



SYRIA

CLIMATE CHANGE ADAPTATION AND MITIGATION CLIMATE PROOFING AND EMISSION SAVING YARMOUK WASTEWATER TREATMENT PLANT



Client Damascus City Water Supply and Sewerage Authority (DWSSA)

Financing KfW Development Bank and the Government of the Syrian Arab Republic

Duration of Services 12/2009 – 01/2012

Cost of Implementation Consulting fees: 446,000 EUR (Study)

Scope of Services

- Feasibility study
- Investigation and site selection
- Analysis of options
- Conceptual planning at pre-feasibility level (including pre-design)
- Analysis and elaboration of climate change adaptation and mitigation options (emission saving)
- Environmental impact assessment (EIA)
- Financial analysis
- Institutional analysis

Context and Challenge

One half of the population of the Middle East and North Africa Region (MENA) is suffering under conditions of water stress. The most water scarce region of the world will be affected most severely by increased water scarcity triggered by climate change impacts.

Also in Syria climate change will exacerbate water stress: By 2025 a reduction of the renewable water resources by 50% is expected. Thus, climate change adaptation in the water sector is of utmost importance. A boost of water resources efficiency focusing - among others - on reuse concepts of waste water is needed. Further, the water sector in Syria is a relevant source of greenhouse gas emissions: Pumping take up a significant share of total electric power generation. Energy saving potentials are high, but energy efficiency programs are hardly implemented yet.

In the project area the mentioned problems and challenges are reflected exemplary:



- The limited water resources of the existing aquifer for the drinking water supply of Ghouta region (Damascus Rif) are getting scarcer. Climate change impacts such as changes of the precipitation regime will aggravate water shortages.
- Extremely elevated pumping costs and low energy efficiency at Yarmouk pumping station (50,000 m³/d), which is transferring collected wastewater for treatment at the WWTP of Adra.
- Endangered public health, pollution of the environment and the local aquifer through discharge of raw domestic and industrial wastewater into receiving water bodies and through reuse of untreated wastewater in irrigated agriculture.

Project Description: The overall objective of the Project is the achievement of an ecologically sound environment. A new WWTP, located near to Yarmouk pump station, shall clarify the wastewater for direct reuse and refrain from expensive pumping to the distant Adra treatment works. The objective of the Consulting Services is the preparation of a feasible concept and framework to achieve the overall objective. The services of CES encompassed the Preparation of a Feasibility Study for the Yarmouk WWTP, including conceptual planning at Pre-feasibility level and project planning at Feasibility level on a technical level:

- Connection of the districts whose raw sewage is currently reused for irrigation and which technically and economically could be connected to Yarmouk WWTP.
- Pre-design of Yarmouk WWTP
- Yarmouk WWTP including Environmental Impact Assessment (EIA) and Social Impact Assessment
- Management and operation (O&M) concept for the new Yarmouk WWTP
- Concept for further use of Yarmouk pump station
- Analysis of socio-economic conditions of target groups and appropriate measures

A particular focus of the EIA and the Climate Check conducted was put on the following aspects:

1. Assessment of climate change adaptation options (Climate Proofing):

- The recharge of groundwater would improve the water availability and water quality of the deteriorated groundwater resources as a major water source for drinking water in Damascus Rif.
- The reuse of effluents for irrigation is considered as the most beneficial and accepted option since the farmers benefit directly in terms of health where they have used untreated wastewater before and in terms of less expenses where they used to pump groundwater for irrigation.

2. Assessment of climate change mitigation options (Emission Saving)

- Management and operation concept for the new Yarmouk WWTP and concept for further use of Yarmouk pump station under consideration of improved energy efficiency
- Reduction potentials of greenhouse gases emissions by:
 - 'extended aeration' aeration with lowest possible energy consumption: 'fine bubble system' instead of 'surface aerators'.
 - 'activated sludge': heated digestion incl. reuse of biogas by means of a combined heat and power plant for covering partially the energy demand of the WWTP
 - Renewable energy generation options (solar and wind energy, biogas) on WWTP in order to cover the energy demand of WWTP