Wastewater Governance: A Challenge for Environmental Engineers

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Presentation content

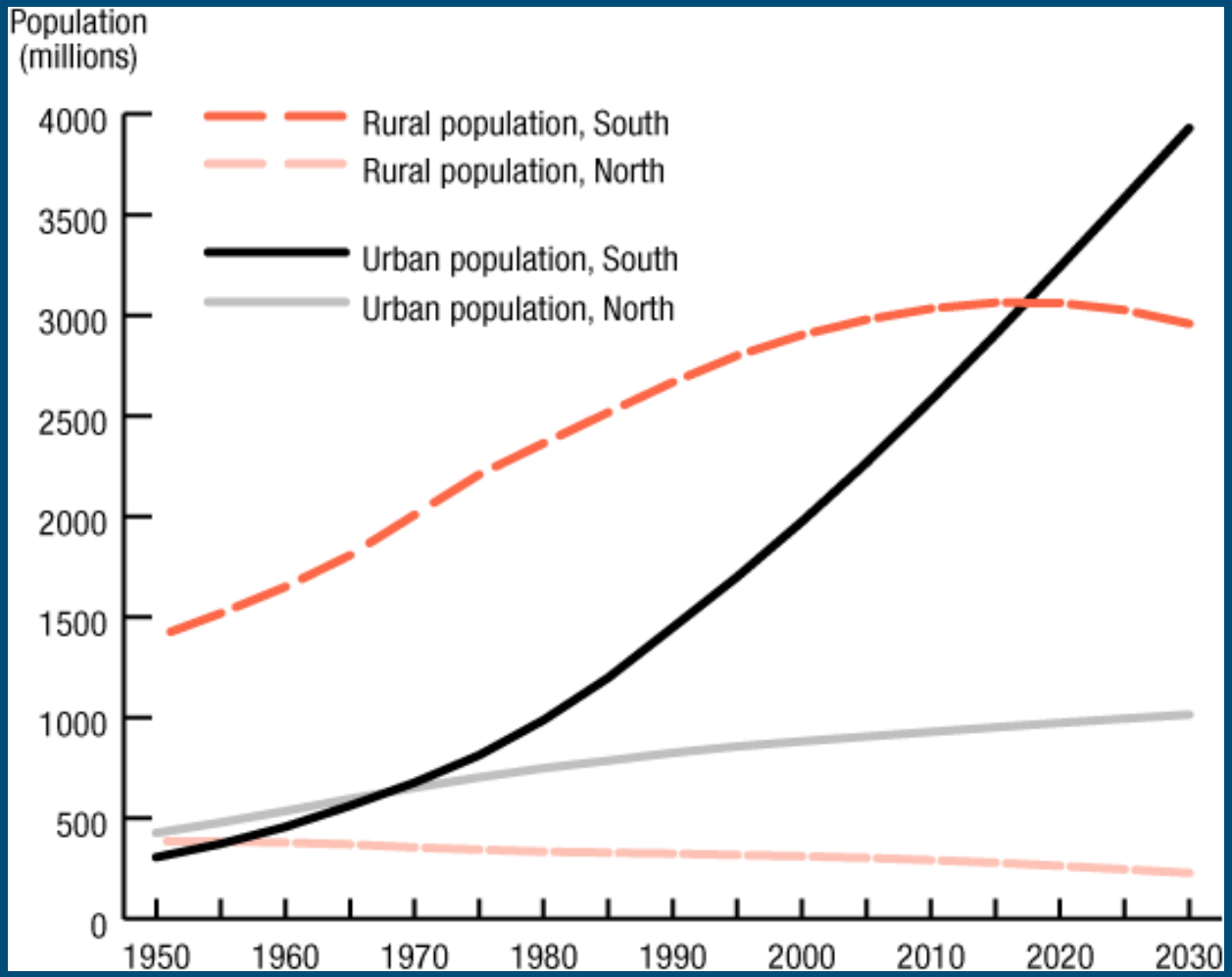
- Introduction wastewater irrigation
- Wastewater governance
- Implications for design
- Challenges

Photo: F Huibers

Wastewater irrigation: 4 facts

- Wastewater is an increasingly important (and reliable) water source
- Nutrients in wastewater may (partly) replace chemical fertilizers
- Irrigation with wastewater can be considered as a treatment step
- Many (poor) farmers benefit from wastewater

Expected population growth upto 2030



Portion Urban Produced of Total Consumed Vegetables

Hanoi, Vietnam	80%
Dakar, Senegal	70%
Dar es Salaam	90%
Bamako,Mali	100%
Haroonabad, Pak.	26 %

10 % world population consumes waste water produce foods

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Wastewater irrigation

- Supplies water and nutrients at the same time
- Crop water requirement differs per crop and is defined by:
  - evapo-transpiration
  - application losses (irrigation technique and management)
  - special operations (land preparation, leaching)
- Optimal use of effluent is defined by: irrigation techniques, effluent storage & blending, crop choice

Contamination by wastewater

- Pathogens
- Nutrient overloading
- Toxic substances

Crop Handling: Contamination Risks

Photo: J Evers

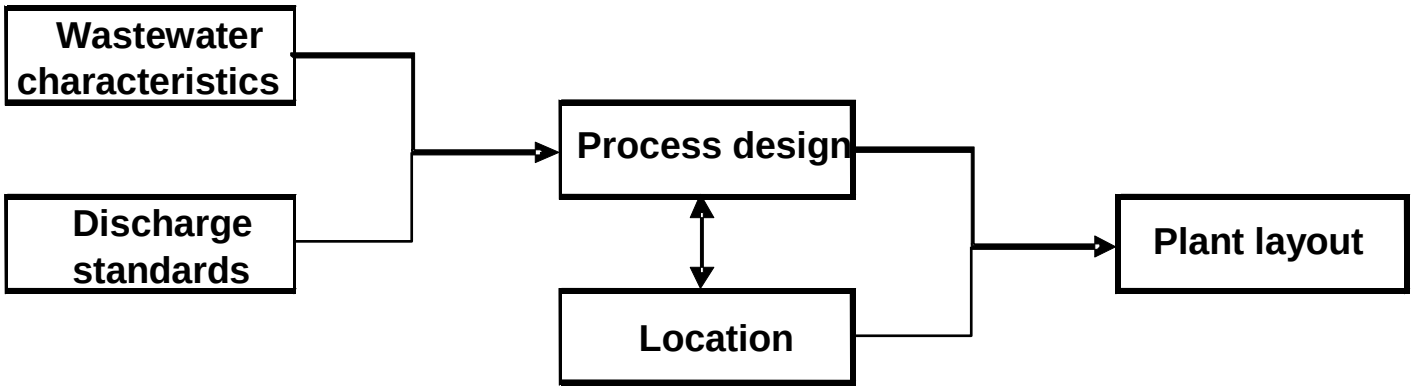
Irrigation Methods

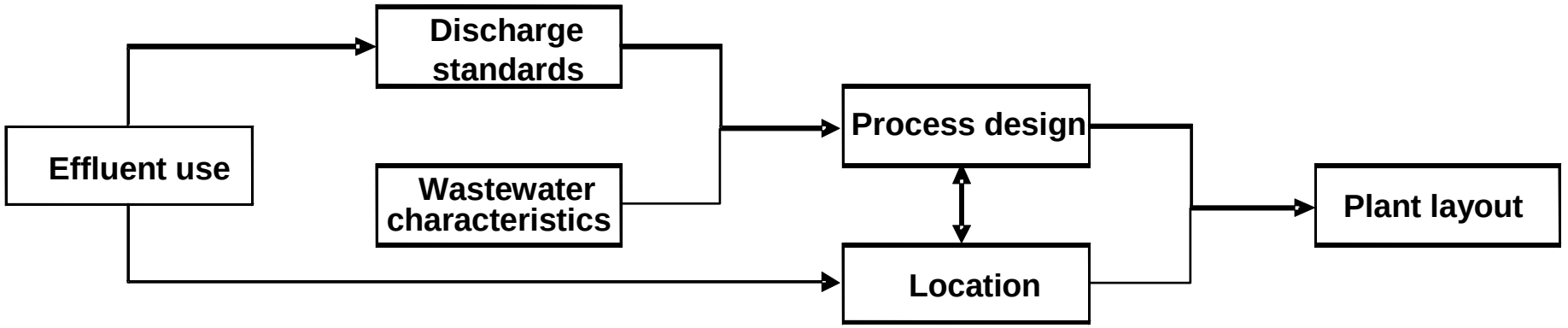
However:

- In most cases:
  - Effluent irrigation is no design criterion in wastewater treatment engineering
  - Farmers are insufficiently aware of nutrient content of the treated sewage they use
- Consequence:
  - Nutrient mismatching at field level, bearing serious agronomic and environmental risks

Wastewater governance

- Interdependency
- Shared overall goal
- Stakeholder involvement
- Information and knowledge exchange
- Use-based design of facilities:
  - Effluent quality
  - Spatial distribution of STPs


Wastewater characteristics
Discharge standards
Process design
Location
Plant layout


Effluent use
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Implications for design [1]

- Boundary conditions for effluent:
  - Toxics, salinity, nutrient content
  - From strict limits to seasonal values
- Technical implications:
  - Location
  - Process-design
  - Differentiation: Domestic v.s. Industrial

Implications for design [2]

- Institutional implications:
  - Stakeholder negotiation platforms
  - Information dissemination
  - Downstream integrated monitoring
  - Lengthy negotiation processes
  - Decentralized management
  - Demand driven v.s. supply driven

Challenge

- Shift from authority-management to participatory and supportive management
- Inclusion of socio-technical concepts of design

THANK YOU

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