



Urban Research Symposium
BMBF Megacity workshop
Marseille 30.06.09

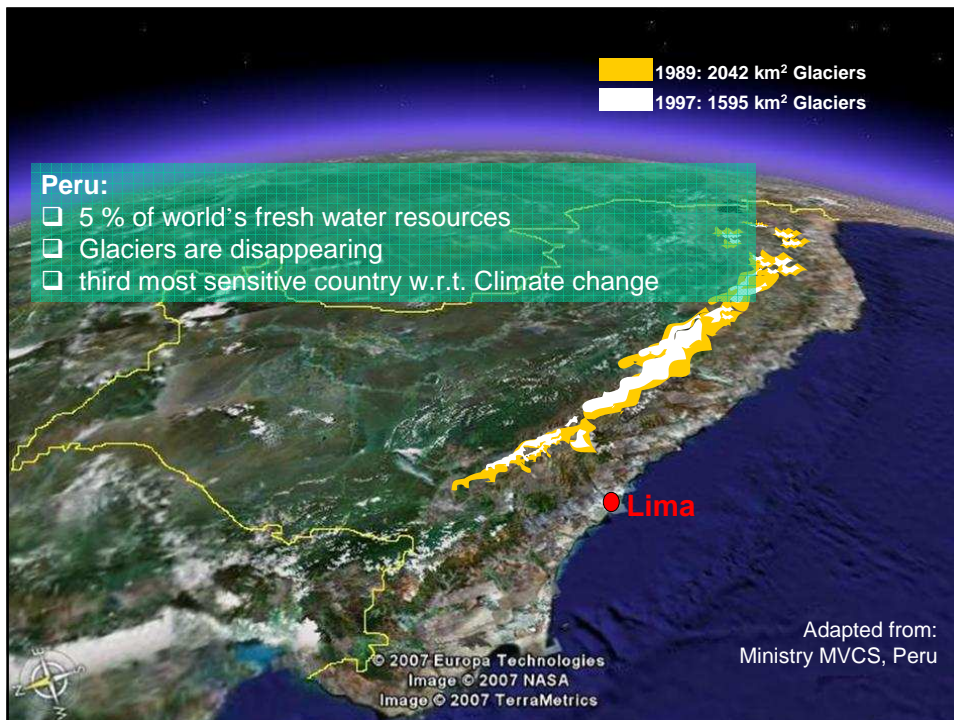


**Sustainable water management
in the emerging megacity of Lima –
Based on macro-modelling and participation**



Dr. Manfred Schütze
ifak Magdeburg e. V., manfred.schuetze@ifak.eu

Msc. Ing. Iván Rodríguez
SEDAPAL, irodriguez@sedapal.com.pe



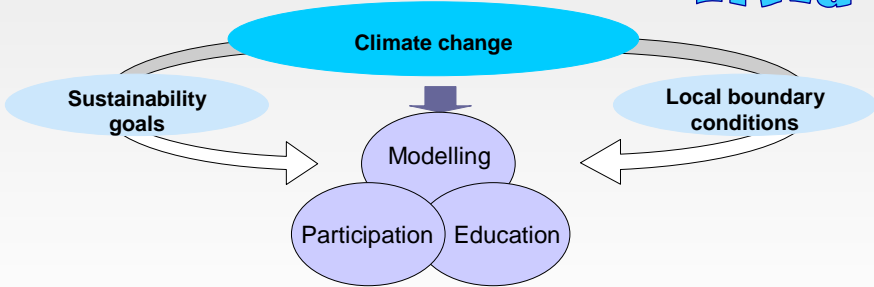
Urban growth centre Lima



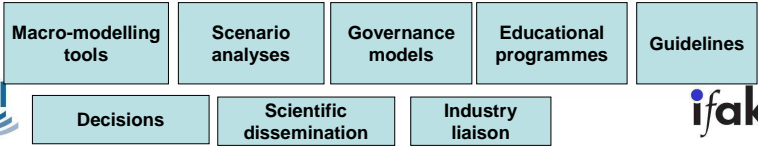
- ❑ Lima: Urban growth centre: 8 million inhabitants
- ❑ Significant population growth (2.1% p.a.), mainly in peri-urban settlements
- ❑ Desert region, almost no rainfall (9 mm p.a.)
- ❑ Challenging boundary conditions for sustainable drinking water supply (demographic and geographic situation)
- ❑ Climate change intensifies water crisis in Lima by melting of glaciers and lack of rainfall in the Andean region



Overview of “LiWa” project



Project outcomes:



The partners of the “LiWa” project



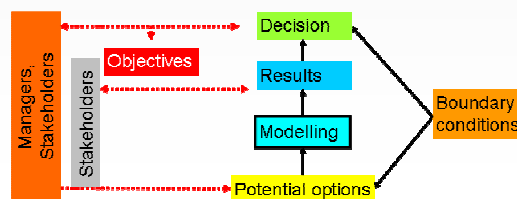
- Germany
 - ifak e. V. Magdeburg (Coordinator)
 - ZIRN, University of Stuttgart
 - IWS, University of Stuttgart
 - Leuphana University Lüneburg
 - Dr. Scholz & Dalchow
- Peru
 - SEDAPAL S.A.
 - Universidad Nacional de Ingenieria
 - Foro Ciudades para la Vida
 - FOVIDA
- Funding: BMBF and BMZ



Sustainable water management: Challenges (systems approach)



- The underlying system
 - Dynamic, fast growing, complex, many subsystems
 - Numerous interactions (of subsystems and processes)
 - Uncertain predictions of future system states
- Present solutions
 - Often driven by particulate interests (e.g. private companies)
- Proposed approach
 - Modelling to cope with complexity
 - Participatory discussion and decision approaches, ensuring ownership



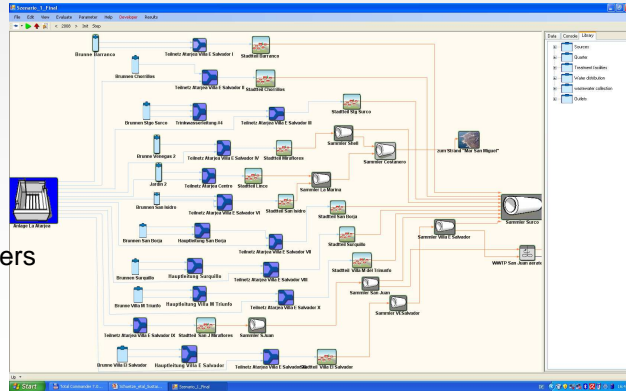
“LiWatool” – Macro-modelling system for urban systems (here: water/wastewater in Lima)



- Planning and analysis of water system on a global (metropolitan) scale
- Modelling and visualisation of scenarios and variants

Modelling of

- Water
- wastewater
- pollution
- Energy
- other resources
- GWP
- qualitative parameters



“LiWatool” – Macro-modelling system



Ejemplo Ilustrativo Manual Alternativa II

File Edit View Evaluate Parameter Help Developer Results

< 2010 > Init Step

31738.39 31738.39 23082.47 30786.84 30759.64

Groundwater well Distribution network **Puente Piedra** City district Sewer network WWTP Rio Rimac 1

Module parameter Stadtteil Barranco

Constructive parameter

Population (PE) [PE]	20930
mean social class of quarter (Classification) [1]	Class B
drinking water consumption per PE (DW/PE) [l/d]	0.188
organic load per PE and day (pBOD) [g BOD/PE]	55.26
Percentage of connection to the drinking water	99.9
Percentage of connection to the sewerage network	99
Percentage of return of drinking water to the	(8)

Variable etaBOD

Unit: %

Formula: $\eta = 100 \cdot 0.4 \cdot (T - 25)^{-2}$

Highly flexible (definition of processes, parameter and variable sets, etc.)

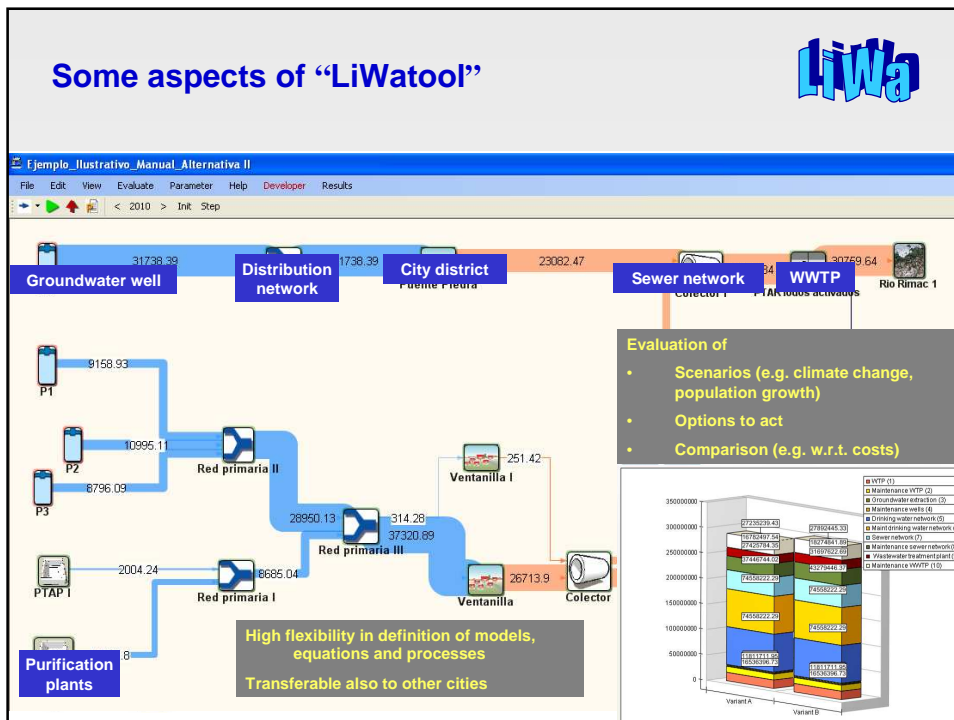
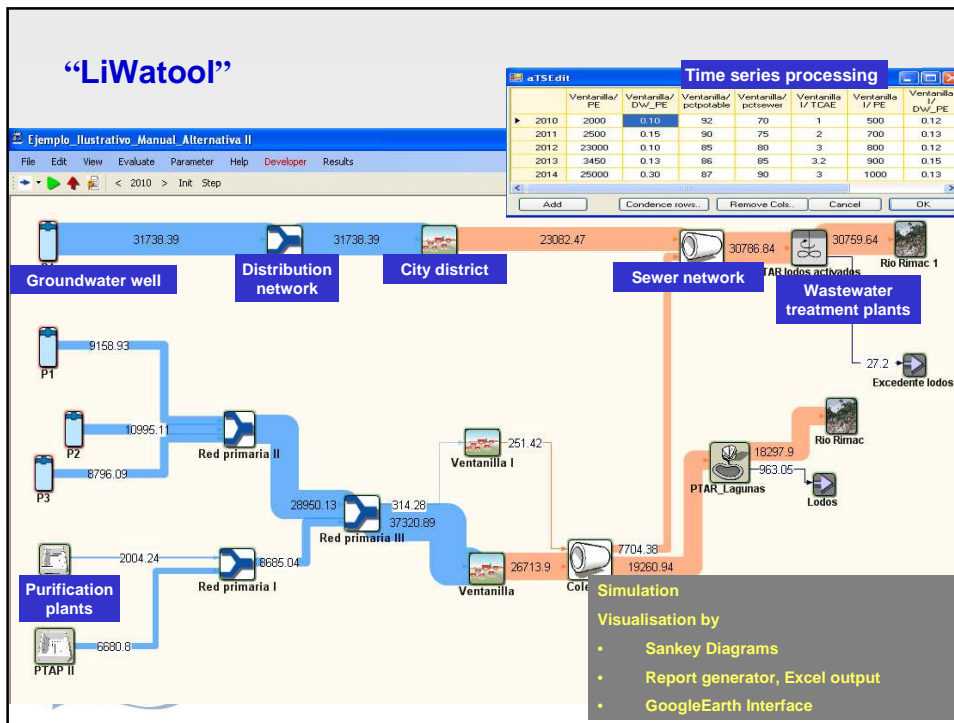
Must be defined as a function of input fractions or flow rates, output flow rates, previously defined variables.

Buttons: OK, Cancel, Apply, Save, Check, New Mix...

Purification plants

Modelling of:

- Urban water system as an entirety
- Water, pollution, Energy, GWP, also qualitative parameters



THANKS FOR YOUR ATTENTION

Project „LiWa“

www.lima-water.de

manfred.schuetze@ifak.eu

LiWa