

PRO-AQUIFER: PROTECTING TRANSBOUNDARY GROUNDWATER RESOURCES FROM POLLUTION. RESEARCH, TRAINING, AND GUIDELINES FOR ISRAELI AND PALESTINIAN MUNICIPALITIES

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The Mountain Aquifer is a vital shared groundwater resource that provides high quality water for both Palestinians and Israelis. Its protection from pollution is a priority for both peoples. Municipalities play a pivotal role in managing pollution sources and water contaminants, and therefore have a major responsibility in protecting ground water.

Currently, sewage of more than two million people, Palestinian and Israelis alike, is discharged into the open environment every year without adequate treatment, or completely untreated. Sewage has been flowing on the aquifer's recharge area for years. Many springs in the West Bank are polluted by upstream sewage, and it is only a matter of time before pollution will reach deeper layers of ground water, since the geological structure in that area allows easy percolation of surface water into the ground. Thus, the water of the Mountain Aquifer is directly threatened. Another significant threat to the ground water of the Mountain Aquifer is liquid from solid waste, which also percolates into the ground and can threaten the underlying water resources. If this water does, in fact, become contaminated, then the water scarcity already experienced by Palestinians and Israelis is bound to become a far greater cause of distress, possibly reaching catastrophic proportions and further exacerbating conflict in the Middle East.

This "Pro-Aquifer" project, being conducted jointly by Friends of the Earth Middle East (an Israeli-Palestinian-Jordanian environmental NGO) and the Palestinian NGO, House of Water and Environment, aims to promote solutions to these pollution problems.

Protecting shared water resources, regardless of their later allocation, is a 'win-win' issue. Both sides can be expected to do their utmost to this end. Conflict over a 'win-win' issue makes little sense, however it continues to characterize attempts to protect the Mountain Aquifer.

Given the continuing stalemate in political ties between national governments on the one hand, and the ongoing need to cooperatively address protection of shared water resources from pollution, municipalities were identified as a promising avenue of progress under current constraints.

This paper presents the findings of this cooperative Israeli-Palestinian project, which aims to reduce groundwater pollution in Palestinian and Israeli municipalities. The project consists of conducting scientific research of potential and existing sources of groundwater pollution that threaten the Aquifer; training municipal staff on sewage treatment technologies, management techniques, and Geographic Information Systems; and, developing policy guidelines for local Palestinian and Israeli municipalities to prevent further contamination of the Aquifer. Tulkarem serves as the Palestinian case study municipality for the Pro-Aquifer project, and Um el Fahem is the Israeli case study municipality. This project is funded by the European Union LIFE Third Countries Program. It also receives financial support from Green Cross France.

FoEME and HWE together developed the research component of this project. It consists of two types of research: scientific and institutional. Palestinian and Israeli Working Committees have informed and overseen the research, and a joint Palestinian-Israeli Steering Committee helped develop the process and provide ongoing advice for the entire project. The Committees reviewed and commented on the research plan, and helped develop the criteria for selecting a case study municipality in each side. These criteria included:

- Origin and type of pollution source;
- Hydrogeological sensitivity – degree of sensitivity of the aquifer to pollution;
- Severity of pollution and risk of potential harm to aquifer;
- Potential ecological effects;
- Availability of data within municipality;
- Applicability of the policy model to other municipalities;
- Willingness of municipality to cooperate on project; and
- Population trends.

Geographic Information Systems (GIS) is a central tool to this Pro-Aquifer project. Currently, within municipalities, GIS is not used extensively for environmental purposes, so we are adding environmental considerations as a new dimension for using this tool. The scientific research consisted of using GIS to map the hazards and analyzing the pollution sources and hydrological sensitivity, among other factors. A risk analysis then was conducted to identify the hazards and areas that pose the greatest threat to groundwater for both TulKarem and Umm el Fahem, and then extrapolating the data from these case studies to apply to Israeli and Palestinian municipalities, more broadly.

We also have conducted research on the national and municipal institutional structures and laws, standards and regulations, financing mechanisms and enforcement procedures to understand the municipalities' governance structures. This has helped us further understand why the potential threats to the groundwater exist and the extent to which they exist, in these municipalities, as well as ways in which they can be resolved.

Our policy paper integrates the institutional and scientific/GIS findings, and then provides policy recommendations for Israeli and Palestinian municipalities, based on, and expanding from, the findings and recommendations for the two case study municipalities, to help alleviate groundwater pollution sources that could harm the Mountain Aquifer.

Some of the key threats to ground water we found include: solid and hazardous waste and wastewater, due to improper disposal and inadequate infrastructure. Lack of municipal institutional capacity, in terms of staff and financial resources, combined with lack of political leadership and lack of enforcement, also contribute to the problems threatening contamination of the Mountain Aquifer.

The key recommendations focus on addressing these threats in the short, medium and long term, by incorporating GIS into municipalities as a key tool.

- The tool should help the municipality understand the overall environmental situation and specific hazards and identify the highest priority risks (areas and hazards).
- A strategic environmental plan should be developed to address existing and potential pollution sources and infrastructure and to integrate sustainable planning, management and coordination, monitoring, enforcement, education and financing. Infrastructure should be expanded, where applicable. Infrastructure should use appropriate-scale technology to ensure proper ongoing operation and maintenance.
- With the help of the GIS, hazards and infrastructure should be inspected and monitored regularly to prevent leakages to ground water and to immediately address any leakages that occur.
- Enforcement should be enhanced.
- Environmental hazards should be assigned to the appropriate departments and the highest priority risks should be remediated first.

- Municipal staff should be educated on the local environmental situation, the value in rehabilitating polluted areas that can affect the Aquifer and in protecting the Aquifer in the future.
- Community awareness should be expanded and the community should be involved in protecting the local groundwater resources.
 - Educational curricula should be developed to make children aware from a young age of the need to protect the local environment, particularly the Aquifer.
 - Women, who bear primary responsibility for cooking, using water resources, and managing the family unit, also should be educated on environment, health, and sustainable development issues.
- Fees collected from enforcement violations and other municipal tariffs should be directed toward repairing and enhancing solid waste and wastewater infrastructure and protecting the Aquifer.

This project also provides training courses on sewage treatment management and technologies for municipal workers and managers. The training courses were designed based on an extensive needs assessment process and were thereby tailored to specific needs identified. The first two courses have taught Israeli and Palestinian municipal staff about sewage management and treatment technologies, including: ways in which sewage could constitute a problem or hazard for a municipality; different sewage treatment methods, according to the size of the municipality and other factors; the need for businesses to pre-treat wastewater; as well as legal and enforcement issues. These courses included study tours, so participants could see first-hand different types of wastewater treatment management techniques and technologies, ranging from reconstructed wetlands to major treatment facilities.

Another course focuses on teaching the basic concepts and usage of Geographic Information Systems and ways in which to incorporate GIS into municipal management and planning. We trained approximately 45 Israeli and 45 Palestinian municipal workers and managers in the first 3 courses.

A final course will teach municipalities about the policy recommendations we have developed for this project.

High significance is placed on creating commitment on the parts of municipal officials and public figures to protect groundwater. Emphasis is placed on the trans-boundary nature of groundwater resources in the region, and the need to cooperate between Israelis and Palestinians on this crucial issue. This project aims to provide the scientific and policy tools and recommendations to alleviate further contamination of the Aquifer in a community-based, sustainable manner.

Major sources of information include:

- 1) Aliewi, A., Rajab, K., Imseih, N., Abu Sada, J., Freimuth, L., Saltman, A., "Pro-Aquifer Scientific Paper," HWE and FoEME, 2008.
- 2) Feitelson, Eran and Marwan Haddad (eds.), *Management of Shared Groundwater Resources: The Israeli-Palestinian Case with an International Perspective*, IDRC and Kluwer Academic Publishers, 2000.
- 3) Fischhendler, Itay, "Institutional Conditions for IWRM: the Israeli Case," Department of Geography, Hebrew University of Jerusalem, 2007.

Reference:

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