

Water Supply and Wastewater in Megacities of Tomorrow (LiWa – Lima Water)

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Overall Objective

The objective of the “LiWa” project consists in the development, planning and implementation of sustainable concepts to improve the water supply and sanitation situation in large conurbations. The Metropolitan area of Lima has been chosen for a case study since it is characterised by a number of features typical of emerging megacities, such as:

- Today Lima Metropolitana has about 8 million inhabitants (one third of the population of Peru). It has been estimated that in 2025, Lima will have a population in excess of 12 million.
- High population growth (annual growth rate of 2.1 %), in particular due to an influx of poorer people, putting an additional pressure on those parts of Lima lacking appropriate supplies of electricity, water and sanitation.
- Irregular water supply due to arid climate (only 9 mm annual mean precipitation) and irregular flow characteristics (significant seasonal rainfall variations in the Andean mountains, which serve as the main source of water supply).

In order to cope with these problems, water and sanitation management demands interdisciplinary expertise to shift from traditional sectoral water management aimed at the control of users’ functions to integrated freshwater and waste water management considering

the full water use cycle. Managing the different water fluxes in an appropriate way, considering the ecological, economic and social aspects, is of crucial importance, in particular for fast growing megacities in arid regions such as Lima. Hence, the core elements of LiWa consist in:

- 1) Implementation of model-based participative methods for designing scenarios and technical-organisational solutions in order to support the decision-making process.
- 2) Evaluation and design of integrated concepts (including technical, financial, organisational and participatory procedures) for sustainable water use and wastewater treatment under the conditions of water shortage and climate change.
- 3) Provision of improved capacity and sufficient capabilities for the local water company, technicians and stakeholders to manage the water services in an effective, efficient, financially viable and socially acceptable way.

Sustainable Water Management Concepts for Lima

The development of sustainable concepts in the LiWa project means taking into account technological, environmental and socio-economic aspects whilst ensuring appropriate public participation and the consideration of all stakeholders’ interests. Public participation may increase public awareness and acceptance of the problems as well as the needed solutions (for example pricing of water).

fig 1. Decentralised wastewater treatment in a peri-urban settlement (Photograph: J. Alex)



fig 2. Irrigation of green areas by lorries using drinking water. (Image source: Ministerio de Vivienda, Construcción y Saneamiento, Peru)



Secondly, participation may lead to better decisions as it enriches the decision-making process with relevant viewpoints, interests and information and is instrumental in a learning process. Thirdly, participation may increase the accountability of decision making, as participants get an inside view in the decision-making process and they become co-responsible for the decisions that are made. Modelling techniques will support decision making processes whilst allowing for a better understanding of the complex interrelationships within the system, the analysis of its sensitive parts, the development of appropriate strategies to manage the system and a prediction of the system's future development. Liwa considers the complex interrelationships between the different technical, social, financial and institutional components of the system constituting the metropolitan region as crucial for its analysis. Hence, the development, implementation and validation of technological and organisational concepts integrates aspects of costs, tariffs and financing options within the prevailing social framework as well as the implementation of the solutions derived in close cooperation with the local water authorities. Methodologies and modelling tools developed in this project will result, *inter alia*, in a manual document which compiles the project experiences and may well serve as a base for capacity building and as a strategic guide to the transfer of the results of Liwa also to other megacities in other parts of the world.

Expectations for the main phase

Despite the fact that significant efforts have already been made by the local authorities and the water company – including, but not limited to, the treatment of water used for irrigation plus a number of other initiatives (e.g. greywater reuse, ecotoilers) with strong NGO involvement – the water supply and sanitation situation in Lima will become serious unless careful plans are developed and

appropriate measures are taken with respect to the rapid developments of urban growth. Pilot projects in various parts of the city, developed and adapted to megacity conditions in close cooperation with industrial partners and with support of the local water company and participation of the population, will allow the implementation of sustainable concepts taking into account the local requirements. Government plans, such as the recently launched programme “Water for All” (Agua para Todos), will assist in implementing the developed solutions.



▲ fig 3: Most parts of Lima are connected to the public water distribution network. Some parts are served by water forries (Photograph: U. Jumar)

▲ fig 4: River Rimac: Lima's main source of water supply (Photograph: U. Jumar)



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