

Dry Sanitation in Palestine ¹ A Pilot Project in the Hebron District 2000-2001

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Summary

The problems of both water scarcity and water pollution severely lower the standard of living in the West Bank and Gaza Strip. Natural water supply is dependent upon yearly precipitation, which replenishes the aquifers in the Palestinian territories; and upon political relation with Israel, that still controls all water reserves in the region. Meanwhile, the water that is available to the Palestinians is under threat of pollution from cesspools and septic tanks, the main wastewater disposal method in Palestine, and uncontrolled discharge of Jewish settlements and Palestinian cities. The groundwater quality is steadily deteriorating, due to a lack of proper sewerage systems and inefficient solid waste management.

An applicable technology, which simultaneously addresses the two environmental and health threats of water scarcity and water pollution, is the urine diversion sanitation system. This ecological sanitation technology has proven to be an especially effective and efficient sanitation alternative in regions of little water and high temperatures. Therefore, it was expected that urine diversion sanitation would be an appropriate, ecological alternative to water-borne sanitation systems for Palestine.

The project will serve to test the performance of *dry sanitation* (urine diversion) systems in this particular climatic and cultural environment. If successful, the project results can be used to encourage politicians to consider wide-scale implementation of ecological sanitation technology, and will convince other communities and individual households to adopt this technology as well. If the test project results illustrate the suitability and applicability of such technology in this region, it will further advance the argument against water-borne sanitation systems, which still is seen as the only alternative to traditional sewage disposal methods.

Rural and Peri-Urban Sanitation in Palestine

Only thirty percent of the population (60% of households in municipal communities) in the West Bank is connected to a sewerage network.

For the other seventy percent of the population, household wastewater is disposed of through cesspits, gardens, streets, and in some cases septic tanks. Cesspits are the most common for wastewater disposal in the absence of a wastewater collection network. They typically serve one household or are shared by families, or neighbors of the same multiple apartment building.

¹ The project is financed by Sida

² This project is part of a sanitation program that based on informed demand sanitation planning and household centered environment sanitation. The program includes projects such as: Integrated Catchment Sanitation Management, Waste(water) reuse, Environmental Sanitation (urine diversion), Micro Credit Facilities, Sludge Treatment, Small Scale Wastewater Treatment, Small Diameter Sewer Network

The size of the tank depends on the availability of land and on the construction costs. Their capacity might range from 5 to 50 m³.

The average period between each complete evacuation of the contents of cesspits is around two years.³ The average annual cost of emptying cesspits in the southern West

Bank is reported to be about \$100/household. However, one must distinguish between cesspits that are built with the purpose to allow infiltration of the wastewater into the ground, and septic tanks that are closed systems that may or may not discharge the effluent in a sub-drainage tank (SDT) system. In theory, the SDT systems are different, but in practice the cesspits become clogged and so the SDT systems of the septic tanks become disabled. In both cases the liquid septage has to be removed periodically.

The economic costs for a household that does have its cesspit or SDT emptied are high, explaining the purposeful construction for infiltration of the wastewater into the soil. A vacuum truck with a volume of 10 m³ costs between 12 and 15 dollar per load. Comparing this cost with the average daily income of a typical unskilled Palestinian labourer (15\$ - 25\$), one economic class found in rural communities, and it is evident that the cost for emptying a septic tank or cesspool would become quite expensive. For this reason, house owners and contractors purposely do not line the cesspits with impermeable material (plastic, concrete) so that the sewage will infiltrate into the underground, and therefore not have to be pumped out. Sewage that does infiltrate into the soil can rapidly reach the underground water aquifer through the many cracks in the rock structure of the West Bank, this is why cesspits are considered to be the main source of groundwater pollution in the Palestinian Territories.

Goal & Objectives

When one witnesses the inadequate sanitation systems in rural households, a scarce national water supply, and the increasing pollution of precious groundwater resources it is clear that an emphasis on the improvement of sanitation technologies is imperative in order to solve this public and environmental health crisis. In this light, the Palestinian Hydrology Group, want to put effort into research of alternative, ecological, and economical sanitation technology for rural and peri-urban sanitation problems. The Sanitation Task Force of the PHG, as part of its newly developing program of activities, is disseminating and implement dry sanitation technology through applied research and pilot projects at three locations in Palestine. The projects aims to illustrate the feasible dry sanitation system that can be adopted by local communities and/or the private sector.

The goal of introducing dry sanitation technology in Palestine is to provide an **ecologically, economically, technically intelligent way of alleviating drinking water scarcity and community health problems**. Specific objectives of introducing dry sanitation technology through applied research and pilot projects are:

1. *Conduct research on the applicability or modifications that need to be made on the operation of dry sanitation systems in this region.*
2. *Test the operation of dry sanitation models; community involvement and participation aspects, technical performance, financial benefits, management criteria*
3. *Build the capacity of Palestinian sanitation professionals in operating and maintaining dry sanitation systems.*

³ 27.25 months according to the Southern Area Water and Sanitation Project - Social Assessment Survey, Sept/Oct 1998; DFID

Test site selection

This project aims to test the application of various urine diversion sanitation technologies on a scale large enough to obtain a reliable assessment of its climatic and cultural suitability. In various villages in the southern area of the West Bank (Hebron district) we are about test 100 toilet units. The individual testing locations (households, schools, communal buildings) will be selected on the following criteria:

- i) A balanced mix of households in different economic classes, so as to avoid the cultural problem of having dry sanitation technology being labeled as a cheaper system suitable only for the lower economic classes.
- ii) Buildings which presently have no sanitation facilities, since it is recognized that selecting either currently constructed buildings, or places where no sanitation facilities exist, is an easier option than retrofitting existing facilities.

Benefits

The *regional and national benefits* of implementing this type of sanitation technology in Palestine are as follows:

- Promoting water conservation: reducing household water demand by eliminating the use of water-intensive conventional sanitation systems.
- Public health protection: currently being caused by overloaded and leaking cesspools.
- Preventing groundwater contamination: vast areas of the West Bank are very rocky with only a thin covering of topsoil, the carstic nature of the geological formation, leaving it extremely susceptible to the percolation of toxic wastewater from cesspools.
- Employment creation: local small manufacturers help to develop and produce the pedestals or squat plates, while the actual construction of the toilet units will not require a high level of skilled manpower; and
- Decrease of wastewater collection and treatment cost and infrastructure problems

The *benefits to the individual households* who install the urine diversion sanitation technology are the following:

- Water conservation: toilet water drastically reduced in each household, reducing the percentage of income that is spent on water consumption.
- Waste minimization: amount of wastewater per household reduced, smaller load for cesspools and septic tanks, reducing probability of leakage and groundwater pollution
- Recycling of nutrients: nitrogen from urine used as fertilizers, dried feces as soil conditioner
- Cleaner household wastewater: black water is no longer put into wastewater collection system and so the gray water is safer, and more easily treated, for garden and crop irrigation.
- Reduction of sanitation costs as the construction of a cesspit can be avoided

Technical considerations

General

The use of local materials is considered important, while the training of Palestinian builders in the technology will be crucial to ensuring long term sustainability and replicability. While appropriate designs and building methods were utilized as far as possible in order to minimize the need for imported expertise, we ensured a high quality of workmanship in order to produce *well built and attractive units* which will serve the promotion of the technology.

Collection of urine and dried faeces

There are various options for the collection of urine and desiccated faeces. The scale of the project is small and the units will be scattered amongst one community. Therefore, collection and reuse on an individual basis will be encouraged, while giving families the option to collect it communally should they so desire. The collection of dried faeces should also be handled on an option basis - should families not wish to reuse the product then entrepreneurs or municipalities should be encouraged to collect and bag it for resale to farmers.

Social considerations addressed in home visits and workshops

Whenever introducing a sanitation program, the factors for success are a mixture of technical suitability, social acceptability, and cultural compatibility. Social and cultural considerations are almost more important factors than the technical details of the actual operation. Therefore, the first phase in the test-project is to sit with the target community to decide which ecological sanitation technology will best match their needs and preferences. This task, deciding upon a specific sanitation model, will be the start of the education program. An outline of the complete education/awareness program is as follows:

1. Pre-selection household visits: discussion of concept and benefits of ecological sanitation technologies in terms of community health, water conservation, hygiene, environmental protection. Presentation of all ecological sanitation options, discussion of the benefits, operational requirements of all the models.
2. Post-selection workshop: further discussion of the relation between hygiene, community health, environmental protection and sanitation (led by community health worker). Question and answer period about the specific technology that the household has chosen to install, operational instruction manual explained and distributed to each household.
3. Post-installation workshop: approximately one month after the sanitation system has been installed, receive feedback on the systems, recommendations for improvements, discuss beginning other collection options (communal, volunteer, individual, private sector).

Health and hygiene education

In any sanitation program, there should be an extensive community education campaign on community health, hygiene, and sanitation, that precludes and accompanies all technical implementation. In light of the fact that this test project is an experiment as to the performance of the dry sanitation toilets in this particular climate and cultural conditions, an education/awareness program is extremely appropriate. The reactions and attitudes of the households

towards the dry sanitation systems will be used in determining what aspects (cultural, economic, health) should be most emphasized in any future sanitation program.

Revising Assumptions

Though initiated by environmental concerns its soon became apparent that we could only introduce technique when we listened to what do people expect from sanitation. Reactions from households after having been introduced to the new technology expressed that sanitation should meet first of all minimal expectation with respect to convenience, privacy & safety, hygiene and status.

That these standards may take different forms and and rankings may be obvious, though often ignored. Each person has her/his customs and concept of improvement. Meaning we all have our own idea what is good (for us). What is good sanitation depends on our culture and religion, generation and age. But very much on gender aspects as well.

Environmental concerns hardly play a role in the decision, unless they are directly related by the individual or community to their own situation.

Therefore, we soon realized that in order to get the interest people in ecological sanitation, it must be convenient, save, clean, beautiful and affordable.

During the project preparation we also started to appreciate the importance of resources for the determination of the final choice of the sanitation option, namely:

Financial Resources,

Water availability

Land availability

Communal Management Level

Goals can me met on a household level, for the application of dry sanitation on a entire village or neighborhood scale institutional support is required to enhance the dissemination..

Initial findings

Findings	Action
Unexpected high interest because of 1) Water scarcity and 2) high cost of sanitation	Systematic integration of dry sanitation in household and communal centred program
Farmers expressed interest in reuse aspect	Introduce good reuse of urine and greywater practices on individual or communal level
Dry sanitation utilities from other parts of the world are not appropriate in Palestine, because they: 1) look cheap; 2) are too expensive ; 3) have no anal cleansing facility	Locally production of attractive ceramic toilet with plastic lit
Most families were willing to pay for the DS unit construction, or want a small loan	Establishment micro credit facility
Simple construction guidelines for squat plate are not available	Drafting of first guidelines

Findings	Action
Stakeholders have different interest in ecological sanitation	Seek strategic alliance
New housing and construction set trend and defines status	Introduce dry sanitation where no sanitation exists
Lack of promotion material	Exchange and cooperation in developmnet of promotion material

Project Result as of October 2000

	Results	Recorded Experience / Documents
1	Public Willingness for Co-operation	Awareness and Promotion Hand-out in Arabic Statement of participation of fifty households
2	Good understanding of the needs and preference of the partners	Preference assessment based on field survey (available)
3	Common understanding of project among stakeholders	Report of First Training Workshop in Palestine on 20-21 st May, 2000 (available)
4	Scope of technical options for local production	Technical report (available)
5	Squat plate and pedestal design that can be produce locally	Design and construction drawings (forthcoming)
6	Squat plate and pedestal produced locally	Local produced high quality smart looking ceramic urine diversion squatting & pedestal toilet (completed)
7	Enhance sustainability of project and increase participation	Agreement with local micro credit organization to support the project
8	Provide simple guideline for promotion of DS	Technical Guidances (in English and Arabic): <ul style="list-style-type: none"> - General procedures for practical implemenation of project - Design & construction guidelines for urine diversion sanitation system - <i>User operation & maintenance guidelines for urine diversion system</i> - Checklist for monitoring of urien diversion sanitation system
9	Improve recording of project experience as basis for monitoring and research	Files for all individual participants and communities, containing: <ul style="list-style-type: none"> - completed questionnaire - statement of cooperation - construction drawings (original situation, suggested changes, as-built drawing) - loan form - visit report (based on standard forms) - pictures

Expected Results as off the end of 2001

Expected Results	recorded experience /documents
Approach to introduce and later promote DS	Workshop report
75 DS units installed in three communities	Installation report
Immediate outstanding problems are solved	Inspection report
Good quality DS units	Construction report
Initial sanitation management system, based on the principle of eventual sustainability	O&M guidelines and program for reuse
Cost of DS are affordable	Cost-Benefit Analysis
Reduced sanitation cost for households and communities	Comparative Cost Analysis
Environment protection and public health safety are save guarded	Project monitoring report
Exchange of experience	Evaluation Report
Use of urine on household / farm level	Guidelines & Practice Report

Remarks made and discussed in the context of the seminar with respect to dissemination and application of ecological sanitation

Promotion and development of EcoSan often ignores the main principles for success of conventional sanitation.

Though reuse of nutrients (closing the loop) is the main focus for environmentalists in promoting EcoSan, relatively little work and research as been conducted in this field.

Resource allocation for the development of EcoSan should be *significantly* increased to make it competitive with conventional sanitation.

Large scale, municipal size EcoSan projects will confront us with new problems, and will help us to find answers to important questions that are currently hindering dissemination of EcoSan.

