



ReNUWit Research Program Year 4

E - Efficient Engineered Systems

E1 - Distributed Urban Water Systems

E1.1: Tailored water for distributed non-potable reuse using sequencing batch/membrane bioreactor hybrid systems

Tzahi Cath, Junko Munakata-Marr, Jennifer Stokes

E1.2: Virus removal by membrane bioreactors for tailored water

Kara Nelson, Tzahi Cath

E1.3: Point-of-entry water treatment for potable reuse

John McCray, Tzahi Cath

E1.4: Osmotic membrane bioreactors to facilitate potable reuse

Tzahi Cath

E1.5: Sustainable landscape irrigation with reclaimed water

Bernd Leinauer, Junko Munakata-Marr

E1.6: Bioaccumulation of Chemicals of Emerging Concern (CECs) in Food Crops irrigated with Reclaimed Water

Christopher Higgins

E1.7: Plant uptake and processing of trace organic chemicals in reclaimed water

Elizabeth Sattely, Richard Luthy

E2 - Energy-positive wastewater treatment and resource recovery

E2.1: The Coupled Aerobic Anoxic Nitrous Decomposition Operation (CANDO): Converting nitrogen waste into energy

Craig Criddle

E2.2: Microalgae for wastewater treatment and energy and nutrient recovery

Nirmala Khandan, Tzahi Cath, Shuguang Deng

E2.3: Recovery of entropic energy at wastewater treatment plants discharging to saline environments

Craig Criddle, Yi Cui

E2.4: Anaerobic primary treatment to improve energy efficiency

Linda Figueroa, Tzahi Cath



E2.5: Enhanced water recovery using cost-effective electrodialysis process for water reuse – Improve energy efficiency and reduce chemical demand

Pei Xu, Tzahi Cath

E2.6: Energy efficient nutrient removal through enhanced side stream treatment

Junko Munakata-Marr

E2.7: Annamox for side-stream treatment

Lisa Alvarez Cohen

E2.8: Novel approaches to nitrogen recovery from urine at the household to building scale

Kara Nelson, Christopher Higgins

E2.9: Membrane distillation crystallization for desalination of hypersaline streams and recovery of minerals

Tzahi Cath

E3 - Direct Potable Reuse

E3.1: Microbiology in DPR Distribution Systems

Kara Nelson

E3.2: Characterizing sources of nitrosamine precursors

William Mitch

E3.3: Low Molecular Weight Compounds in Direct Potable Reuse Systems

David Sedlak, William Mitch

N - Natural Water Infrastructure Systems

N1 - Unit Process Wetlands and Riparian Zones

N1.1: Design of unit process wetlands to optimize pathogen removal

Kara Nelson, Alexandria Boehm, Alex Horne, David Sedlak

N1.2: Unit process wetlands: Chemical contaminants

David Sedlak, Alex Horne, Kara Nelson, Jonathan Sharp

N1.3: Oro Loma Ecotone Pilot Project

David Sedlak, Alexandria Boehm, Alex Horne, John McCray

N1.4: Managed riparian zones to conserve and improve water quality and improve habitat

Salim Bawazir, James King, Richard Luthy, John McCray

N1.5: Bivalves as biological filters in surface waters

Richard Luthy, Alexandria Boehm, Alex Horne, David Sedlak



N1.6: Water reuse for ecosystems

Richard Luthy, Vincent Resh, John McCray

N1.7: 2013 Rim Fire: Survey of Potential Water Quality Impacts on the Hetch Hetchy Reservoir System

Terri Hogue, Christopher Higgins, Richard Luthy, John McCray

N2 - SMART - Smart managed aquifer recharge technologies

N2.1: Managed aquifer recharge and recovery: Simulation, modeling and operation

Peter Kitanidis, Tissa Illangesakare, Rosemary Knight, Kathleen Smits

N2.2: Improving water quality during managed aquifer recharge

John McCray, David Sedlak, Jonathan Sharp

N2.3: Determining geochemical factors controlling metal adsorption/desorption during MAR

Scott Fendorf, Richard Luthy

N2.4: Geomedia to enhance contaminant removal during MARR

David Sedlak, Christopher Higgins, Richard Luthy

N2.5: Enhanced Removal of Nutrients from Urban Runoff with Novel Unit-Process Capture, Treatment, and Recharge Systems

Richard Luthy

N2.6: Enhanced Removal of Nutrients from Urban Runoff with Novel Unit-Process Capture, Treatment, and Recharge Systems

Rosemary Knight

N3 - Distributed Stormwater Treatment Unit Processes

N3.1: Aquifer storage, treatment, and harvesting of stormwater for distributed reuse: Coupled modeling, laboratory and field studies

Reed Maxwell, Alexandria Boehm, Christopher Higgins, Kara Nelson, David Sedlak

N3.2: Methodologies, models, and materials for predictable removal of pathogens from stormwater during distributed recharge

Alexandria Boehm, Reed Maxwell, Kara Nelson

N3.3: Methodologies, models, and materials for predictable removal of chemicals from stormwater during distributed recharge

Christopher Higgins

N3.4: Hyporheic zone management through BEST (biohydrochemical enhancements for streamwater treatment)

John McCray, Salim Bawazir, William Eisenstein, Christopher Higgins, Louise Mazingo, Jonathan Sharp



N3.5: Endocrine Disruption Caused by Complex Mixtures of Chemicals in Runoff

David Sedlak, Tyrone Hayes, Richard Luthy

U - Systems Integration and Institutions

U1 - Decision Support Tools for Utilities

U1.1: Life Cycle Analysis of Water Systems and Greenhouse Gas Abatement Curves

Arpad Horvath, Tzahi Cath, Christopher Higgins, Jennifer Stokes

U1.2: Tools to support decision making for nested, spatially scaled, integrated urban water infrastructure

Craig Criddle, Tzahi Cath, David Freyberg, Mengistu Geza, Pei Xu

U1.3: Multi-Criteria Suitability Analysis for Stormwater Capture, Treatment and Recharge

William Eisenstein, Louise Mozingo

U1.4: Optimal Capacity Investment and Operations Management for a Wastewater Treatment Facility

Craig Criddle, Erica Plambeck

U2 - Visioning, assessment and implementation tools for regional and municipal planning

U2.1: San Francisco Bay Nitrogen Control

David Sedlak, William Eisenstein, Michael Kiparsky

U2.2: Public Goods Charge of Water Infrastructure

Newsha Ajami, Barton Thompson

U2.3: Enhancing Water Reliability of the San Francisco Bay Region: Coordinating Regional Water Management

Newsha Ajami

U2.4: Regional demand forecasting

Newsha Ajami, Terri Hogue, Barton Thompson

U2.5: Legal, policy, economic, and technical feasibility study for beneficial use of storm water in a west Denver neighborhood redevelopment

John McCray, William Eisenstein, Christopher Higgins, Reed Maxwell

U2.8: Combined stormwater/recycled water recharge for urban water supply

Richard Luthy, William Eisenstein



U2.9: Los Angeles Clean Water Sustainability Analysis

Terri Hogue

U2.10: The Role of Local Water Resources in the Water Sustainability of Los Angeles

Terri Hogue

U3 - Technology diffusion pathways

U3.1: Urban Water Innovation Survey

Michael Kiparsky, Barton Thompson

U3.2: Overcoming risk and risk aversion as barriers to innovation

Michael Kiparsky, Barton Thompson

U3.3: Feasibility assessment of the off-the-grid water/wastewater infrastructure development

Arpad Horvath, William Eisenstein, Jennifer Stokes