

# Realm of Possibilities- Water Supply and Quality

- Water Conservation
- Water Management

# So Many Approaches and Technologies...

- Irrigation meters (reduce water use by 33-66%)
- Low impact development
- Composting and water recycling toilets
- Green roofs
- Living Machines

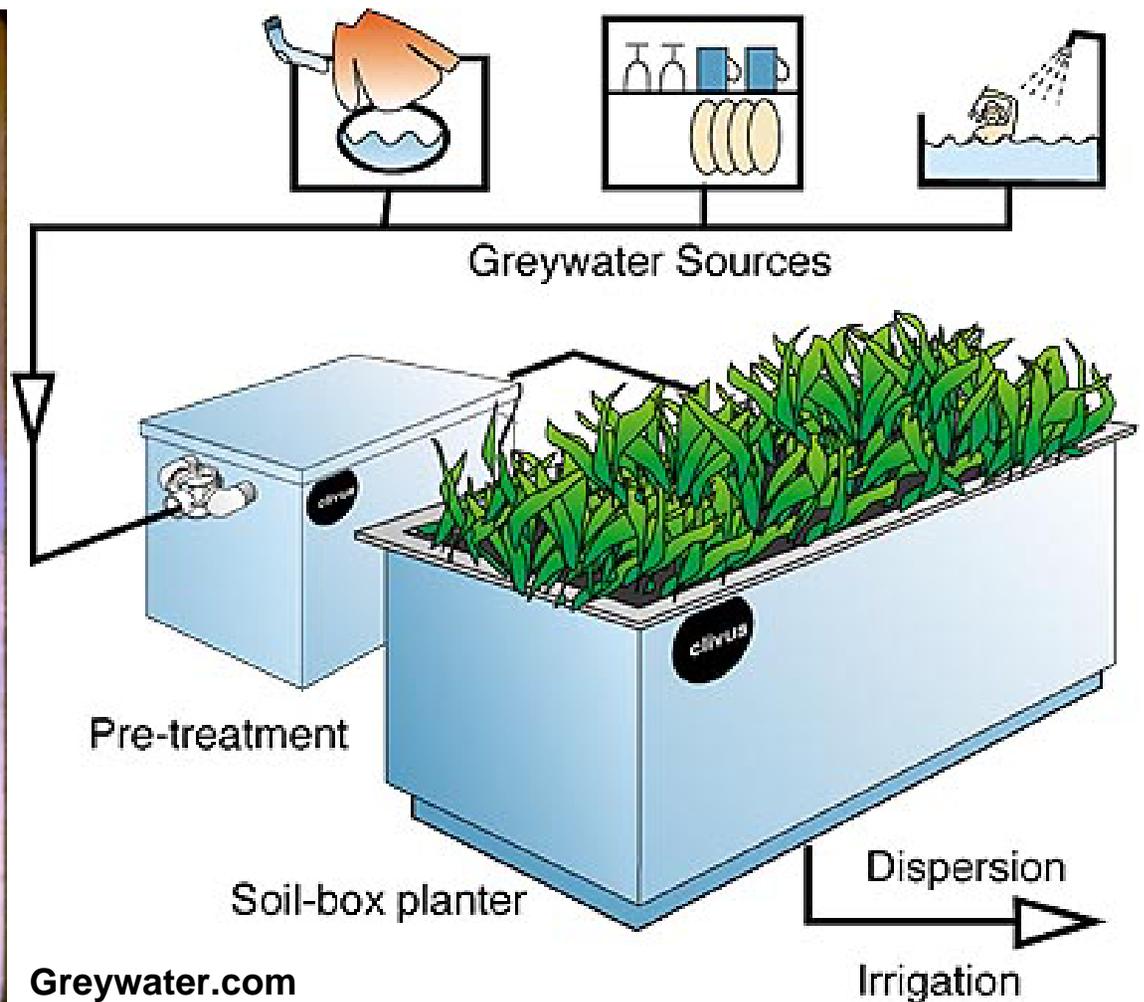
# Composting Toilets

Composting toilets eliminate the use of water to transport human waste, which accounts for 26% of residential water use



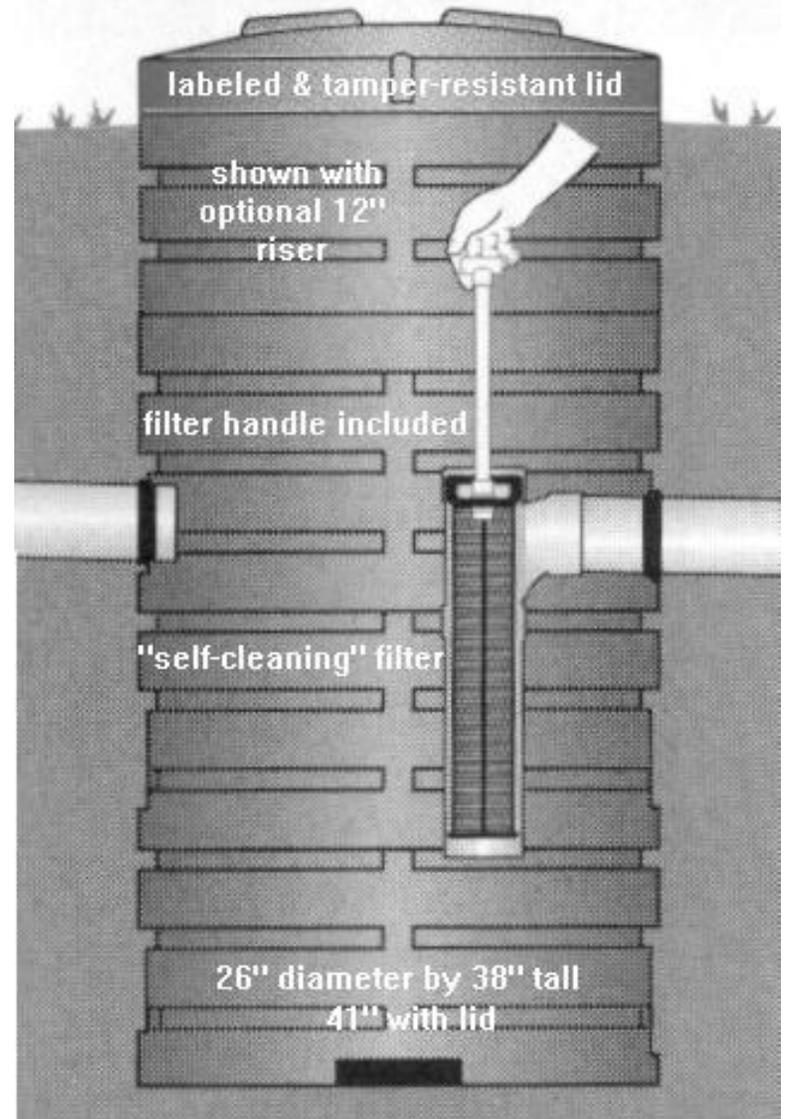
Only uses 1825 gallons of water/yr versus 200,000 in traditional toilet, and without treatment costs.

# Wastewater Technology is available to cascade water from higher to lower quality needs



# Greywater Recycling

- Fort Carson saves 100 million gallons of potable water, by using greywater for their golf course.
- Can provide up to 70% of daily water needs of an individual residential home.
- Uses low-tech and cost-effective treatment systems, with natural bacteria and plants.



# Seven Principles of Xeriscaping

- Water conserving design
- Low water use/drought tolerant plants
- Reduction in turf
- Water harvesting techniques
- Appropriate irrigation method
- Use of mulches
- Proper maintenance practices



# Water Conservation

- Drip Irrigation
- Horizontal-Axis Washers
- Irrigation Meters
- Low Flow Fixtures

# Implement Efficient End-use Technologies and Practices



# Central Vehicle Wash Facility- Fort Carson

- \$333,000 saved annually on costs;
- 491 vehicles/day.
- Saves 150-200 million gallons of water/yr
- Has saved over 4 billion gallons since its inception in 1990.

# Ford Dearborne Plant- Michigan

\$8M in a green roof, porous pavement for parking lot and a constructed wetland for landscaping.

Eliminates \$40M in storm water management and \$6M/yr. in landscaping.



# Porous Paving / Infiltration Islands Berlin, Leipzig



# How would you design a sewage plant if you had to live downwind?



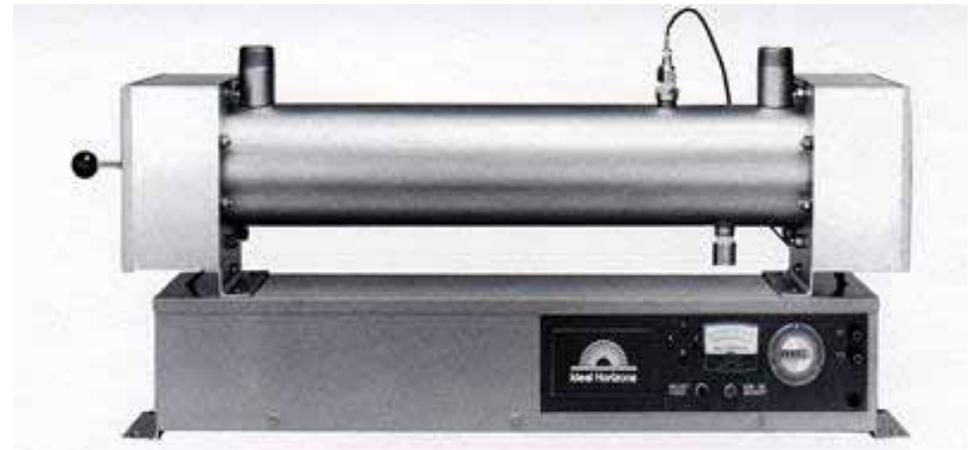
Living Machines™ turn sewage into clean water and flowers.

Dr. John Todd



# Ultraviolet Wastewater Distillation

- Allows for safer water treatment and is cost-effective
- No harmful by-products
- Low energy requirements



# Beneficial Conservation Water Rights – San Marcos, TX

- Private foundation applied for water rights, for conservation to be considered a beneficial use.
- 40B gallon permit
- Montana and Colorado have done so
- Permitting procedure is stuck in TX court system

# New York City Watershed Agreement

- In 1990 EPA mandated that all public supplies of surface water be filtered for microbes. New York would need to spend \$4-\$6 billion dollars to meet these mandate – what to do?

Water quality, development, and resource protection are more strictly monitored by the rural areas of the Catskill Mtns.

- NYC and the state financially sponsors
- Better performance without upgrades





# Working with Community Towards Sustainability

## New York City, the State, and Catskills Watershed

- **New York City has some of the cleanest drinking water in the world**
- **The water source is the Catskill Mountain Watershed (1,600 sq mi)**
- **In 1990 EPA mandated that all public supplies of surface water be filtered for microbes**
- **spend \$4-\$6 billion dollars to meet these mandates**

# Approach

- NYC worked with upstate communities on land use, development planning, and agricultural best management practices that would improve water quality.
- Communities and NYC purchased select properties to be held undeveloped and in public trust.
- NYC spent \$550 million to improve their water system, upgrade aging sewage treatment plants, and replace failing septic systems in the Catskill watershed area
- Another \$278 million has been spent for conservation easements and partnerships to protect forest lands
- The state of New York is also contributing funds to these programs

# Results

Water quality improved to the point where the investment in system upgrades for systems within watershed was unnecessary

Cost Avoided = **\$6 Billion**

Open Space preserved = 258,716 acres

Total investment = \$833 M

# Napa California - How a town can live with a river and not get soaked

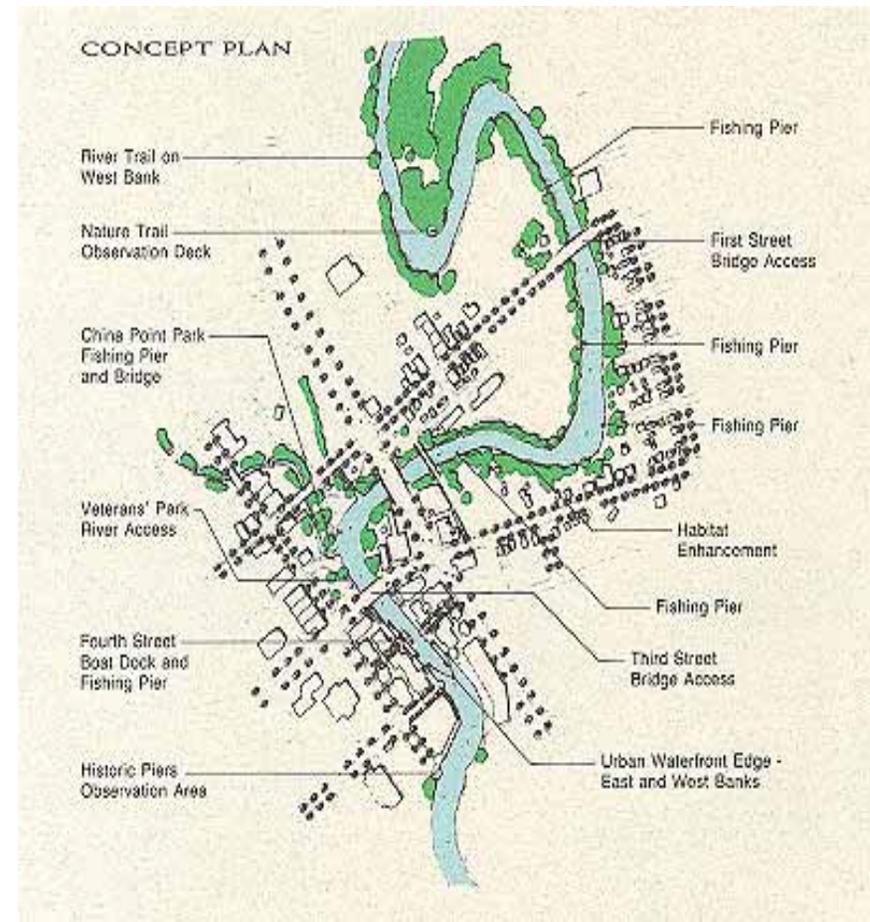
By the late 1980s, the Napa River was more of a liability than an asset:

- **frankly ugly**
- **extensive levee system**
- **periodic flooding still a major problem**
  - **\$542M property damage since 1960**
  - **3 deaths during one flood**
- **dying downtown**



# The Napa River flood control project

- Local community voted down 3 Corps proposals to straighten and channelize the river
- Community worked with the Corps to develop a precise definition of a “living river”
- Concept was to restore river and let it run free in original flood plain



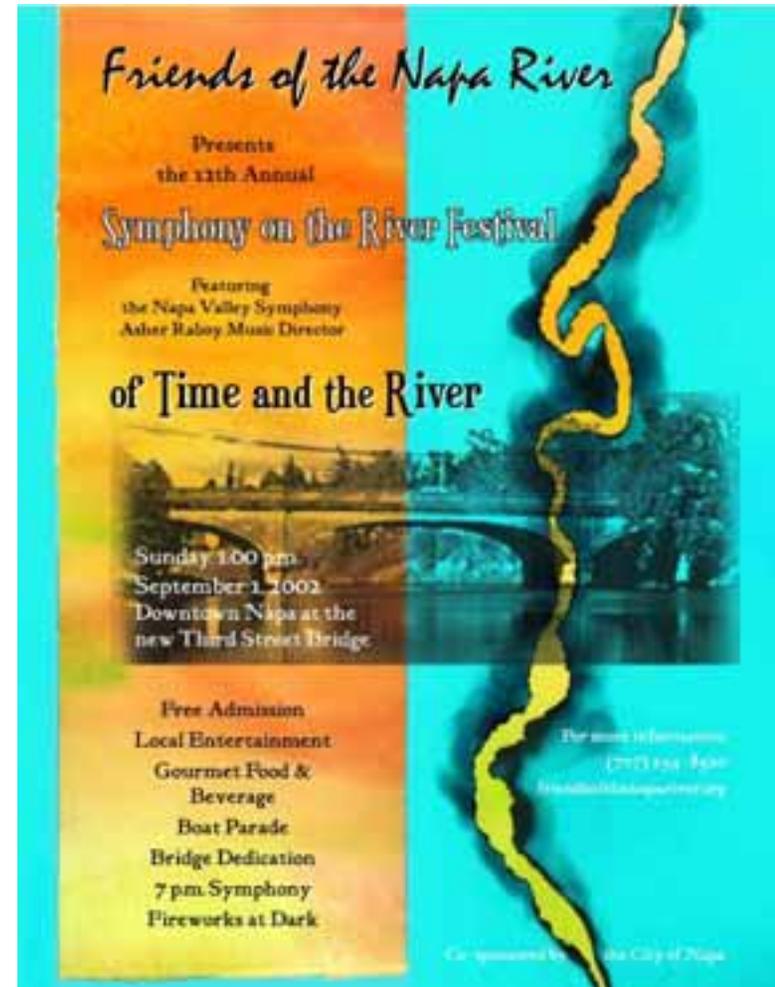
# The Napa River “flood promotion” project

- Total cost: \$240M  
GULP!
- County residents voted to raise sales tax \$3.9M/year
- 300 people/businesses relocated
- 9 bridges removed; 5 replaced at higher locations



# Results

- Estimated \$22M/year avoided flood damage to property
- Flood insurance rates reduced 20%
- Commercial real estate values up almost 20%
- A revitalized river and city



# The Napa River flood promotion project

“The public can decide its own future...as long as you have a really *loud* public.”

Karen Rippey  
former officer Friends of the Napa River  
current USACE Sacramento District employee

