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Wastewater boom

- Urbanization
- Water supply + latent (unmet) water demand
- Expanding sewerage (collection & “disposal”)
- Results of Millennium Development Goals, and present Sustainable Devel. Goals investments

Yet, wastewater (treated effluent & raw sewage):
- profound public health, poverty, and livelihoods implications
- a traded commodity (informal and formal markets)
- regulated using overly simplistic, antiquated frameworks
- research emphasis on case study documentation
- receives inadequate investment, management & policy
Global population explosion

- Vast majority of all demographic growth now occurs in developing country cities
- India has crossed the 50-50 urban-rural population threshold…
  - 750 million urban Indians by 2050, most without adequate sanitation
- China actively plans for cities each with more than 100 million population… infrastructure nightmare
- Africa’s urban population growth rates are the highest in the world
- Latin America has been predominantly urban for decades
AGRICULTURAL REUSE INEVITABLE

Need photo here of tacos with cilantro and fresh salsa
Show next slides (#5 - 8)
quickly, mostly to catch people's interest
Hyderabad, India
Faisalabad, Pakistan
Hermosillo, Sonora
Hermosillo - 3 periods

1970s-2016
- No operating wastewater treatment plant (WWTP) – agriculture use of raw wastewater

1994-2014
- Bumpy road to political will, finance, design and build WWTP

2016
- WWTP operation
1970s-2016 Agriculture use of raw wastewater

- Unregulated and unplanned (informal organization by ejido growers)
- Wastewater used to grow fodder for cattle
- Contamination, bad smell, and health risks
- Wasted opportunity (cost)
1994-2014 Bumpy road to WWTP construction

- WWTP construction devised and cancelled several times
  - Political bias to assign and choose construction firm and operator (BOT for 20 years)
  - 2000s Single large plant (by sole contractor) chosen instead of numerous, distributed small WWTPs.
  - Contested project – put off several times (went to court for final decision).
  - Planned as an isolated project with no reuse consideration.
  - Isolated from the rest of the urban water system
2016 - WTTP operation

- Late and made to comply with legal obligation due since 1996
- Water rates sharp increase due to the operation of WWTP (water users pay for WTTP but don’t see the benefit – plant out of town)
- No reuse consideration or planned
  - Current raw wastewater farmers now have to pay to pump water (conflict)
  - New prospects of effluent water considered (cement plant or new more modern farmers) – conflict with old farmers.
- Operation is not financially sustainable
  - Too expensive operation costs and not enough and certain revenue
  - Bankrupt city water utility is to pay for the operation
  - No income from sale or reuse of treated wastewater
- Paradoxical challenge for sanitation policy
La Paz and Mexicali – Generic findings

- Managerial capacity of WWTP operator (within municipal, public utility company) needs to be strengthened
- Financial cost recovery of WWTP and operating costs pose huge challenges locally
- La Paz has especially important ecological and tourism-related needs for effective treatment – no downstream agricultural reuse opportunities such as in Mexicali or Hermosillo
Commodity, resource, or hazard?  
*Water security/ human security tradeoff*

- Wastewater value high in water-scarce regions
- Latent irrigation and environmental demand
- Increases land values
- Growing resource-value for urban reuse
- Wastewater markets & informal trading expected to increase
- Current regulation absent or highly disarticulated (minimizing hazard impact; little attention to wastewater resource or “service”)
Wastewater regulation

- Multiple uses, multiple users
- Overlapping jurisdictions
  - Water supply
  - Urban development
  - Public health
  - Environmental protection
  - Agriculture/irrigation
  - Civil society

- Need coherent institutional framework
  - Promote beneficial reuse while mitigating risk
  - ‘Polluter pays’ principle to mobilize funds
  - Stockholm Framework - adaptive, evolutionary
Major findings

- In Mexico (representative of many middle-income countries)
  - National level treatment only 50% despite 20+ years of sanitation investments and regulation (NOM ECOL 001 – 1996)
  - Sanitation policy has stagnated, in part due to inadequate institutional and financial models at local level

- Wastewater treatment should be integrated with the rest of:
  - Urban water cycle – to support supply and city uses
  - Water cycle in general – water feedback loop.

- Financial sustainability of WWTP is critical – reuse could be a source of income to pay for operation

- Reuse must be planned, encouraged and furthered according to their economic and social value.
  - Agricultural – crops
  - City uses – nurseries, park irrigation
  - Industrial – many possibilities
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  www.lrfoundation.org.uk

For further information, see:
http://aquasec.org/wrpg/waterreuse.html