewage system for the Nablus area, including the Zomar Valley and its olive mills. The work should be completed by the end of 2012.

Meeting Role Play between Factory Owner and Community

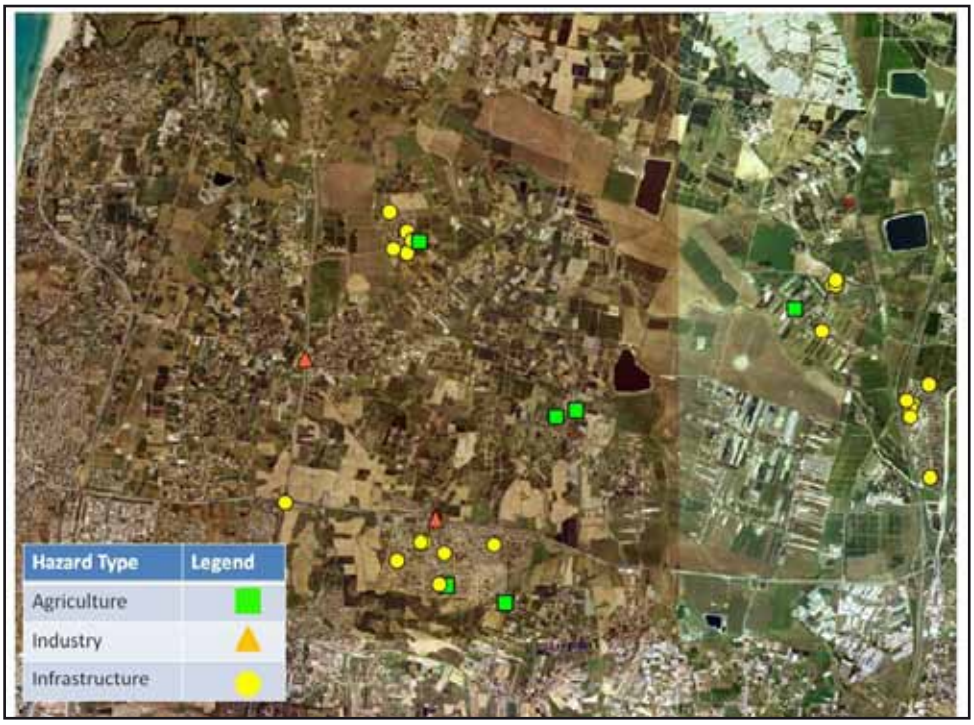
Students Presenting Hazards at GIS Youth Camp

Emek Hefer Regional Council, Israel

General Overview

Emek Hefer Regional Council is a cluster of communities located in Israel's central region comprised of 38,000 inhabitants and extending over 130,000 dunams of land. The municipality is partnered with the Palestinian community of Tulkarem with which it shares the Shcem/Nablus and Alexander/Zomar Rivers as well as the waters of the western aquifer.
The youth water trustees of Emek Hefer have identified wastewater disposal, solid waste dumping, mosquito outbreaks and gasoline tank leaks as the main environmental hazards.

Year 11 students from Ramot Hefer High School identified 30 potential environmental hazards in their area. The major potential hazards are oil and gasoline leaking from gas station tanks. Under the guidance of FoEME field staff Ms. Ayelet Tapiro and teachers Ms. Tze'ela Shaham and Ms. Nava Gal, they found that some of the leaks are located near freshwater sources. Another hazard is domestic and industrial sewage flowing in the Schem Stream. Sewage that penetrates into the water sources contains organic and chemical compounds which promote the development of various disease-causing agents.



Environmental Hazards Map, Emek Hefer, Israel, 2009-2010

ENVIRONMENTAL THREATS

Domestic sewage pollution:

Untreated wastewater disposal is resulting in the pollution of the Nablus and Alexander river, threatening the rehabilitation of the stream and polluting the mountain aquifer, which is the main source of freshwater in the area. The building of a treatment plant in 2002 improved the situation, but several pollution sources still exist, especially on the Palestinian side, due to poor wastewater infrastructure.

Gas station pollution:

Students from Ramot Hefer high school have identified leaks from gas station oil tanks as a major environmental hazard. In fact, many leaks occur near freshwater sources, seriously compromising the water quality in the area.

Industrial sewage:

Similar to the issue of domestic wastewater, industrial sewage constitutes a major pollution source for the local water bodies.

Solid waste dumping:

Random domestic and industrial waste dumping results in pollution of the underground aquifers. Areas that are not specifically designated for waste disposal can potentially be recharge zones for the aquifer. Pollutants can find their way through permeable soil layers and reach groundwater reserves.

Mosquitoes outbreak:

Fish ponds, reservoirs, sewage treatment plants and untreated sewage water running into the Alexander River provide a perfect habitat for the reproduction of mosquitoes. Limited cooperation between Emek Hefer and Tulkarem, its partnering community on the Palestinian side, further exacerbates the situation.

Tuval Castro,
11 grade, Ramot Hefer High School, Israel

During the first days of November 2009 I had the opportunity to participate in a three day conference in Amman – the capital of our neighboring country Jordan – a place where I have never visited. Our group consisted of environmental activists from Emek Hefer Regional Council including water experts, regional council representatives, our community coordinator and myself – the Israeli youth representative together with my friend Shuval from Biet Shean.

I was representing the CGIS project, which stands for Community Geographical Information Systems. The project's aim is to locate environmental and ecological hazards in the different communities, and my class – 11th grade Geography students at the "Ramot Hefer" school focused on hazards in the Emek Hefer area. We learned how to identify the hazards and how to map them using special software. The final aim of the project is to upload the map of hazards to Google Earth, a worldwide accessible map, in order to expose the data we collected and raise the public's awareness about the issue.

At the conference, I described our CGIS activities and the cross border activities we undertook in front of over 250 conference participants as the Israeli youth representative. In addition, we met students from the King's Academy in Jordan and had fun speaking to them and found we have a lot in common.

We also presented posters and campaigns we created, demonstrating the joint process the neighboring community went through. Throughout the presentations the conference participants expressed their support for the project. It was good to find such a diverse combination of people with one common denominator - the ecological approach.

Overall, my participation in the conference was a very unique and outstanding experience. I mostly enjoyed the opportunity to meet many different people, and really valued the open conversations between Jordanian, Palestinian and Israeli community participants. I think this is the way to reach peace between the countries and this is the best way to build the relationship between the communities and countries. I hope the project will continue and succeed.

Tuval presenting the posters at the GWN conference in Jordan

RECOMMENDATIONS

Emek Hefer students were particularly creative in presenting their environmental recommendations. At the CGIS youth camp, together with youth from other communities, they created a beautiful collage of drawings which was exhibited in an open gallery at the Alexander River Bridges Festival. The students continued to raise awareness as to the potential hazards in a special exhibition at the Emek Hefer annual parade and received excellent feedback from their teachers at school for their Geography project.
Finally, the GIS map created by the students was reviewed by the Emek Hefer Municipality who thanked them for their work and promised to follow up on the relevant hazards. Their work also contributed to the municipality's plans for setting up a GIS system for environmental management!

1. Domestic and industrial sewage:

The water treatment plant could be a catalyst for cooperation if used by both partner communities, and it would help to reduce the amount of pollutants dumped daily into the Alexander/Zomar stream. A reduction in sewage spills would also have the beneficial effect of reducing mosquito outbreaks.

2. Gas station and solid waste pollution:

All gas tanks should be legally approved and stationed according to high level standards, minimizing damage from potential leaks. Regarding treatment of solid waste, the Emek Hefer Regional Municipality has begun a pilot project to separate domestic organic waste from dry waste such as plastic and paper.

At the GIS camp in Jordan Ecopark

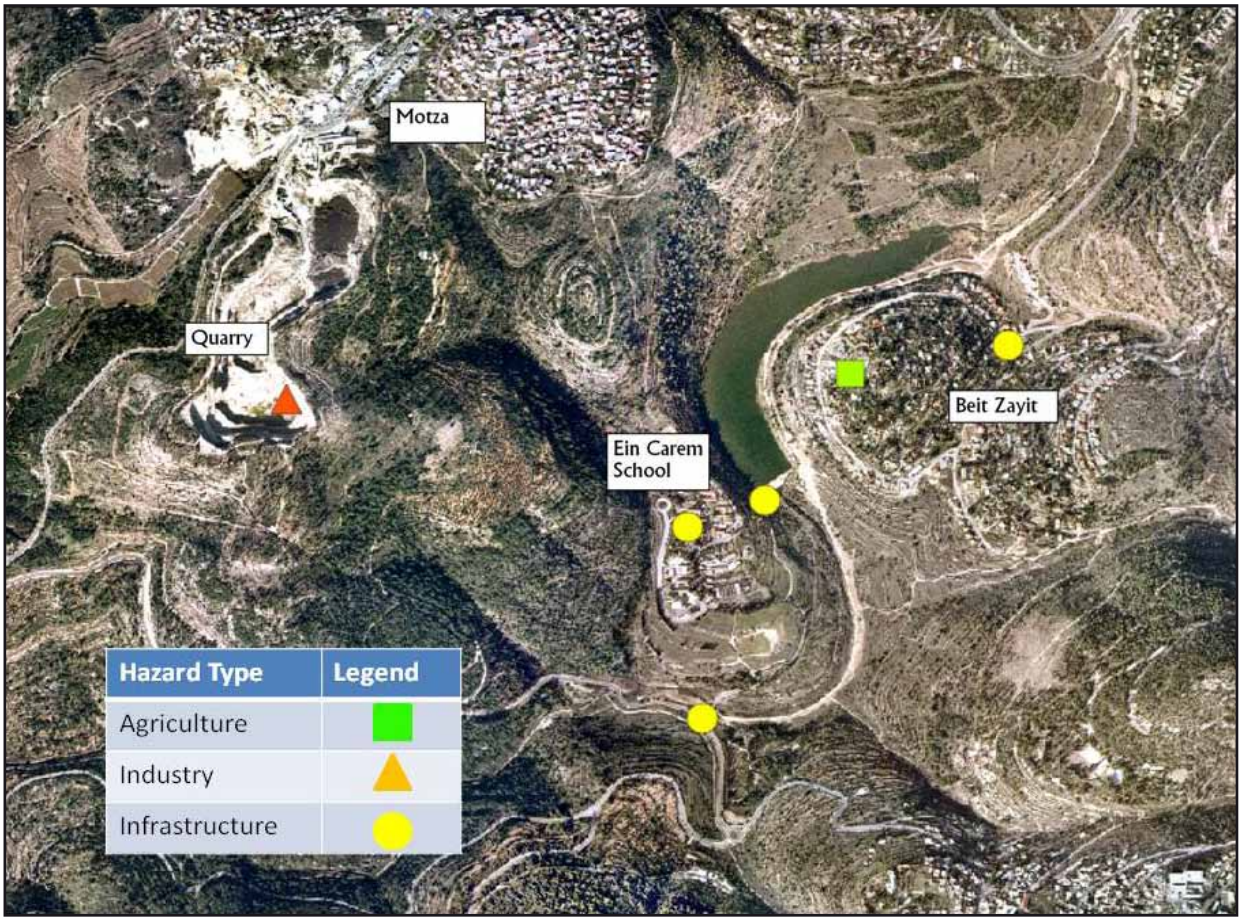
Drawings from the collage

Tzur Hadassah, Israel

General Overview

Tzur Hadassah is located in the Jerusalem district, in the Judean Hills of Israel. It is comprised of approximately 4,000 residents, most of them working in the service sector of the Jerusalem area.
Tzur Hadassah partners with the Palestinian village of Wadi Fukin, an outstanding, well preserved model of a traditional agricultural way of life, developed thousands of years ago.
Tzur Hadassah's Community GIS project was carried out in the regional high school - Ein Karem Environmental School.

Students from the Ein Karem environmental school identified 22 environmental points of concern in their area, threatening the mountain aquifer and a local seasonal lake. They were guided by FoEME field staff Mr. Netanel Silverman and teacher Ms. Tzippi Dahan.



Environmental Hazards Map, Tzur Hadassah, Israel, 2009-2010

ENVIRONMENTAL THREATS

Overflowing garbage bins:

Inappropriate trash collection often results in overflowing garbage bins. Besides having a negative aesthetic impact, garbage left to rot into the bins can result in bad odors and eventually, percolation of pollutants into underground water resources.

Quarry:

During the survey the students located a stone quarry that is (1) producing noise and dust; (2) destroying the natural landscape, and (3) negatively impacting the watershed of the area. Moreover, dust from the quarry can be blown around by wind, negatively impacting human health.

Domestic sewage:

Inappropriate collection and treatment of domestic wastewater is resulting in leakage of sewage into the seasonal lake located next to the inhabited area. This can cause eutrophication, destroying the aquatic ecosystem, as well as lowering the water quality of the lake in general.

Tzipi Dahan, Geography teacher and Noga Teri, 9th grade student Ein Karem High School, Tzur Hadassah, Israel

9th graders from Ein Karem High School experienced three fascinating days at a regional meeting with Palestinian and Jordanian students. The meeting took place at Kibbutz Beit Alpha in the Jordan Valley and was dedicated to enhancing environmental knowledge and especially about the protection of shared water sources in the region.

This special workshop was the initiative of Friends of the Earth Middle East, concluding a year's research project at school. It started with ice breaker games between the students, who showed openness and willingness to get to know each other. The activities included learning about the shared water sources in the region and the hazards threatening the sources through maps the students had prepared using GIS software. On the second day we enjoyed bathing in the nearby stream and springs in the Beit She'an Valley.

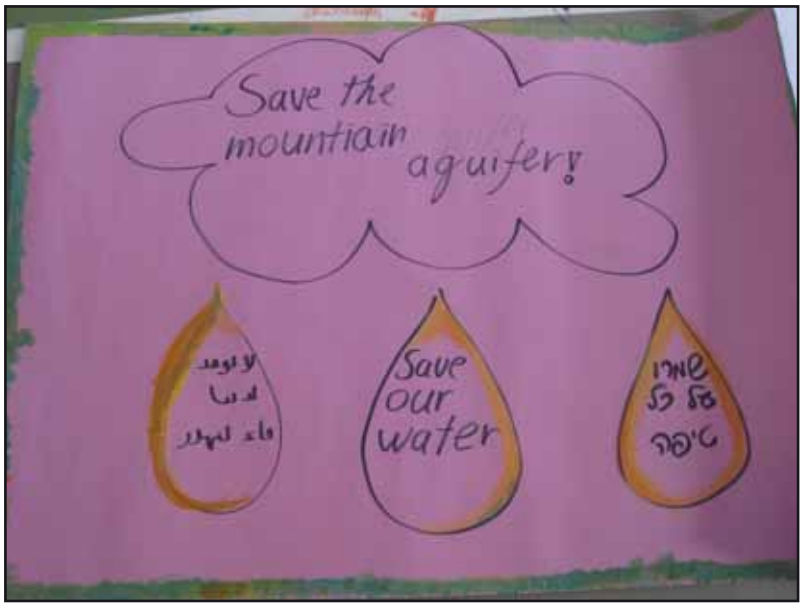
The third day culminated with planning a campaign meant to make a change in the authorities' attitude towards treatment of hazards contaminating water in the region and to convince them to take action. Ein Karem students' campaign focused on two main hazards they found in the school area: pollution at the Beitt Zayit reservoir caused by waste water and the Castel Quarry that causes air pollution.

By the end of the workshop friendships were made between our students and Palestinian students from Auja in the Jordan Valley (north of Jericho) and they decided to keep in touch.

Tzipi, (right) and Noga (3rd left) presenting the poster at youth camp

RECOMMENDATIONS

The students from Ein Karem met with their counterparts from the Palestinian communities of Auja and Wadi Fukin, in order to discuss the protection of the shared mountain aquifer. Together they agreed to approach their local decision makers to seek and promote solutions to the continuing degradation of ground and surface water resources. In order to raise awareness of the local population, they produced a video clip and wrote an article in the local newspaper about their experience at the youth camp and the need to protect the shared environment.
Tzur Hadassah students plan to invite their new friends from the neighboring Palestinian village, Wadi Fukin to visit their school and Poster made at youth camp



Presenting at GIS youth camp

Wadi Fukin, West Bethlehem, Palestine

General Overview

Wadi Fukin is a Palestinian community of approximately 1,400 residents located west of Bethlehem, whose main economic revenue is based on agricultural production for the surrounding area. The community uses the water flowing from the valley's eleven springs to nourish their fields. Kilometers of canals direct the spring water to storage pools and onwards to agricultural plots.
The traditional agricultural lifestyle in Wadi Fukin is threatened by the massive urban expansion of the Israeli settlement of Beitar Elite on the southeastern side and by the expansion plan of Tzur Hadassah.

A group of students from Wadi Fukin organized a field survey in order to locate the main pollution sources of this water rich area. Under the guidance of FoEME field staff Ms. Fida Laham they identified 46 environmental hazards scattered throughout this relatively small village.

Environmental Hazards Map, Wadi Fukin, Palestine, 2009-2010

ENVIRONMENTAL THREATS

Solid waste:

As in any community that lacks proper waste collection and/or disposal systems, domestic and industrial waste tend to be dumped in random sites in the area. Consequences include polluting of groundwater reserves, attracting diseases, affecting the air quality and the natural beauty of the area. Moreover, burning trash spreads pollutants over a large area, with dioxins latching onto crops that ultimately contaminate the food chain.

Israeli settlement expansion:

Intensive urban development of the Beitar Elite settlement over the recharge area of the Fukin Aquifer, leads to a constant decrease in the flow of Wadi Fuki's water springs. In addition, surplus dirt and building waste from Beitar Elite is being dumped over the slopes of Wadi Fukin, creating hydrological changes and endangering the agricultural plots downhill. Malfunctions in the Beitar Elite sewage pumping station led to the leakage of raw sewage to three agricultural plots in the Wadi, rendering them useless.

Stone residue:

Stone grinding operations near the Beitar Elite settlement have created massive destruction to the agricultural fields of Wadi Fukin, covering the farmer's plots with a layer of stone residue, impenetrable to water and oxygen.

Algae growth in springs:

Lack of a sewage network and use of cesspits cause pollution in the springs and subsequently, hastens algae growth in the villages' agricultural pools. This results in high nutrient contents causing eutrophication, severely reducing the water quality.

Muhamed, Wadi Fukin School, Palestine

The GIS training was very useful and important to evaluate the environmental situation of our village.
We have learnt about the negative impacts of environmental degradation in our town especially about those due to the construction of the Israeli settlements around our town and the lack of a sewage network in our village.
Concerning the GIS camp it was a marvelous trip and program. As for meeting kids from the Israeli side it was a good contradictory experience and we wish that we can be able to solve the environmental issues together in the future. I wonder if we can do it one day….!

Mohamed next to Alexander Zomar Stream during youth camp

RECOMMENDATIONS

Students presented their findings and map to the Village Council who encouraged them to continue researching. They also planned and participated in clean up campaigns. Like many of their peers, students from Wadi Fukin suggest proper management of solid waste, yet additionally, they must also relate to the issue of the environmental effects of urban expansion.

1. Solid waste:

Identifying a proper dumping site, possibly with impermeable lining, would reduce the impact of pollutants leaching into the aquifer, while also reducing the negative effects on the quality of life due to garbage scattered around in random sites.

2. Urban expansion:

The environmental impact from urban expansion cannot be minimized or limited, especially with the approved urban plan. The alternative would be the creation of a protected buffer zone that would serve as provider of ecosystem services and recreation area. The Israeli Ministry of Housing has committed to prepare and implement a plan to remove the excess building waste. Regarding the spillage of sewage from the settlement, following a FoEME campaign, the pumping station was repaired and an additional reserve tank was added to accommodate overflow.

3. Stone grinding:

Project activists' follow-up led to the involvement of the Civil Administration and to the subsequent enforcement of the law, namely closure of operations of the stone grinder and forcing the contractors to restore the damage caused.

4. Waste water management:

In cooperation with the Bethlehem Joint Council, the Palestinian Water Authority, and the Israeli Civil Administration, FoEME has submitted a proposal to the World Bank for a sewage and water supply network for the West Bethlehem rural areas, including Wadi Fukin.

GIS students in Wadi Fukin

Abassan, Palestine

General Overview

Abassan Alkabira is located 4 km to the southeast of Khan Younis in the southern Gaza Strip. It extends across 19,000 dunams and has a population of 21,000 residents. The area's agriculture boasts a variety of crops such as grains, water melon, melon, almonds, and other rain-fed crops.

Located near the Wadi Besor/Gaza delta, Abassan suffers from the downstream pollution which originates in the Hebron stream, flows to the Be'er Sheva stream, continues to the Besor stream, and finally to Wadi Gaza.

Abassan's residents face many severe environmental threats, and their lives are greatly challenged by the restrictions imposed on the Gaza Strip.

A group of 14-15 year olds from different schools in Abassan, together with the FoEME field coordinator Mr. Basil Yasin, identified the most pressing environmental issues in their community.

Environmental Hazards Map, Wadi Fukin, Palestine, 2009-2010

ENVIRONMENTAL THREATS

Cesspits:

Because there is no sewage network in Abassan, cesspits pollute the ground water and overflow onto the streets. Sometimes people hire special trucks to pump the sewage out of the cesspits and dump it further away. These sewage dumping grounds breed diseases that can spread around town.

Irrigating Vegetables with Grey and Black Water:

Many of the farmers in the Abassan area were advised to irrigate their trees with grey or black water. Several farmers began irrigating their vegetables with this type of water as well. Grey and black water are not suitable for irrigating crops for consumption since the water can be contaminated with fecal matter, and can spread disease.

The Over-Use of Pesticides and Fertilizers:

The overuse of pesticides and fertilizers in agriculture is a common practice in Gaza. These chemicals infiltrate the groundwater and can cause an increase of nitrates concentration, endangering the quality of water.

Basil Yassin, FoEME Field Staff in Abassan

After several CGIS workshops and activities that integrate the environment and technology, I have noticed that kids love using computers, the internet, and field surveys. When presented with the idea of the GIS, they were very enthusiastic and excited to learn the technology. Today they know how to use Google Earth very well and can easily locate whatever they want. In the field, the kids enjoyed spotting the environmental hazard areas, and they were very pleased that Abassan is one of the first places to do such work in Gaza. The kids liked identifying solutions for their community's problems and hoped that this might orient the municipality's search for funding toward environmental protection. They enjoyed going into the field and giving advice directly to the people creating and being affected by the environmental problems.

Basil giving students a lecture about GIS

Despite the hardship of growing up in such a complex reality, the youth of Abassan are taking action to better their environment and community. They have worked hard to educate residents about the threats of different environmental hazards and ways to change their behavior. Youth 'Water Trustees' have taken farmers on field visits to give them advice on irrigation, explaining to them the dangers of irrigating vegetables with grey water. They have worked with FoEME staff to show community members safe and proper models for reusing water. Here are more of the recent steps taken:

1. Cesspits:

- Abassan Municipality has tried desperately to find funding for a sanitation network although it has been hindered by high costs.
- Abassan Municipality has designated a special area for sewage. Truck owners must follow regulations and dump pumped sewage only in these areas.
- Some organizations have tried to provide on-site solutions for treatment in an effort to provide some cleanup even if it does not include the entire town.
- FoEME staff has held awareness workshops for different sectors of the community, advising residents on the use of better sanitation techniques such as the use of closed septic tanks, how to best conserve water, and more.

2. Irrigation with grey water:

- FoEME built a model that illustrates how to properly reuse treated water. This model is important as it demonstrates to residents a safer method for water reuse.

3. Fertilizers and pesticides:

- Using CGIS, youth located and marked the many green houses in their community. They are concerned by their heavy use of chemicals that may be impacting the water.
- FoEME has held workshops to provide alternatives to chemicals. These include organic farming methods, the benefits of composting, etc.

Abassan Water Trusstees

Eshkol Regional Council, Israel

General Overview

Eshkol Regional Council is a community in the north western Negev bordering the Gaza Strip. The main source of revenue for the local population is agriculture, and as such, creates the main sources of environmental concern.
The Besor stream flows through the Eshkol Regional Council. The stream is a shared watershed that originates in Hebron, flows through the Negev before reaching Eshkol, and continues to the Gaza strip and into the Mediterranean. The pollution in this stream is thus a serious cross border environmental hazard and needs to be dealt with in a regional fashion.

Under the guidance of Mr. Tal Shamir and teacher Ms. Rinat Nave, 10th grade geography students from Nofey Habsor High School identified over 20 hazards in their area that threaten water sources and litter the landscape. The main livelihood in Eshkol Regional Council is agriculture; therefore, most hazards are connected to agricultural waste. A main source of waste is the plastic coverings from greenhouses which are often discarded improperly or burnt. In addition, some towns are not connected to a sewage system and still use cesspits. These hazards affect our health, pollute ground water and create an unpleasant environment.

Environmental Hazards Map, Eshkol Regional Council, Israel, 2009-2010

ENVIRONMENTAL THREATS

Polluted stream water:

The pollution of Wadi Besor/Gaza has damaged the natural environment and eradicated local fauna and flora species. The local residents suffer from the odor and mosquitoes, as well as the contamination of their underground water (wells).

Plastic lining of the greenhouses:

In the harsh desert climate crops have to be protected by greenhouses in order to reduce evapotranspiration and reduce the scorching of the sun. Plastic linings of the greenhouses are often disposed of improperly or simply burned, with serious consequences for air quality, pollutants fallout (including deadly dioxins) and aesthetic degradation.

Intensive use of pesticides and fertilizers:

Chemicals used for agricultural activity are a major threat for water quality. Agricultural runoff constitutes an additional threat to water quality, especially for the downstream communities inside the Gaza Strip.

Tal Shamir,
Eshkol Community Field Coordinator

The GIS project with students from "Nofey Habsor" high school began with their excitement to participate in this cross-community project. Recent changes in Eshkol Regional Council area such as the merging of the Kibbutz and the Moshav school systems, a new general interest in one's neighbors, and an increasing awareness of environmental issues contributed to the excitement.

The students were assigned to survey and map environmental hazards with GIS software in various towns in Eshkol R.C. It was an important social and educational experience for the kids, and produced important findings. They discovered environmental degradation and hazards caused by intensive farming of vegetables and livestock in the area.

Today, the voluntary Regional Environmental Committee uses the report as a basis for continued environmental efforts. Thanks to the initial work of the GIS project participants, additional support and further surveying will help improve the region's natural resources.

Tal, right, with students, on the way to GIS youth camp in Jordan 2010

Eshkol youth found that their community shares similar environmental problems with their Jordanian and Palestinian peers when they met at the youth camp. In order to raise awareness and try and solve these problems, particularly the management of agricultural plastic waste, the students presented the hazard map to the Regional Council, participated in a local ecological fair and created plastic sculptures from recycled materials. These activities have catalyzed the regional council's plans for establishing a specialized environmental management unit.

1. Cross border watershed management

The Hebron-Beer Sheva-Besor-Gaza watershed is unique in its size, diversity and the many communities through which it flows. Therefore, solving the environmental problems caused by pollution requires cross border management. FoEME, together with other environmental organizations in the area, has begun working on this issue.

2. Contamination from fertilizers:

A possible solution could be limiting fertilizer-intensive agriculture by introducing organic agriculture, and development of alternative livelihood better suited for a desert climate (eco tourism, services, etc.).

3. Greenhouse plastic lining:

Many crops in the region require plastic greenhouses for protection from the sun and extreme heat, yet much of this plastic is discarded in an unsustainable manner. The dumping of used plastic lining constitutes not only an aesthetic problem, but also a reason for serious environmental concern when it is burned. To avoid this, it would be necessary to develop and manage proper recycling/disposal of used plastic.

Presenting together at GIS camp

Creating with reused plastic waste

Recommendations and Conclusions

The Community GIS project provided a unique opportunity for youth involvement in environmental peacemaking. This project empowered youth from FoEME's Good Water Neighbors (GWN) communities to identify environmental hazards in their municipalities using GIS and GPS technology. The GIS camp brought the Youth Water Trustees together to exchange information, bringing to light not only the shared environmental problems of each region, but creating a genuine connection with the unknown and sometimes 'feared' neighbor.

The issues identified by the CGIS surveys present astounding similarities despite the diversity of the places in which they were conducted. Most of the GWN communities involved rely on a common water source, whether it is the Jordan River, the Zomar/Alexander or Abu Nar River, or the Mountain Aquifer, they are being degraded by mismanagement and exploitation by all parties.
Environmental Hazards Summary

Most relevant is the situation of the Lower Jordan River, shared by three distinct parties and a perfect example of human-induced environmental degradation, typical to other water resources in the region. The problems of the Lower Jordan River begin with the diversion of its natural inflows, most notably south of the Tiberias/Galilee Lake and along the Yarmouk River. All the pollution sources discovered during the CGIS report are consequences not only of development, but also due to lack of infrastructure, lack of awareness and prolonged mismanagement. This irreplaceable resource is a common good belonging to all the people that live along its banks, despite their nationality, religious or political affiliation, and its degradation affects everyone in equal measure.

A common problem identified in all the communities is the dumping of waste water, mostly untreated, directly into the river bed. If sewage is not directly discharged into the river and is left to flow above ground, it still leaks into the underground aquifers, threatening to pollute the water. Reliance on cesspits exacerbates this problem in most of the communities, creating unpleasant and potentially dangerous situations. However, waste water treatment plants are slowly being planned and built, with high hopes for removing pollutants from river beds as well as the reuse of purified wastewater.

Agriculture has played a major role in water diversion plans, including the building of the National Water Carrier in Israel and the King Abdullah canal in Jordan, both diverting water from the Jordan River Basin and intervening in the region's natural water balance, all in an effort to supply water for expanded agricultural purposes. In addition to diversion and a decrease in water quantity, agriculture also contributes to the degradation of water quality. Agricultural runoff is rich in pesticides as well as nutrients that contribute to eutrophication and oxygen depletion, dealing a deadly blow to the natural capacity of self regeneration of the river.

Industrial and solid wastes are often disposed of in random places, mostly due to lack of infrastructure or lack of environmental awareness on the part of citizens and decision makers. As a result, domestic and industrial garbage accumulates in areas scattered along the entire watershed, leaching pollutants into the soil and groundwater, reducing the quality of the underground water reservoirs and ultimately the river itself.

Recommendations:

There is never only one solution when it comes to environmental issues, especially when dealing with many parties sharing a common resource, but there are a number of recommendations that must be implemented in order to make a step, however small it may be, towards a healthy natural environment for the betterment of all.

Communities should discontinue the use of septic tanks, particularly if not sealed, in order to minimize leaching underground, and adopt a capillary sewage system in order to collect domestic wastewater and prevent the contamination of water sources. Water collected in this way should be transported via pipeline either to a treatment plant or, as a more economically efficient alternative, to artificial wetlands constructed for the function of water purification. Using a relatively small amount of land from farmers would allow the creation of wetlands able to purify the water through biological processes while providing at the same time a perfect habitat for the numerous migratory birds passing twice each year through the region. Treated water from the wetlands, cleaned from excess nutrients and chemicals, could then be used for irrigation, decreasing the amount of fresh water currently used for agriculture. Additionally, artificial wetlands, if properly managed, can fulfill a recreational function, providing the communities of the Valley with much needed green spaces. Management of a wetland park could also provide additional jobs as an alternative to agriculture.

Agriculture products and techniques should be adjusted in order to minimize its environmental impact on water quality and quantity. The use of raw manure should be banned and replaced with more environmentally friendly practices, as well as the consumption of artificial fertilizers. Permaculture and organic farming are potentially good alternatives to the current situation. At the same time, crops should be selected not only in terms of their economic return, but also in terms of water consumption. Irrigation should employ techniques in order to minimize the loss of water to evapotranspiration, which is extremely high in the entire region and often exceeds the amount of precipitation.

Pollution from solid waste could be drastically reduced by awareness campaigns, controls and creation of proper infrastructure in order to safely dispose of domestic garbage and industrial byproducts. An eventual second step would be the introduction of recycling facilities, possibly with economic incentives.

These measures would have a great beneficial effect on water quality and eventually would increase even the quantity of water available for the ecosystem. In fact, reusing domestic wastewater for irrigation would ease the pressure on surface water and aquifers allowing the release of freshwater into the ecosystem, most notably into the Lower Jordan River, making a small step towards its rehabilitation.
Youth Environmental Peacemaking.

Taking Action:

Based on their findings from field research, Youth Water Trustees are creating awareness campaigns about pressing environmental issues in their community. Developing and producing publications is an important factor in distributing the knowledge and information gained from the CGIS project. Another tool for spreading information is Google Earth. The data collected by students was uploaded to Google Earth to create an accessible means of learning about environmental issues in the region. Public awareness is vital to promoting change. On Google Earth, the hazards are paired with "Neighbor Path" Stations to show both the challenges and points of interest for each community. The Google Earth layers reflect shared environmental hazards while showing how communities can cooperate together to solve these problems.

Environmental Leaders of Tomorrow:

Incorporating environmental education into youth activities is vital to the Environmental Peacemaking process. The CGIS project shows how EcoPeace/Friends of the Earth Middle East's projects can empower students and youth in the region to engage with one another to combat environmental degradation. In addition, it has taught them to find ways to relate to each other through their shared resources and common environmental hazards. The CGIS Youth Camps demonstrated how sharing ideas and information can dissolve political boundaries for the betterment of the environment and society. It is especially important to both educate and empower youth to create change within their own communities, as they will be our environmental leaders of the future.

Photo Gallery

Taking Action on Water Hazards
Community GIS

SPECIAL THANKS - Teachers

1. Teacher **Mustafa Abaideh**, Deir Ala, Jordan
2. Teacher **Awad Nawasrah**, South Ghor, Jordan.
3. Teacher **Issam Beshtawi**, Muaz Bin Jabal, Jordan
4. Teacher **Hazem Abo Zaytoun**, Tabket Fahal, Jordan
5. Teacher **Yosra Al Shqoor**, South Ghor, Jordan
6. Teacher **Luay Abdel Al**, Jericho, Palestine
7. Teacher **Hashem Ashqar**, Tulkarem, Palestine
8. **Mr. Said Nasrallah**, Baka Sharkia, Palestine
9. **Mr. Mohanad Saideh**, Auja, Palestine
10. Teacher **Esti Agami**, Jordan Valley Regional Council, Israel
11. Teacher **Ella Sela**, Jordan Valley Regional Council, Israel
12. Teacher **Yael Arama**, Beit Shean, Israel
13. Teacher **Zeela Shaham**, Emek Hefer Regional Council, Israel
14. Teacher **Nava Gal**, Emek Hefer Regional Council, Israel
15. Teacher **Mubarak Wated**, Baka Garbia, Israel
16. Teacher **Tzippi Dahan**, Tzur Hadassah, Israel
17. Teacher **Revital Sabag**, Tamar Regional Council, Israel
18. Teacher **Rinat Nave**, Eshkol Regional Council, Israel

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1. **Mr. Jack Dangermond**, President of Environmental Systems Research Institute Inc. (ESRI)
2. GIS Specialist **Joseph Berry**, Jerusalem, Israel
3. GIS Specialists **Michael and Hanna Younan**,Good Sheperds Engineering Company (GSE), Bethlehem, Palestine
4. GIS Specialist **Yolla Asmar and Amany Mansour** Amman, Jordan.

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EcoPeace/ Friends of the Earth Middle East (FoEME) is a unique organization at the forefront of the environmental peacemaking movement. As a tri-lateral 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. FoEME is a member of Friends of the Earth International, the largest grassroots environmental organization in the world.

For more information on FoEME or to download any of our publications please visit: www.foeme.org

Amman Office
PO Box 840252 - Amman, Jordan,
11181
Tel: 962 6 5866602/3
Fax: 962 6 5866604
Email: info@foeme.org

Bethlehem Office
PO Box 421 – Bethlehem, Palestine
Tel: 972 2 2747948
Fax: 972 2 2745968
Email: info@foeme.org

Tel Aviv Office
8 Negev Street, Third Floor – Tel Aviv,
66186 Israel
Tel: 972 3 5605383
Fax: 972 3 5604693
Email: info@foeme.org