



Rethinking Irrigation Water Conservation

J. Phillip King, P.E., Ph.D.

Professor/Associate Department Head

Department of Civil Engineering

New Mexico State University

Consultant to Elephant Butte Irrigation District

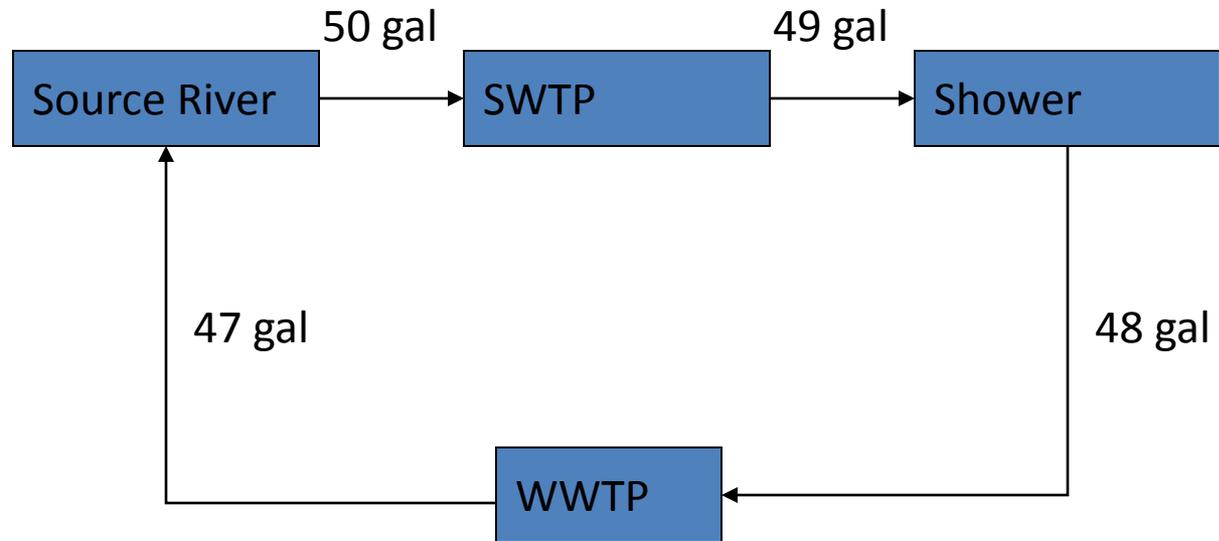
What is Water Conservation?



- Reduction in Water Use
- Reduction of Applied Water
- Reduction of Depletion
- Increase in production for a fixed application
- Increase in production for a fixed depletion
- Use of low quality water in lieu of high quality water

Shower Head Example

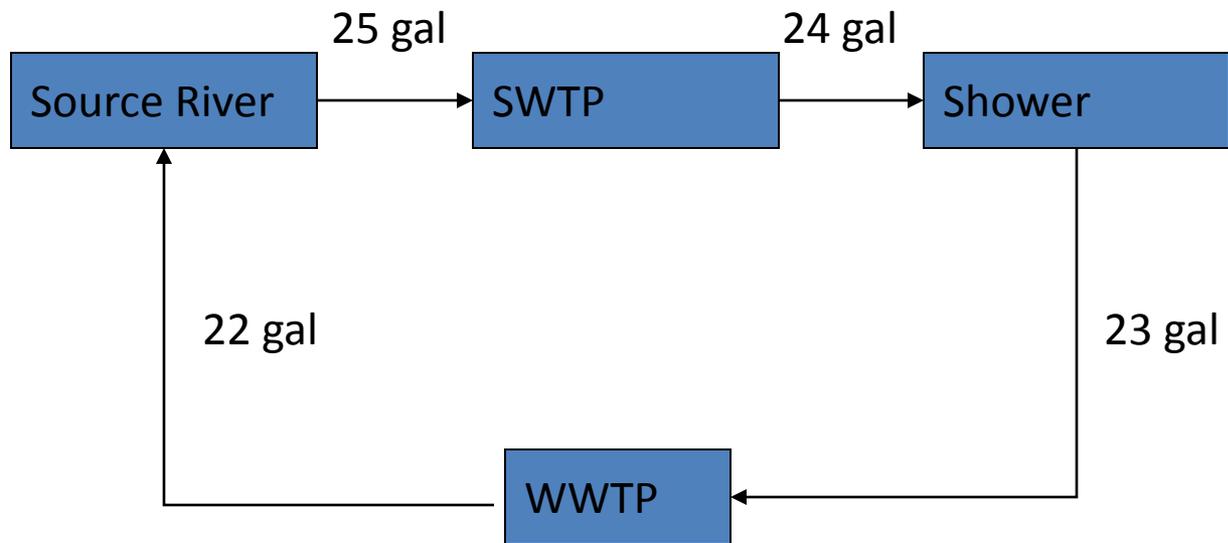
50 gal/shower



3 gallon depletion

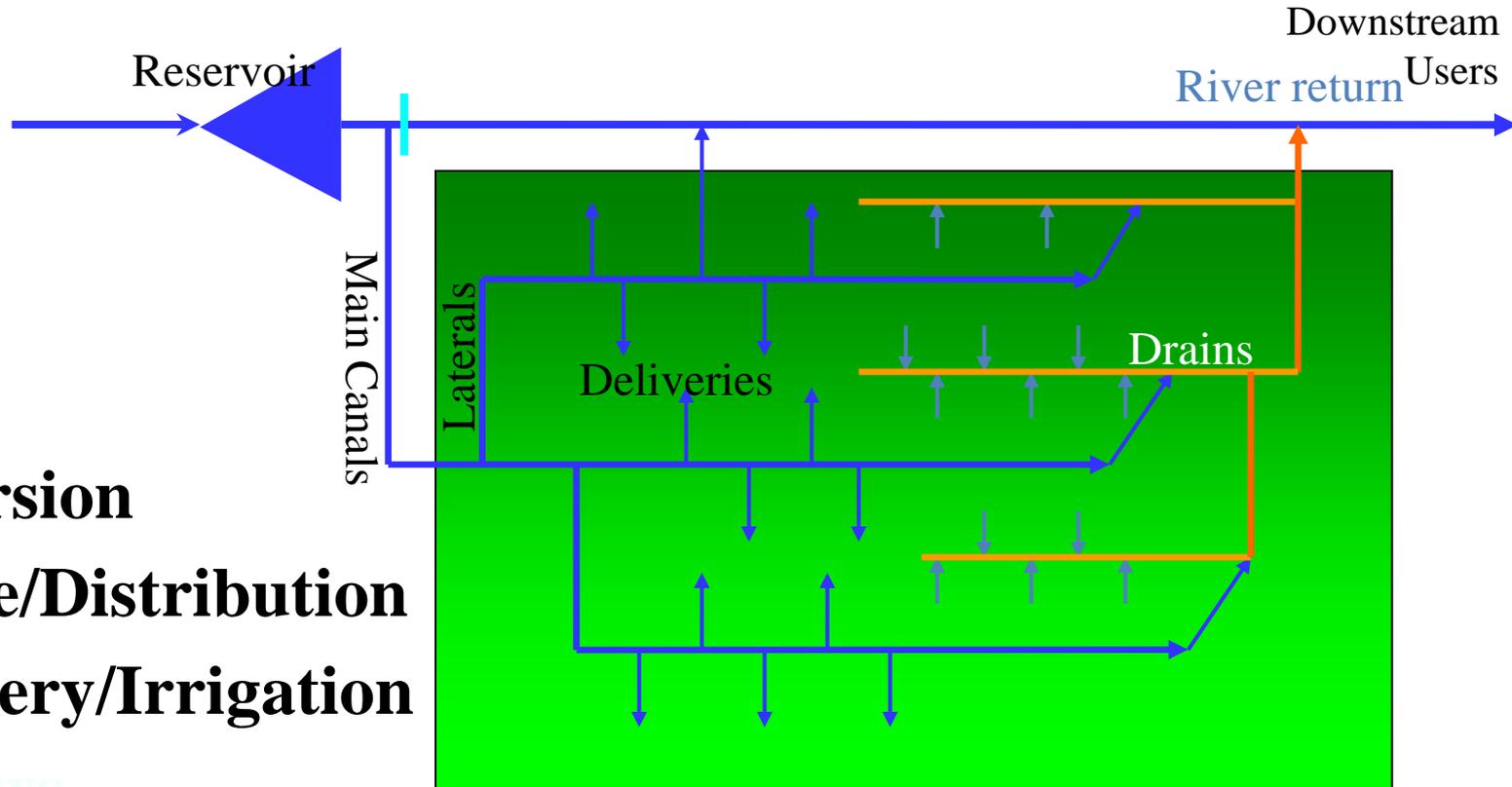
Shower Head Example

25 gal/shower



3 gallon depletion

Irrigation Hydrologic Cycle: Plan View



River/Diversion

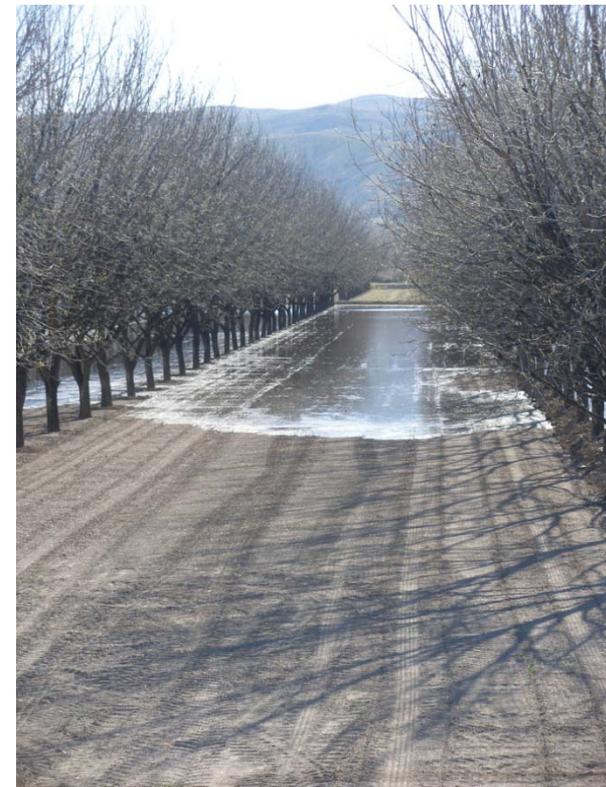
Conveyance/Distribution

Farm Delivery/Irrigation

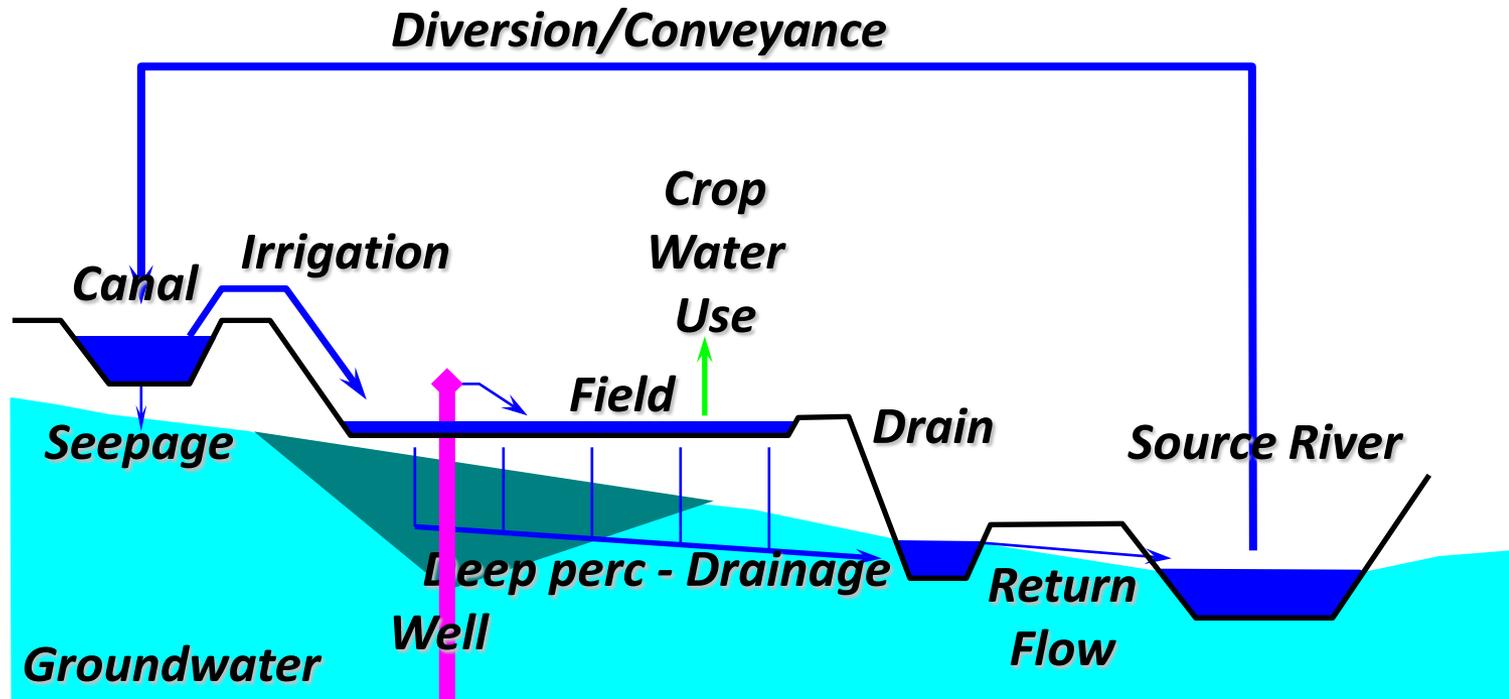
Return Flows

Extensive vs. Intensive Irrigation

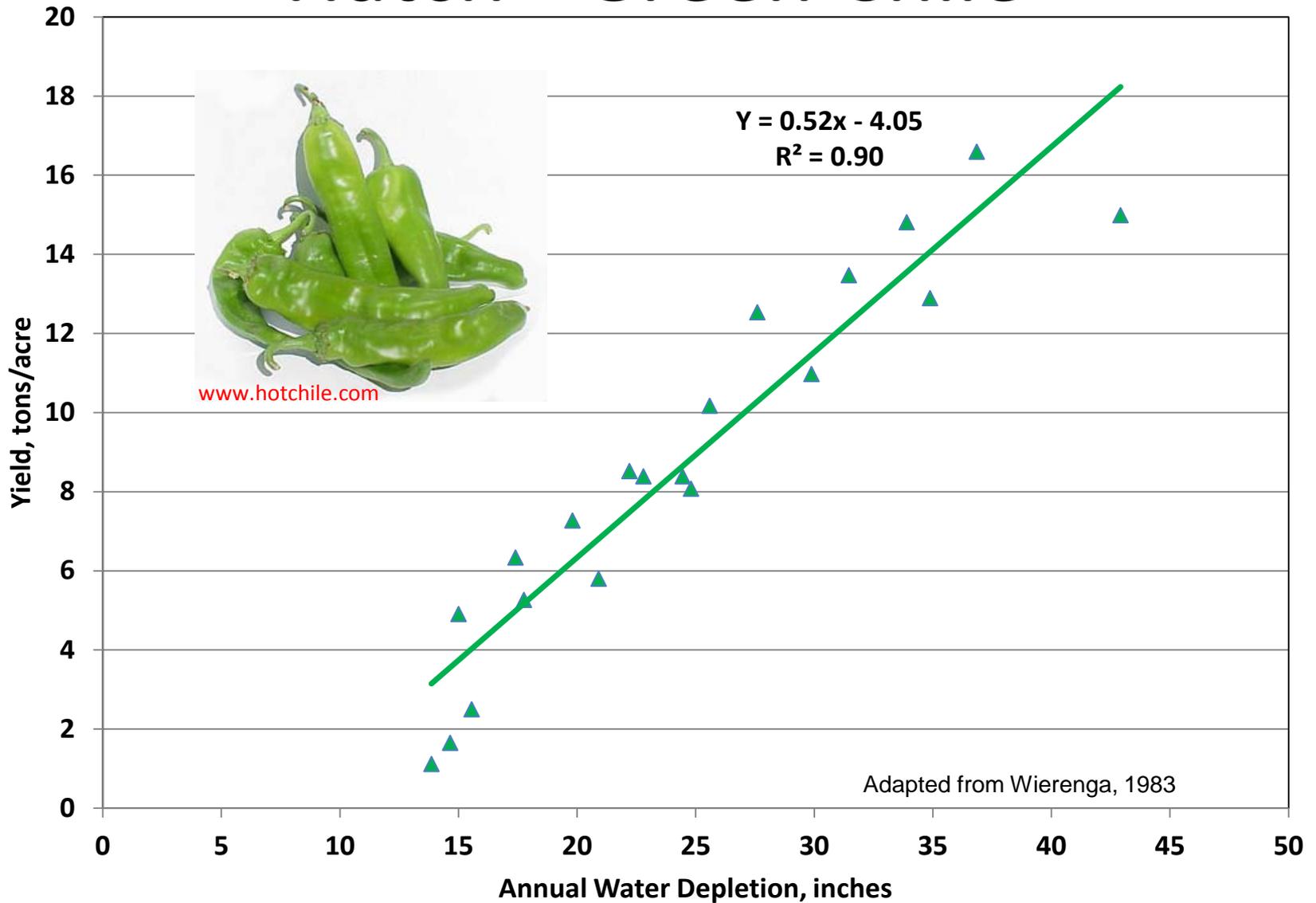
- Extensive – Lower management/investment level
 - High unit application
 - Low unit depletion
 - Low unit production
- Intensive – Higher management/investment level
 - Reduced unit application
 - High unit depletion
 - High unit production



Irrigation Hydrologic Cycle: Profile



Hatch[©] Green Chile



Conversion from Traditional to High Efficiency Irrigation

Traditional Practice	
100	acres cultivated
36	inches applied water
300	acre-feet applied water
65%	irrigation efficeincy
23.4	inches depletion
195	acre-feet depletion
12.6	inches pontential return flow
105	acre-feet potetnial return flow
8.1	tons/acre yield
810	tons total production

"Improved" Practice	
100	acres cultivated
30	inches applied water
250	acre-feet applied water
95%	irrigation efficeincy
28.5	inches depletion
237.5	acre-feet depletion
1.5	inches pontential return flow
12.5	acre-feet potetnial return flow
10.8	tons/acre yield
1075	tons total production



Potential Unintended Impacts

- Decline in groundwater storage
- Decline in groundwater quality
- Die-off of riparian vegetation, habitat loss
- Technical issues, risk with new irrigation methods and technology



“Make things as simple as possible, and not one bit simpler.”

- Einstein



- Fit conservation measures to local hydrology
 - Return flow consideration
 - Quality issues
- Fit conservation measures to institutional setting
 - Quantify potential impairment on water rights
 - Surface water-groundwater interaction
- Recognize short-term drought benefits, control of water
- One size does NOT fit all