



We work with others to protect the health of the people of Washington State by ensuring safe and reliable drinking water.

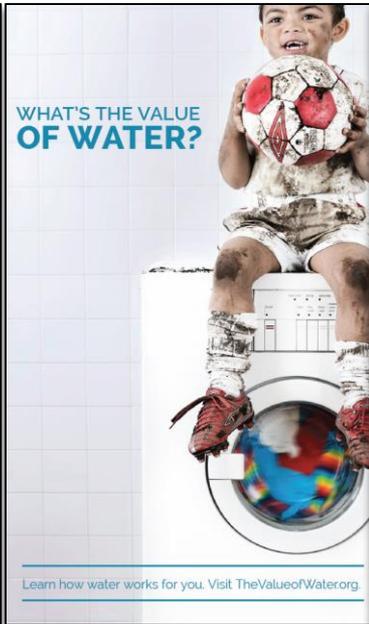
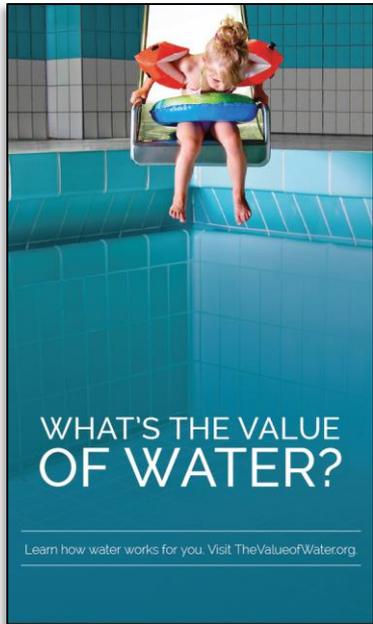
## **INTRO TO DRINKING WATER**



Washington State Department of Health



# What's the Value of Water?



# Better Check Your Sources – Historical Cites

The Age of Buckets

From Here to There  
(without getting everywhere)

**Better Check  
your Sources**

Out of Sight,  
Out of Mind

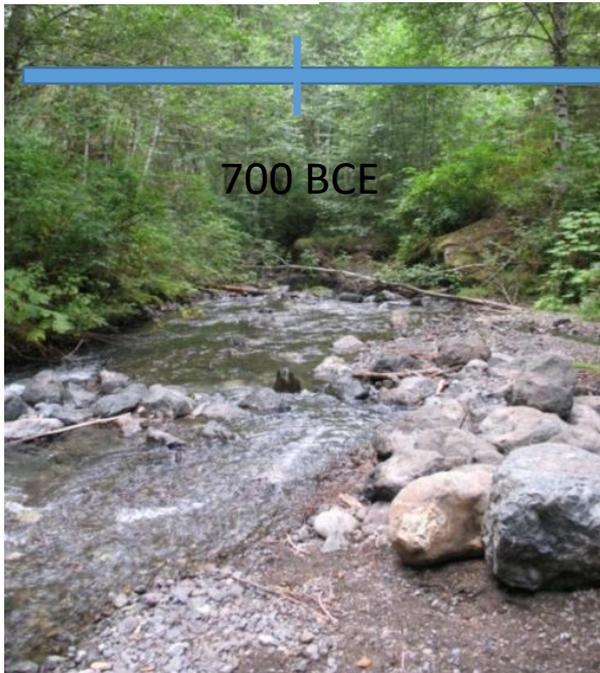
Facing the  
Future

700 BCE

1800's CE

1900's CE

Present



# Better Check Your Sources – Historical Cites



Images courtesy of Wikipedia Commons

# Federal Surface Water Rules

Milwaukee Crypto Outbreak (1993) – over 400,000 people sick



SWTR  
(1989)

IESWTR  
(1998)

FBRR  
(2001)

LT1ESWTR  
(2002)

LT2ESWTR  
(2006)

SWTR - Surface Water Treatment Rule

IESWTR - Interim Enhanced Surface Water Treatment Rule

FBRR - Filter Backwash Recycling Rule

LT1ESWTR - Long Term 1 Enhanced Surface Water Treatment Rule

LT2ESWTR - Long Term 2 Enhanced Surface Water Treatment Rule



# Target Organisms

- Surface water – “a body of water open to the atmosphere and subject to surface runoff”
- *Giardia lamblia*
- Viruses
- *Legionella*, and
- Heterotrophic Bacteria
- *Cryptosporidium* – IESWTR, LT1ESWTR, and LT2ESWTR
- Others??



# Treatment requirements

---

*Giardia* and Virus removal + inactivation =

- At least 99.9% (3 Log) *Giardia* cysts
- At least 99.99% (4 Log) Viruses

At least 99% (2 Log) *Cryptosporidium* oocysts

## Treatment Technique Requirements

- Disinfect
- Filter or meet avoidance criteria

## Qualified Operators

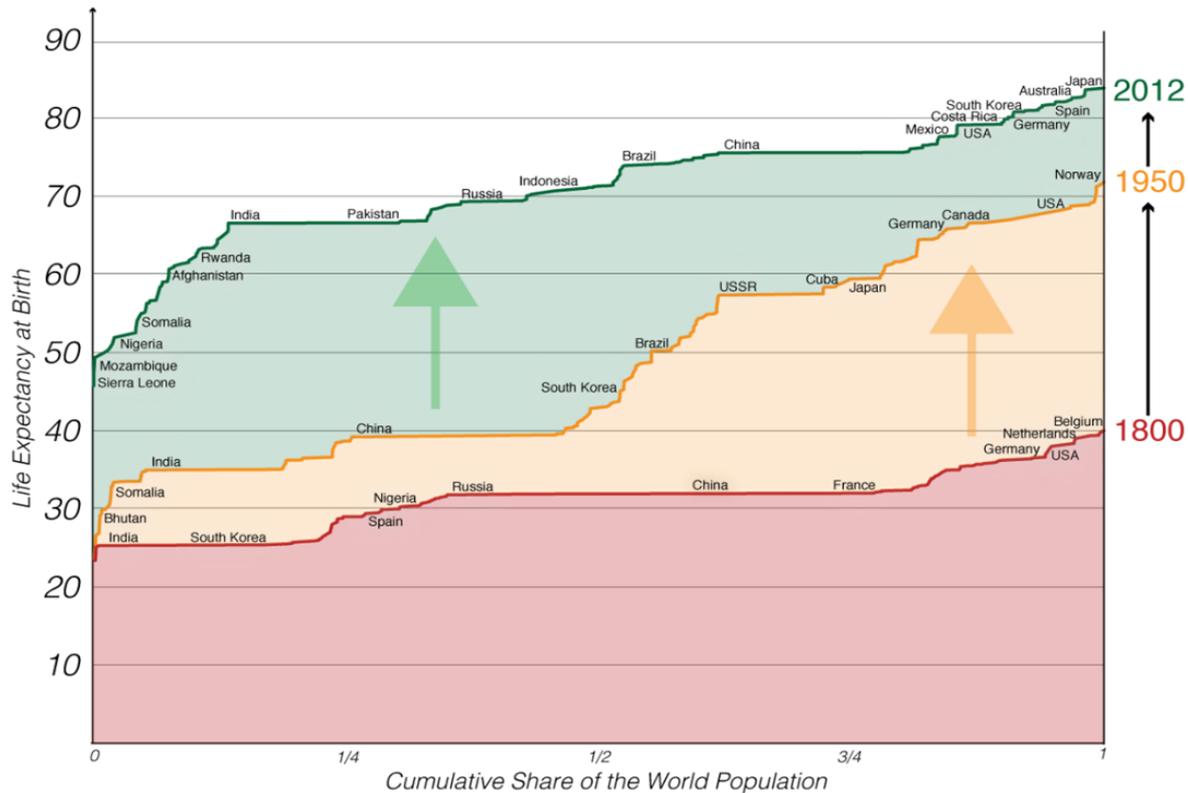


# Cryptosporidiosis Outbreaks in SW Supplies

Location	Year	Type of System	Approximate Number of Cases
Carrollton, GA	1987	Treated Surface Water Supply	13,000
Jackson County, OR	1992	Medford-Chlorinated Spring Talent-Treated Surface Water Supply	15,000
Milwaukee, WI	1993	Treated Surface Water Supply	403,000
Cook County, MN	1993	Treated Surface Water Supply	27
Clark County, NV	1994	Treated Surface Water Supply	78
North Battleford, SK	2001	Treated Surface Water Supply	>1000
Baker City, OR	2013	Treated Surface Water Supply	2,780

# Why

Reduction in water borne disease added more to life expectancy than all of recent modern medicine....



# Turbidity

---

## What is it and why do we measure it?

- A measurement of the cloudiness caused by particulate matter.
- Measured in Nephelometric Turbidity Units (NTUs) (USEPA Method 180.1)
- Monitoring is used to:
  - -Show how efficiently the filtration system is working (rapid rate)
  - -Ensure levels won't interfere with disinfection



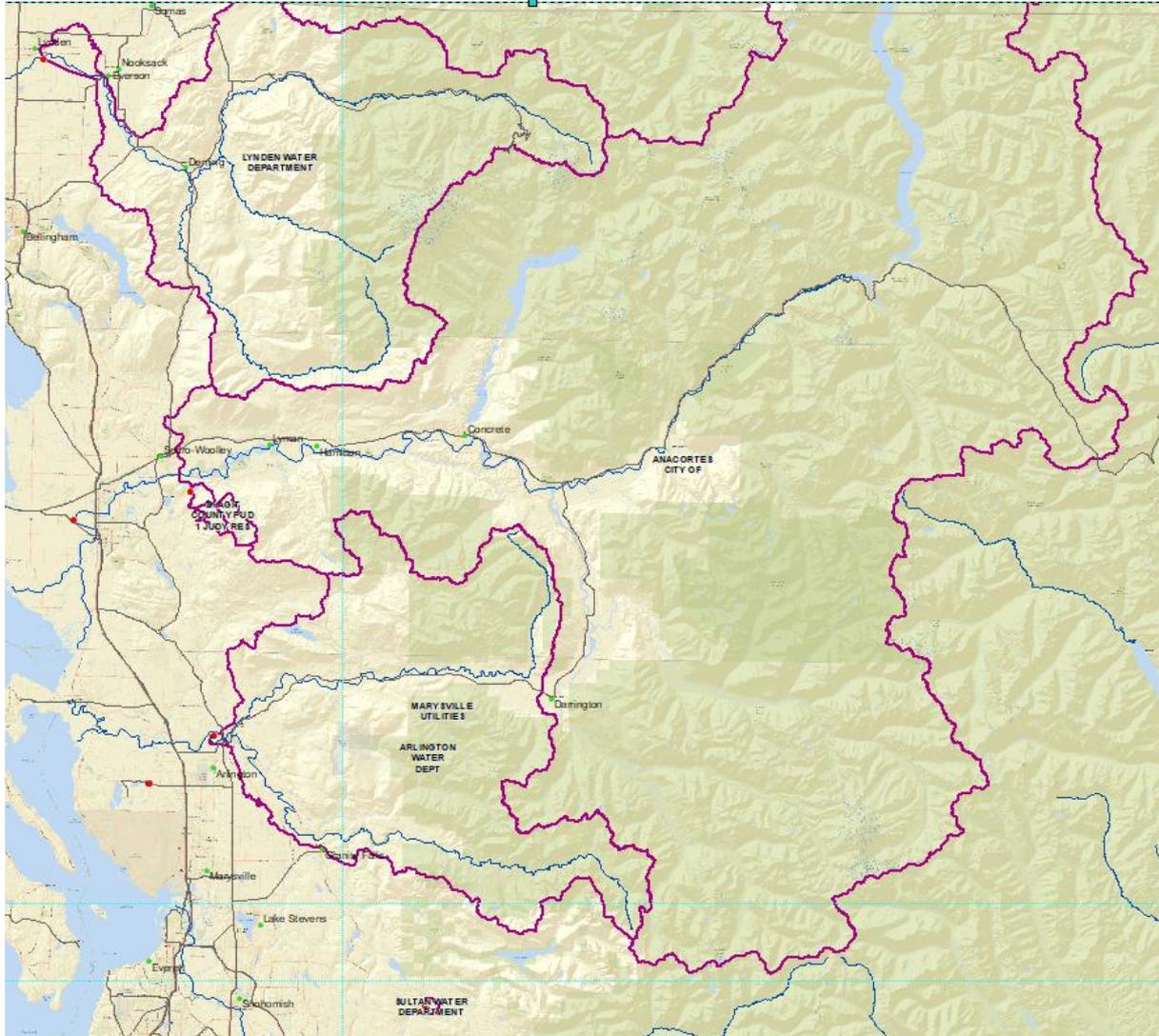
# Surface Water Treatment

Every treatment plant has a limit of turbidity it can treat

- Slow sand: 10 NTU with roughing filter
- Diatomaceous Earth: 20 NTU
- Rapid rate: 30 NTU
- Membranes: 80 to 100 NTU



# Watersheds





Images courtesy of Wikipedia Commons

# Drinking Water Sources

