

Actual Vs. Perceived Amounts of De facto Wastewater Reuse in the Continental United States



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What is the difference between actual and perceived amounts of de facto reuse in the U.S.?

De facto Wastewater Reuse

An occurrence in any watershed for a drinking water treatment plant (DWTP) that contains discharges of wastewater

SIGNIFICANCE

Engineering Research Need:

- National Research Council Report: Potential for Expanding the Nation's Water Supply through Reuse of Municipal Wastewater
- Contaminants of Emerging Concern Exposure
- Assessment of impact on water resource portfolio

Social Need:

- Hindrances to reuse projects
- "Yuck" factor

Potential Contaminants in Wastewater:

- Pathogens
- Inorganics (metals and nutrients)
- Organics: (CEC's, disinfection by-product precursors)

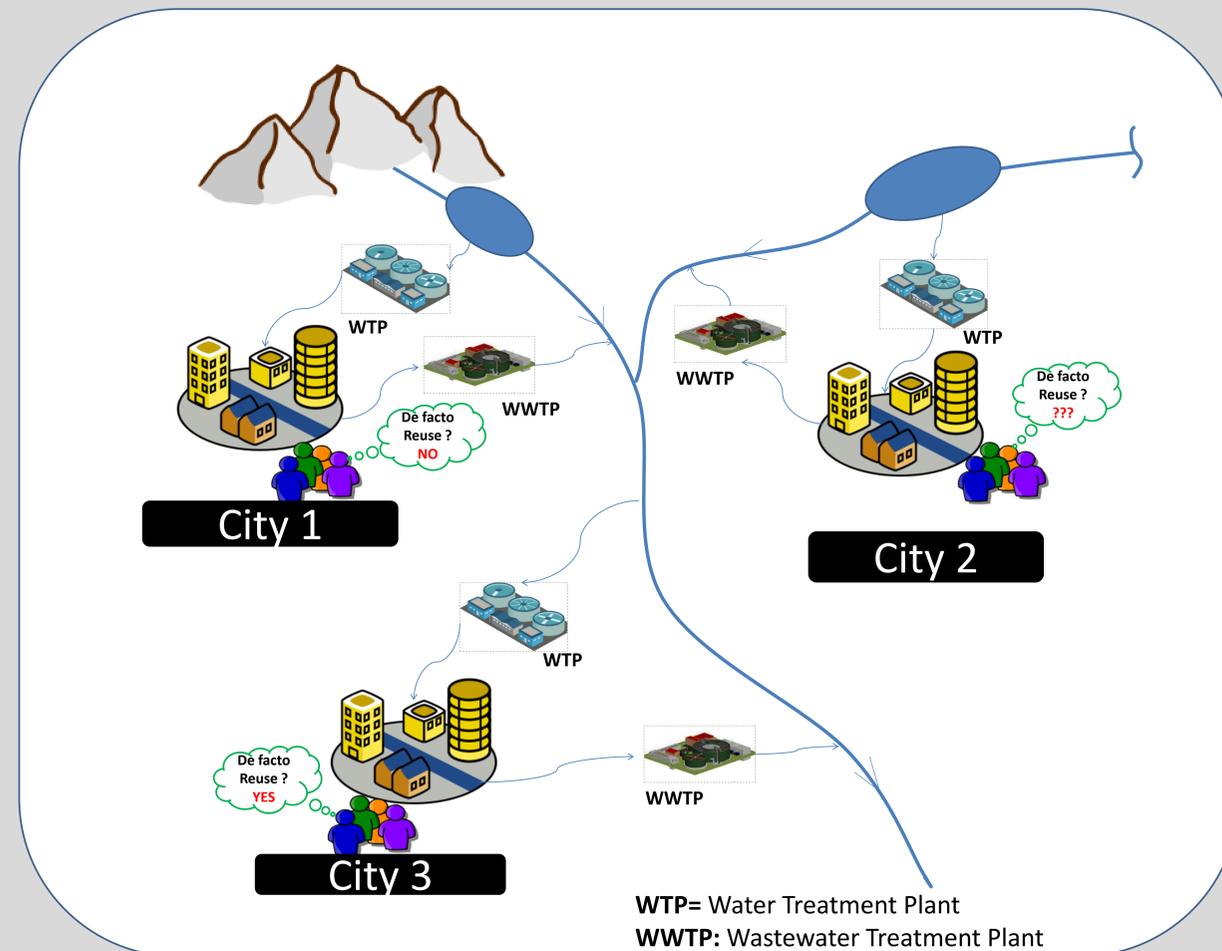


Figure 2: De facto Reuse Schematic

Ongoing Approach

Social

Online Survey

Developed to capture the public's knowledge of de facto reuse occurrence, and the amount acceptable within their drinking water. Will be launched to a random sample of participants in Atlanta, GA (n = 400), Philadelphia, PA (n = 400), and Phoenix, AZ (n = 400).



Data Analysis

STATA will be utilized to perform a multiple regression analysis, in an effort to determine if higher perceived values of de facto reuse correlate to higher acceptance (threshold values). Threshold values will be incorporated into a GIS layer at census tract resolution to allow for visual comparison of actual and perceived values.



Modeling

Geographical Information Systems (GIS) Model

Developed utilizing vector and raster layers from several sources (Figure 1). The underlying mathematical basis for the model is a mass balance linked to online river flow data.

Validation through the Analysis of Sucralose

Grab samples to be taken at selected WTP intakes. Samples will be prepped and are to undergo Solid phase extraction (SPE), extracts to be analyzed through liquid chromatography-mass spectrometry LC/MS.

Temporal Variations

Streamgauge data obtained from the USGS will be used to assess the changes in wastewater effluent percentages, due to seasonal river flows and wastewater flows.

ACKNOWLEDGEMENTS

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GIS Model

Integrating predicted de facto reuse with public perception



Predicted Values

- De facto Reuse
- Incidence in our Nations
- Consumable Supply

Perceived Values



Figure 1: DRINCS Model Approach

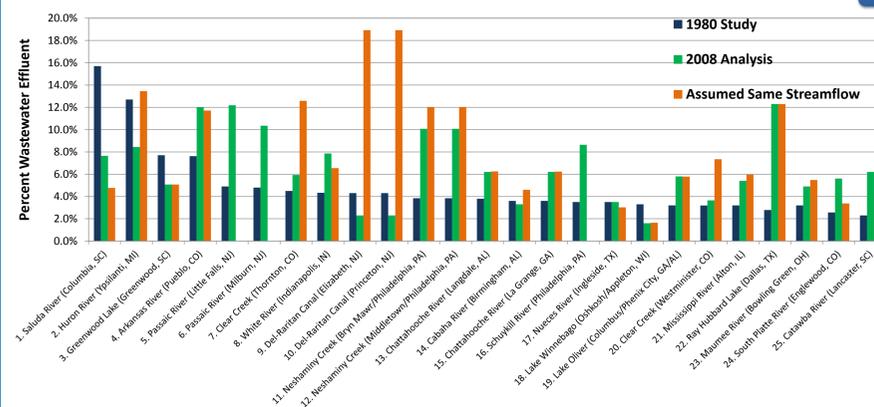
Increase in De facto Reuse from 1980-2008

Preliminary Results: Predicted Values

- 1980 EPA Study: Wastewater in Receiving Waters at Water Supply Abstraction Points (EPA-600/2-80-044)
- Top 25 of 1980 Study updated with 2008 dataset
- DRINCS Model utilized for spatial relationships between WTP intakes and upstream WWTP discharges
- Mass balance performed at each intake quantifying the percentage of WW effluent, assuming no degradation



Indianapolis, IN



- 17 of 25 sites WW% increased since 1980
- Average WW% increased from 4.9% in 1980 to 6.2% in 2008
- On average municipal flows increased by 102.3%