Challenges of the Groundwater Management in Can Tho City, Vietnam

Thomas Nuber
Harro Stolpe

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Sanitation and Groundwater Protection
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Hannover

Environmental Engineering + Ecology
Professor Dr. Harro Stolpe
Ruhr-University Bochum
SANSED-Project

- Closing Nutrient Cycles in Decentralized Water Treatment Systems in the Mekong Delta, Vietnam

- 3 involved Universities
  - Ruhr University Bochum, Germany
  - University of Bonn, Germany (Coordinating)
  - University of Can Tho, Vietnam

- 8 German private companies

- 2003 – 2008

- Funded by the Federal Ministry of Education and Research of Germany (BMBF), PT FZ Karlsruhe

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## Sanitation in Vietnam

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<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>Rural Areas</td>
<td>85 % acess to a min. of 60 l/d * capita</td>
<td>70 % access to latrines</td>
<td>100 % acess to latrines</td>
</tr>
<tr>
<td>Vietnam Development Goals (2001)</td>
<td>Water supply: 60 % (rural areas) 80 % (urban areas)</td>
<td>Water Supply: 80 % (rural areas) 85 % (urban areas)</td>
<td>Waste Water Treatment of 100% of the urban waste water</td>
</tr>
</tbody>
</table>
Sanitation

- Responsible Authorities
  - Center of Rural Water Supply and Sanitation
    (Department of Agriculture and Rural Development)
  - Department of Health

- Concept
  - Use of Septic Tanks
  - Use of Groundwater as hygienically safe drinking water resource
    • Remote areas: Small scale tube wells
    • Decentralized Water Treatment Plants
      (Groundwater, Capacity 60 m³/d)
  - VAC(B)-Modell

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Waste Water
from households and farms

untreated into canals

into fishponds

Septic tanks

in biogas digesters

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Groundwater Use

[Diagram showing groundwater levels and formations with grid reference, scale, and note: www.rub.de/ecology]
Groundwater Use

Groundwater supply stations per community

Accessed HHs per supply station

396 ground water supply stations in Can Tho
Accessed to QII-III

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Groundwater Use

32,000 known small scale tube wells in Can Tho
Depth 60 – 100 m below surface

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Impacts on Groundwater Quality

Infiltration through leaking well casing or missing sealing

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Impacts on Groundwater Quantity

Growing Pressures on Groundwater

- Rapid population and economical growth
- Use of surface water for waste water disposal
- Use of groundwater as a safe source

Groundwater Resource

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Conclusions

QUALITY IMPACTS
- Good protection of main aquifer through the covering layer
- Possible impacts on groundwater quality through wells
  - Short cuts because of leaking well casings or missing sealing
  - Use of „dry“ small scale tube wells for „waste water disposal“ reported

QUANTITY IMPACTS
- Lack of waste water treatment causes higher groundwater abstraction
- Overexploitation of groundwater resources observed
  - Rapid declining groundwater tables
  - In 5 – 10 years use of GW through suction pumps not possible anymore

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Approaches

- Implementation of decentralized waste water treatment concepts ([www.sansed.uni-bonn.de](http://www.sansed.uni-bonn.de))

- Removal of small scale tube wells should include sophisticated backfill and sealing

- Implementation of alternative drinking water treatment methods
  - rainwater storage,
  - artificial groundwater recharge,
  - slow sand filtration

- Coordinated groundwater monitoring concept
  - Transboundary monitoring
  - Monitoring of quantity and quality

- Introduction of an IWRM-Concept ([www.iwrm.vn](http://www.iwrm.vn))
Contact and more information

- Thomas Nuber  
  Federal Institute for Waterway Constructions  
  Bundesanstalt für Wasserbau, Karlsruhe  
  thomas.nuber@baw.de

- Harro Stolpe  
  Environmental Engineering and Ecology  
  Ruhr-University Bochum  
  harro.stolpe@rub.de
Outline

- Introduction
- Investigation Area
- Sanitation in Vietnam
- Groundwater Use in Can Tho City
- Impacts of Sanitation on Groundwater Quantity
- Impacts of Sanitation on Groundwater Quality
- Conclusions
Involved Private Companies

- bioreact
  Fermentation Systems & Bioreactors

- gewitra

- HUBER TECHNOLOGY

- sachsenwasser
  Consulting + operations + management

- B³ BiogasBeratungBornim GmbH
  Eine Ausgründung des ATB

- Ith Ingenieurbüro für technische Hydrologie
  Thilo Herrmann

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<table>
<thead>
<tr>
<th>Vietnam in figures</th>
<th>VN</th>
<th>Germany</th>
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<tbody>
<tr>
<td>Population</td>
<td>80 Mio.</td>
<td>82 Mio.</td>
</tr>
<tr>
<td>Area</td>
<td>327 000 km²</td>
<td>357 000 km²</td>
</tr>
<tr>
<td>GDP</td>
<td>36,40 Billion Euros</td>
<td>2 168,82 Billion Euros</td>
</tr>
<tr>
<td>Economical Growth</td>
<td>8 %</td>
<td>1 %</td>
</tr>
<tr>
<td>Average Age</td>
<td>26 years</td>
<td>40 years</td>
</tr>
<tr>
<td>Climate</td>
<td>tropical - subtropical</td>
<td>moderate</td>
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Can Tho
Idea of the Project

Recycling of nutrients + Water Management

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eE+E
Water sources utilised for drinking water purposes

- 60% use of Groundwater as drinking water
- General: use of different water sources in parallel

(Wienecke, 2005)

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