Case studies of sustainable sanitation projects

Sewage disposal in Fethiye
Asia / Turkey/ Fethiye

1 Objective

The objective of the project was to protect the environment against pollution by waste water and to improve the sanitation standard of the population in Fethiye.

2 Context

BMZ-Nr.: 1999 66 326
Construction 2002 – 2004; start of operation 2004; training of staff 2001 – 2005

	Project area	Turkey
Population of Fethiye	45,000 (2005)	72 million (2008)**
Population of Fethiye + tourists	65,000 (2005)	n.a.
Under 5 mortality rate (per 1,000)	n.a.	25.1 (2006)*
Population growth p.a.	3.3% (urban Turkey)*	1.2% (2006)*
GDP per capita at official exchange rate	n.a.	EUR 4,365 (2006)*
N°of households connected to sewers	2,700	n.a.
Sewer connection rate	50% (before project) 65% (after project in 2005)	66% (2004)*
% sewage treated	0% (before project) approx. 70% (2005)	n.a.

*Turkish Statistical Institute Prime Ministry Republic of Turkey (TURKSTAT), http://nkg.die.gov.tr/
**CIA World Factbook, July 2008

The city of Fethiye is located on the Mediterranean coast in the South-West of Turkey. The bay of Fethiye is a protected nature reserve and harbours one of the last hatcheries of the loggerhead turtle. It is also a popular tourist destination.

Prior to the project, nearly all inhabitants of Fethiye had house connections for water, but only half of the households were connected to the old and totally overloaded sewer system. The other households discharged their wastewater into cesspits, which pollute the groundwater, or to septic tanks, which were often not emptied or maintained. The wastewater collected in the sewer system was discharged into the Mediterranean Sea without any treatment. Thus the coastal waters showed high pollution with coliform bacteria, nitrogen and phosphorus. This threatened the nature reserve and the attractiveness of the location for tourists.

3 Project approach

Investments / technology

The project included the rehabilitation and extension of the sewer network and the construction of a waste water treatment plant. By 2005, 2,700 households were newly connected to the sewer. With an additional loan, the city of Fethiye expects to connect all households by 2009. In 2013 an expansion of the treatment plant will be necessary. For the households not yet connected the project financed a sludge suction vehicle and an acceptance point for this sludge at the entrance of the wastewater treatment plant.

The wastewater treatment plant is one of Turkey's most advanced facilities. The treatment process is mechanical-biological with nutrient removal. To further ensure high water quality in the bay, the process also includes UV disinfection, being Turkey's first.

Wastewater treatment plant

Institutional concept / support activities

The project executing organisation is the municipal water and sewage department FESKI which was transformed into a semi-autonomous water and sewage utility with own accounts and management responsibility. The municipal council has to approve the water and wastewater tariffs. Initially, it was considered a potential risk that the municipality would not raise tariffs for political reasons. But in 2004 the tariffs were increased sufficiently (approx. 30%) to cover the costs.

The project supported the training of FESKI staff in financial management, sludge management and environmental monitoring. FESKI monitors the water quality at 14 measuring points in the bay of Fethiye. Shortly after starting the wastewater treatment, the water quality improved significantly.

Operation and maintenance concept

The functional tender for the treatment plant included a period of 42 months of operation. So far, the operation has shown no problems and the quality of effluent has always complied with the legal requirements. The sludge is mechanically dewatered and deposited on a substandard landfill, 15 km outside the city. In the future, it is planned to use the sludge as fertiliser in agriculture. Since 2007, FESKI has contracted a private service provider for the operation of the treatment plant.

4 Costs and financing

The net cost for investment and training was 16.8 million EUR (2004 prices). However, FESKI also had to pay EUR 3 million of national value added tax (VAT). German Development Cooperation financed the training component with a grant and the main share of investment (EUR 13.45 million) with a subsidised loan (2% interest) through KfW Entwicklungsbank. In addition, FESKI had access to national loans (Iller Bank) and funding from the municipality. The financing structure included the first 42 months of operation of the wastewater treatment plant. This permitted a gradual increase of user fees. The grant and the subsidy value of the KfW Entwicklungsbank loan are only slightly higher than the national tax (VAT) born by FESKI, so user fees have to cover almost the entire net investment cost.

The annual operating costs of the network are approximately EUR 0.6 million and the operating costs of the treatment plant are around EUR 0.5 million (2004 prices). The calculation of the long-run marginal cost (LRMC) further includes the value of the existing sewer network before the start of the project at an estimated replacement value of EUR 5.5 million. The long-run marginal cost per inhabitant and year served (including approximately 30% seasonal tourists) is EUR 32. In relation to Turkey's per capita GDP in 2006, the LRMC corresponds to 0.7% of GDP.

	Project	per capita (30% tourists)
Infrastructure investment (2004 prices)*	EUR 15.5 million	EUR 313
Consultant services and training (2004 prices)	EUR 1.3 million	EUR 23
KfW loan (2% interest; 30 years)	EUR 13.45 million	
Other loans / municipality of Fethiye		
KfW grant of EUR 1.02 million and net present subsidy value of KfW loan EUR 3.0 million	EUR 4.0 million	
Operation cost p.a. (2004 prices)	EUR 1.1 million	EUR 23
LRMC p.a. (2004 prices) over 30 years		EUR 32
LRMC as % of Turkey's per capita GDP (2006)		0.7%
Costs borne by users as % of per capita GDP		0.7%

* Also considering estimated replacement cost of assets existing prior to the project: EUR 5.5 million; useful lifetime pipes and civil works 40 years, equipment 15, power-supply 30, vehicles 8 years

The resulting tariffs are affordable and collection efficiency is acceptable (around 90%). The tariffs for commercial clients and industry are progressive for large consumers (>1,500 m³/month) and they provide a certain cross-subsidy for residential customers. The envisaged extension of the network and the treatment plant might require a further increase in tariffs.

5 Experiences / lessons learnt / critical aspects

The old parts of the sewer system drain a considerable amount of ground water, especially in winter time. As a consequence, the treatment plant already works almost at full hydraulic capacity. Nevertheless, the energy efficiency of the entire system is good and treatment results are very good. The first years of operation of the wastewater treatment have been successful. The quality of the effluent and the improved sea water quality have already earned two national environmental awards.

National environmental award for treatment plant in Fethiye

A critical point is the sludge disposal as long as it is not reused in agriculture. The actual landfill has no base seal or other technical means to protect the groundwater. A new sanitary landfill is planned but not yet realised.

The operation cost of the treatment plant in the first years was part of the financing arrangement for the overall investment. This facilitated a gradual increase of tariffs and thus made political acceptance easier. Furthermore, the operation is state of the art and FESKI could outsource this task. Thus FESKI has presently less staff than initially planned.