A new approach to sanitation in Palestine

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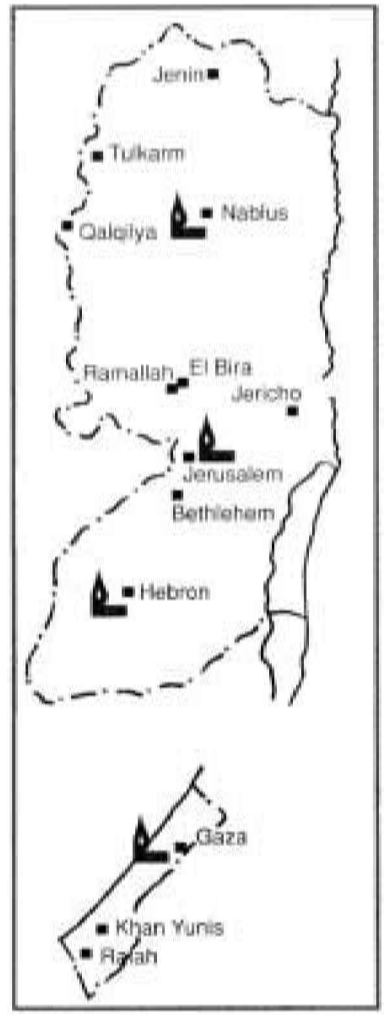
The Integrated Sanitation Project in the Artas Valley incorporates a combination of sanitation concepts and techniques, some of which are used for the first time in the Middle East. The project aims to demonstrate an affordable rural sanitation alternative for densely populated mountain communities where on-plot sanitation is not feasible.[1]

1. The project is financed by the Belgium Government through a grant to the UNDP, and initiated and implemented by the Palestinian Hydrology Group.

Artas (pop. 3,000) in Palestine is a fast growing village, located on one slope of a steep-sided valley immediately south of Bethlehem. The valley stretches from the West Bank watershed, two kilometres west of Artas, to the Dead Sea.

In 1994 a water supply network was installed in the village by the district Water Supply and Sewerage Authorities. This extracts water from 600-800 metre deep aquifers, some ten kilometres southeast of Artas.



Map showing the various centres of the Palestinian Hydrology Group in Palestine and Israel

However, the water supply often fails to meet the daily need. Poor quality water from the Artas spring (400 m^3/day) and purchased water are the usual supplements during the long dry summers.

The sanitation problems of the village are characteristic of many rural communities in Palestine – water scarcity during summer months, use of cesspits for disposal of sewage, and increasing pollution of the ground water.

In 1998 a local NGO in cooperation with GHK Research & Training held a training course for employed engineers in the design of an interceptor-small diameter sewer network (SDS).

Artas was chosen for a rapid appraisal exercise to collect data to be used to illustrate the advantages and disadvantages of SDS system. The positive reactions of both the trainees and the people of Artas encouraged the preparation of a demonstration project.

Demand for improvement

There was no doubt about a clear demand to improve the bad sanitation situation. The main concerns of the people related to overflowing cesspits, their high cost of construction and maintenance and an increasing awareness about the link between the leaking cesspits and the quality of the Artas spring. In the spring of 1999 more than 1000 faecal coliforms per 100 ml were measured.

According to WHO standards (1989) the water is unfit for unrestricted irrigation of vegetables, such as lettuce, for which Artas is locally renowned and which is the focus of the annual village festival. Sanitation for the people of Artas meant large diameter sewers, which they saw laid in Bethlehem financed through millions-of-dollar projects financed by foreign donors.

"A grown-up man has to be able to walk through the sewer, otherwise we will not allow you to work," said one of the

"Young Palestinian grooms these days are expected to welcome the bride in a well furnished sleeping room with indoor bathroom. New options, such as dry sanitation might be feasible, but still need to be tested in Palestine."

The system

An interceptor-small diameter sewer system is based on the sedimentation of solid phase of raw sewage in on-plot or communal septic tanks, allowing only liquids to be carried over into the sewers (for Artas network 4 inch; primary outfall sewer 8-10 inch). Apart from low construction costs, the advantages of the system are: pretreatment of sewage in the interceptors, application in communities with low water consumption, broad slope margins, minimal need for land surveying, light or no construction machinery. Disadvantages are: need for regular desludging of interceptors (once every two years) and community awareness building on how to maintain the system.

villagers at the start of the project.

Within the Sanitation and Environment Program of the Palestinian Hydrology Group (PHG), we are looking for ways to reduce costs in order to present an alternative that could be replicated in other villages as well.

Old irrigation channel and storage ponds

Erosion complications

Small diameter sewage was such an alternative, as we realized that in Artas on-plot sanitation was in most cases impossible because of the high density of the village and the strong erosion that years ago had washed the top soil down the valley.

Further development of existing on-plot sanitation with separate grey-water disposal might have been possible in some areas, but in general is regarded as old-fashioned. Young Palestinian grooms these days are expected to welcome the bride in a well furnished sleeping room with indoor bathroom. New options, such as dry sanitation might be feasible, but still need to be tested in Palestine.

The Artas Integrated Sanitation Project has been developed based on the concept that not only Artas, but also the upstream communities, including a tourist/conference resort at the two thousand year old Solomon Pools will be connected to the system. The total design population in 2005 is about 9000 (flow 580 m^3/d) reaching 18,000 in 2030. At this point in time the scheme might include three villages and the resort.

Technically the project includes:

- interceptor tank-small diameter sewer system
- decentralized wastewater treatment (UASB followed by waste stabilization ponds)
- reuse of treated waste water in irrigated agriculture
- sludge treatment using constructed wetland
- community involvement in the design of the neighbourhood sewers

Signing up the families

Though the demand of the community for improved sanitation was certainly there, it was the PHG that initiated the project. It was only during the implementation, when people saw actual work on the ground executed by construction workers from

New irrigation channel on top of 8in sewage pipe passing the PHG project office in Artas

the village, that the support for the project quickly increased and households were willing to sign up for their contribution, i.e. the construction and/or financing of the sewers on private property between the houses.

It was at this stage that many families became involved in attempts to address the question: how to connect the house to the main network? At this point, issues of trespassing, lack of space for interceptors, and costs became more concrete.

The managerial capacity of the political appointed Village Council has been inadequate to deal with the poor infrastructure as well as the social conflicts in the village. Many of these problems are primarily a result of the lack of a functional institutional framework. Therefore, strengthening the local capacity to construct and maintain the system is a key element of the project. The project assistant is a graduate from the village, the operation and maintenance (O&M) staff will be trained during the project implementation as well, and contractors and workers are from the area.

Management options

PHG also invited water and sanitation engineering students from Palestinian and foreign universities to cooperate in the projects for their MSc thesis research on the applied technologies. It is too early to evaluate this experience.

We expect that their experience will contribute to a more positive attitude and better understanding about decentralized sanitary options within the engineering community.

Different management options are discussed, but the most feasible structure seems to be an integrated management (from interceptor to monitoring of wastewater reuse) governed by a Board of village representatives, local officials and farmers who will start irrigating with treated wastewater. The O&M may possibly be placed under the newly established Southern West Bank Water (and Sanitation) Utility. However, developments in the field of water and sanitation management in Palestine are

New irrigation channel on top of 8in sewage pipe passing village lettuce beds

10in sewage pipe laid in old irrgation channel under steel irrigation pipe

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difficult to forecast, and force project stakeholders to be flexible in their approach.

The need to be flexible in the fast changing social-political context of Palestine is a prerequisite for good project planning, in respect of both management options and technical solutions. An example of the latter is provided by the process adopted in choosing a route for the primary sewer line, which runs down the valley to the treatment site outside the village.

Based on the recommendation of the Village Council, we initially planned the primary sewer line to run under a storm drainage channel along one side of the valley, thus avoiding routing the sewer through agricultural land. Later, responding to criticism and new suggestions from various villagers, we re-examined the design plans. The sewer line is now laid in the old concrete irrigation channel, and a new channel will be built on top of the sewer.

Questioning ones own assumptions might be perceived by many as a weakness, but is an important asset of good project management. An open mind of project staff to suggestions from the community will in return make the community receptive to ideas that are new to them.

Striking a balance

The project tries to strike a balance between what is environmentally sound and financially feasible – others might call it sustainable. In the context of the Sanitation & Environment Program of PHG, we are searching for and demonstrating solutions that are affordable to the community and individual households. We do not prescribe one solution, on the contrary, we intend to show that there are often different sanitation options.

Each society has to determine what it can (and wants) to afford to sustain the future of its children. The Artas Integrated Sanitation project, including design, collection, treatment and wastewater reuse is expected to cost about $800,000. In Palestine the cost of living is similar to Western Europe, though wages are much lower. Today, when everybody is talking about peace, donor money often provides a substitute for political justice. However, these funds are not sustainable. On the contrary, the projects and investments which are financed on these short-term funds might present a burden for the future in terms of operation, maintenance and replacement. Engineers tend to plan according to what is 'best'. We want to show what is sustainable. A second best solution that operates over thirty years and produces revenues for replacement might be better.

Increasing interest

We notice an increasing interest in our work. Sanitation has been out of reach for low-income communities. Our approach presents options that might be affordable. International organizations working in the region and local councils have been particularly interested in the cost aspect of the Artas project. Questions were, and

Construction of bridge for 10in gravity sewage line bypassing private land

still are, raised about the small diameter of the sewers. But our calculations show that in Palestine the costs of a small diameter sewer network appear to be around 40% of the costs of a conventional system. Even when the public sanitation works (collection, treatment and reuse) would only serve the village of Artas, it would cost $200 per capita. The cost for the neighbourhood sewer network will not exceed $500 per household. In comparison, the cost of construction of a regular cesspit (50 m^3) is between $1000-$1500, mainly due to high excavation costs.

The only solutions?

In many similar situations low-cost sanitation is the only solution, because financial resources are limited. In order to be convincing we should not present these options as poor-man solutions. In principle, we suggest cost-effective alternatives to serve larger numbers of people and deal with a global environmental problem.

In particular, investors and (local) politicians are sensitive to this argument as they are interested in economies of scale and political support (of voters) respectively.