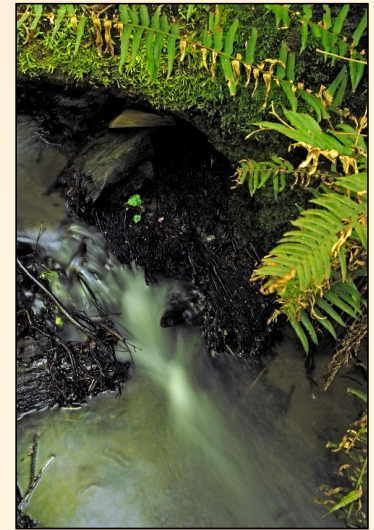
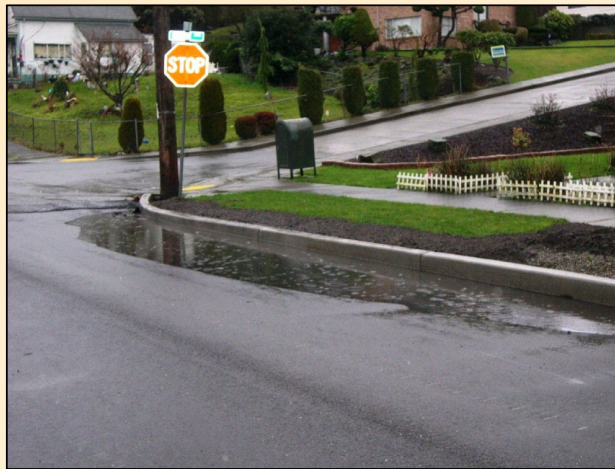


# STORMWATER RUNOFF

The urban reality



# What is stormwater?



Rain, sleet and melted snow that “runs off” to lower areas, making its way into streams, lakes and other water bodies.



## Quiz time

Which city receives the most rain?

- Everett
- Spokane
- Seattle
- Olympia



## Answer

1. Olympia (50")
2. Everett (37")
3. Seattle (34")
4. Spokane (16")



# How much rain is that really?



**1,200 square foot roof**  
**1" rain event**

**1" rain = 745 GALLONS**

**37" a year = 27,565 gallons/yr.**

# How much in a parking lot?



**1 acre parking lot**

**1" rain event**

**1" rain = 27,043 GALLONS**

**37" a year = 1 M gallons/yr.**





Where does that water go?

# Down the drain



Minimal to no treatment



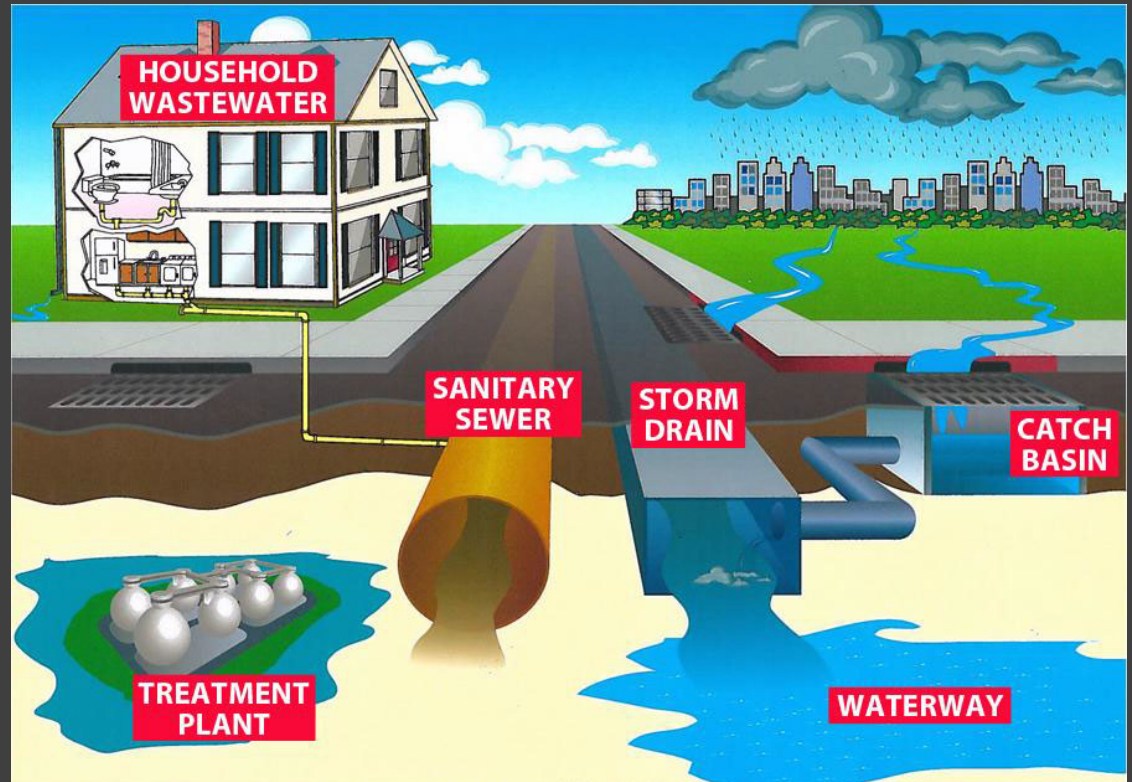
Treated at wastewater treatment plant  
to meet federal water quality standards

EWPCF serves 160,000 people



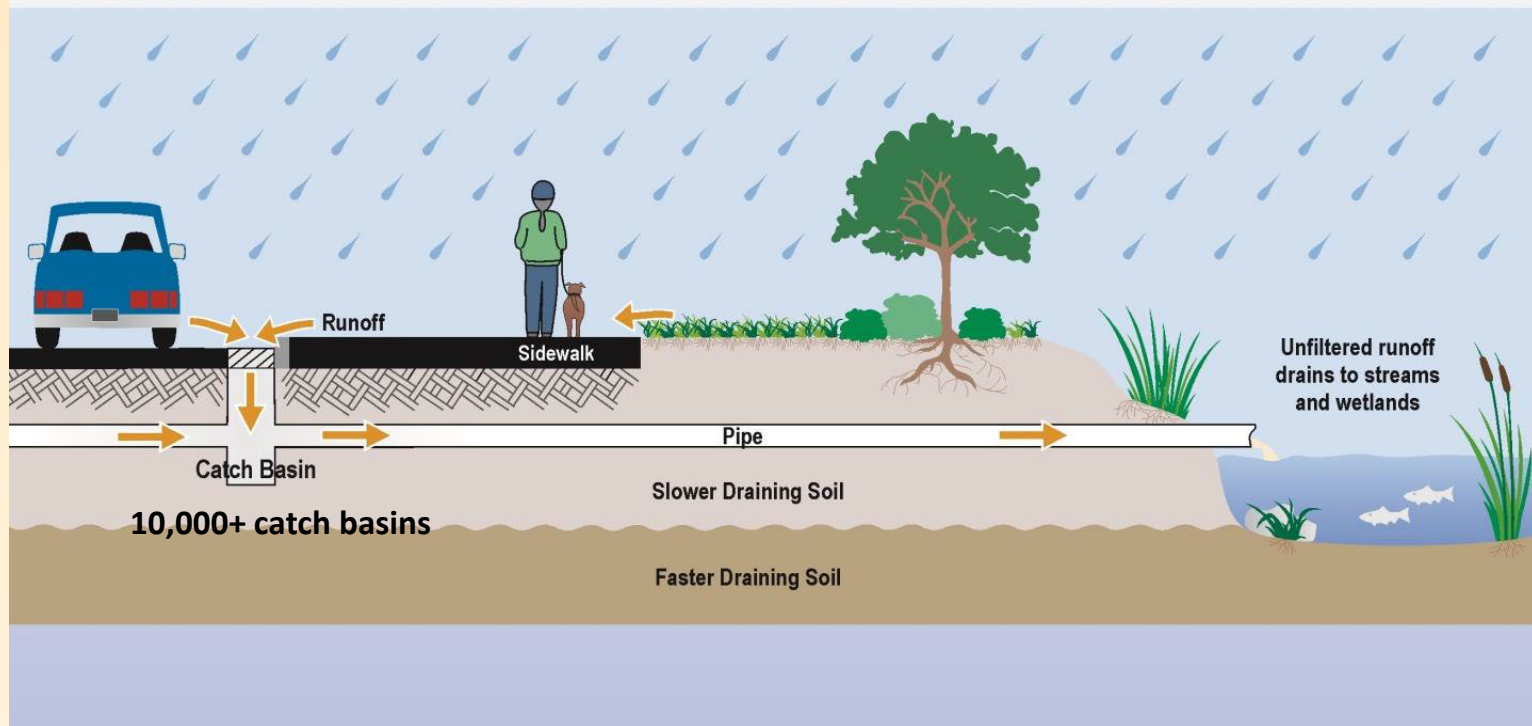


# SEPARATE sewer and storm system

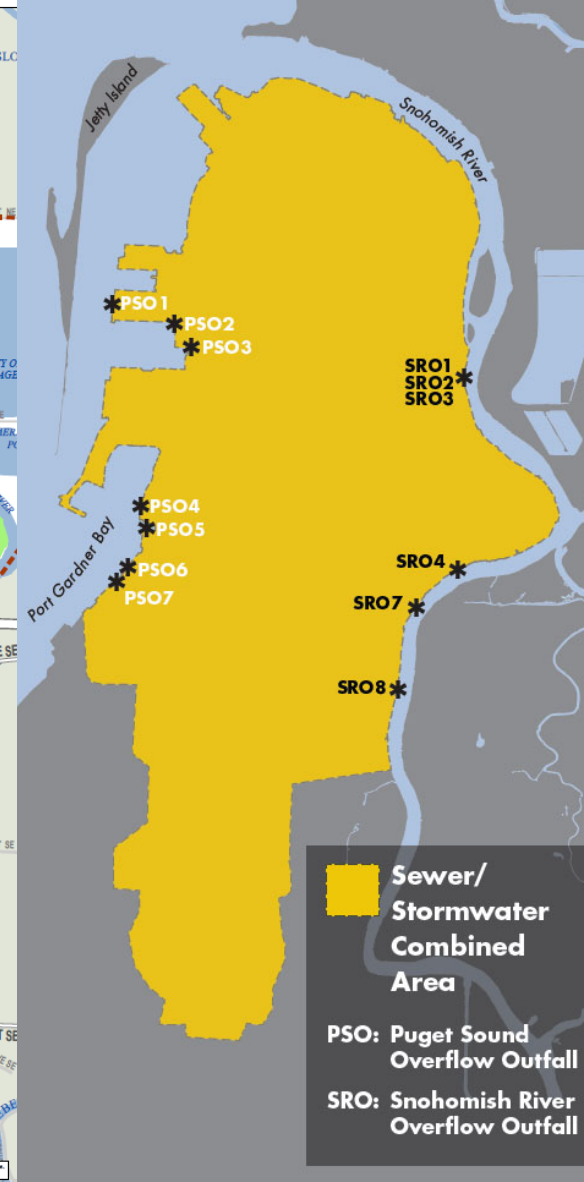


# Drainage in our neighborhoods

## Typical Road Drainage *Water runs off!*



# COMBINED sewer and storm system

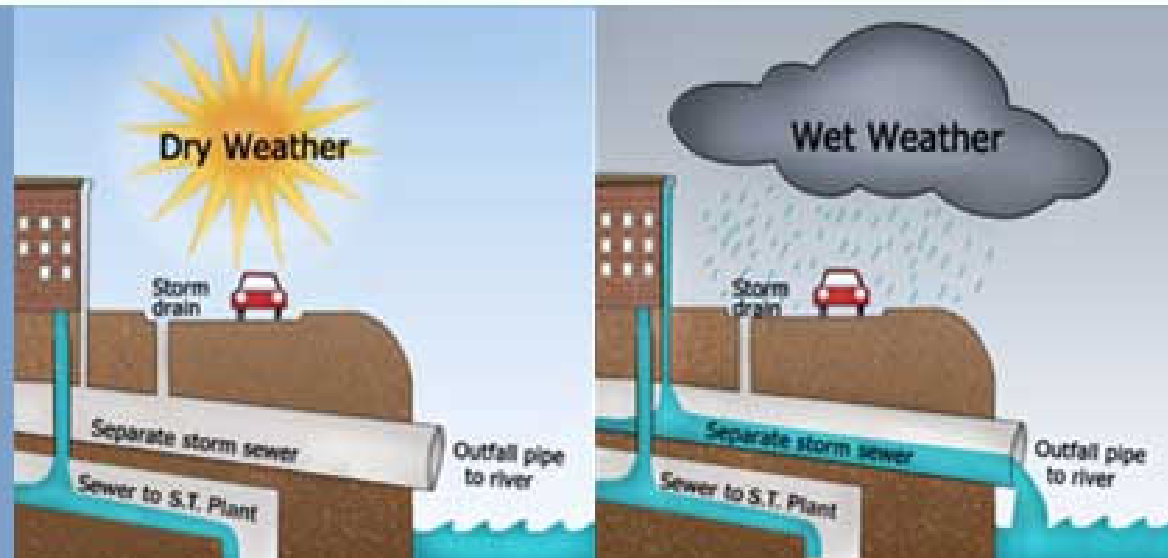


# Overflows

Combined  
Sewer  
Overflow  
(CSO)

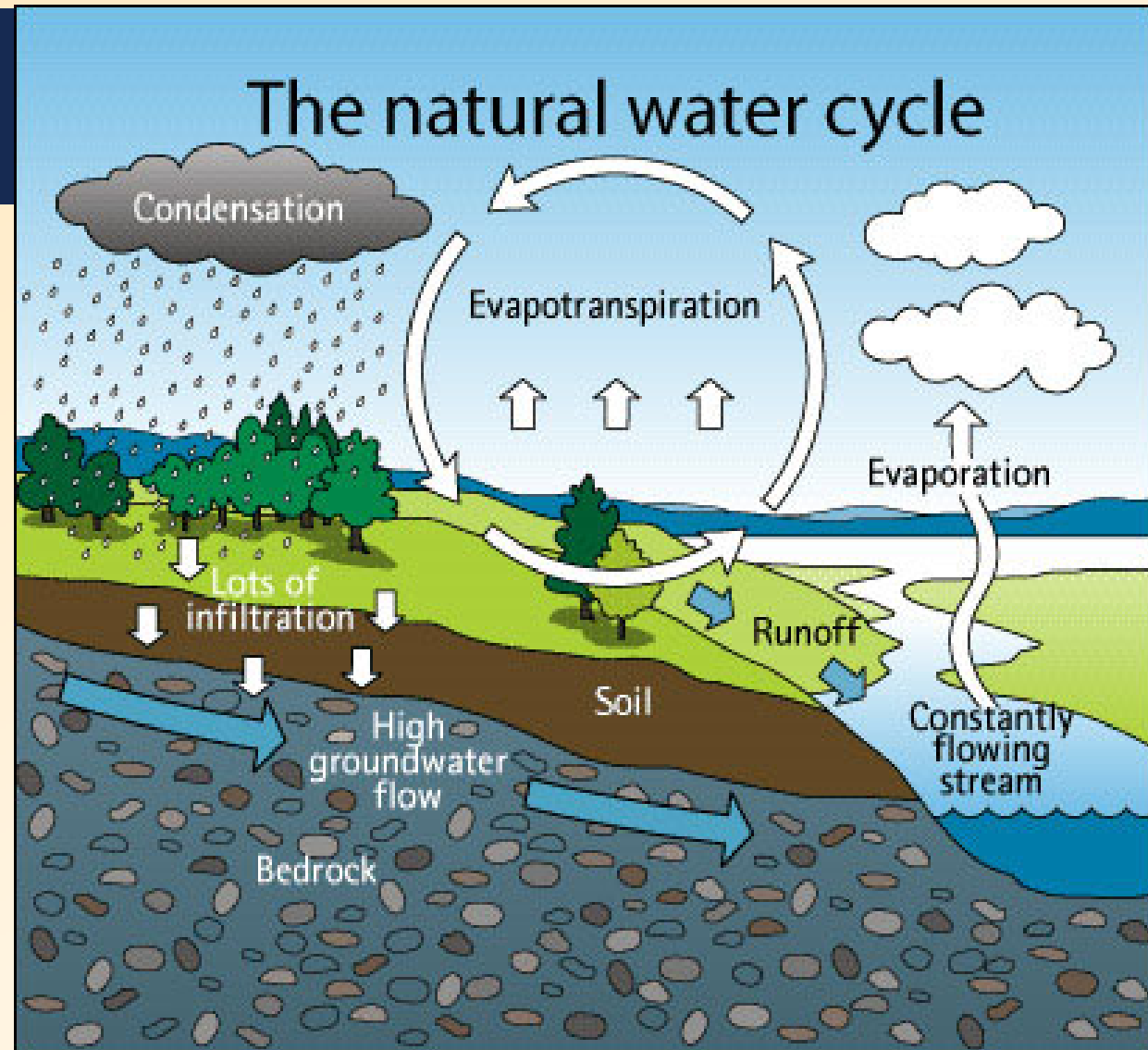
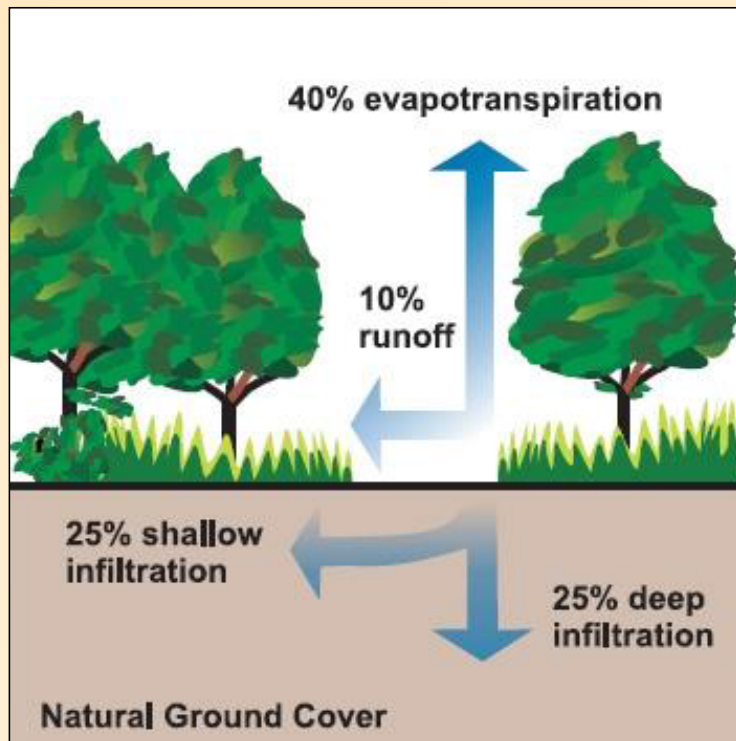


Sanitary  
Sewer  
Overflow  
(SSO)

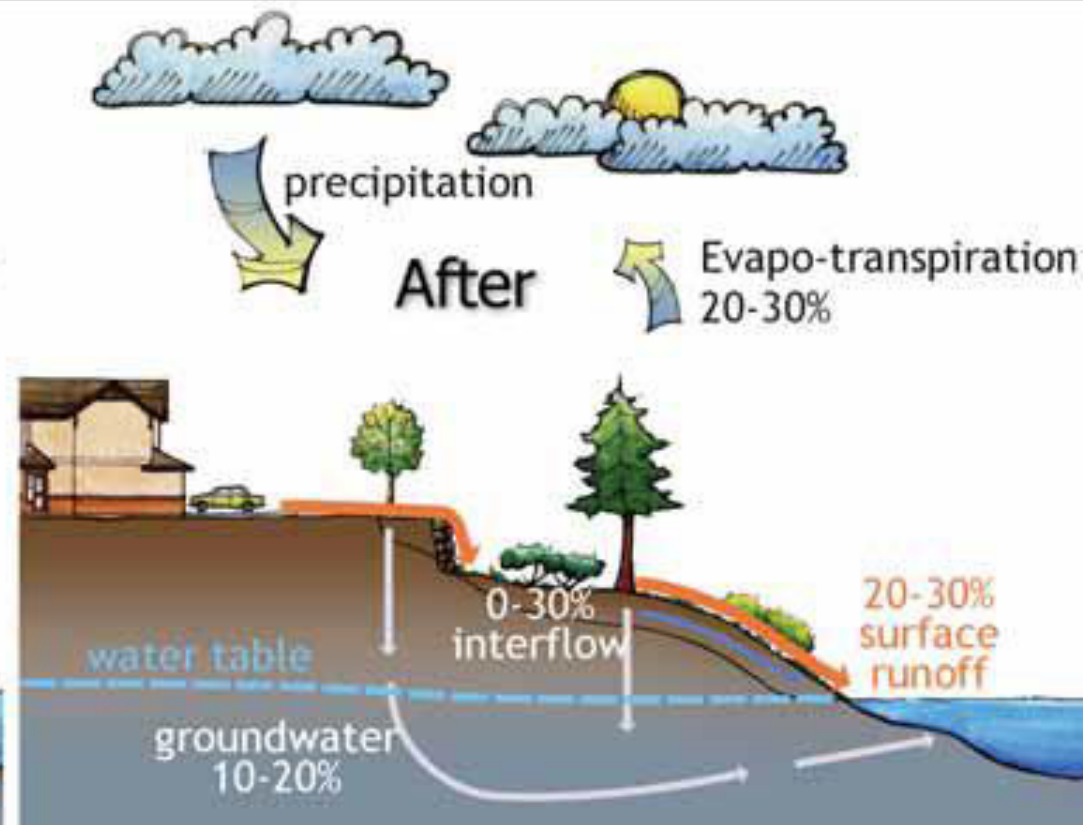
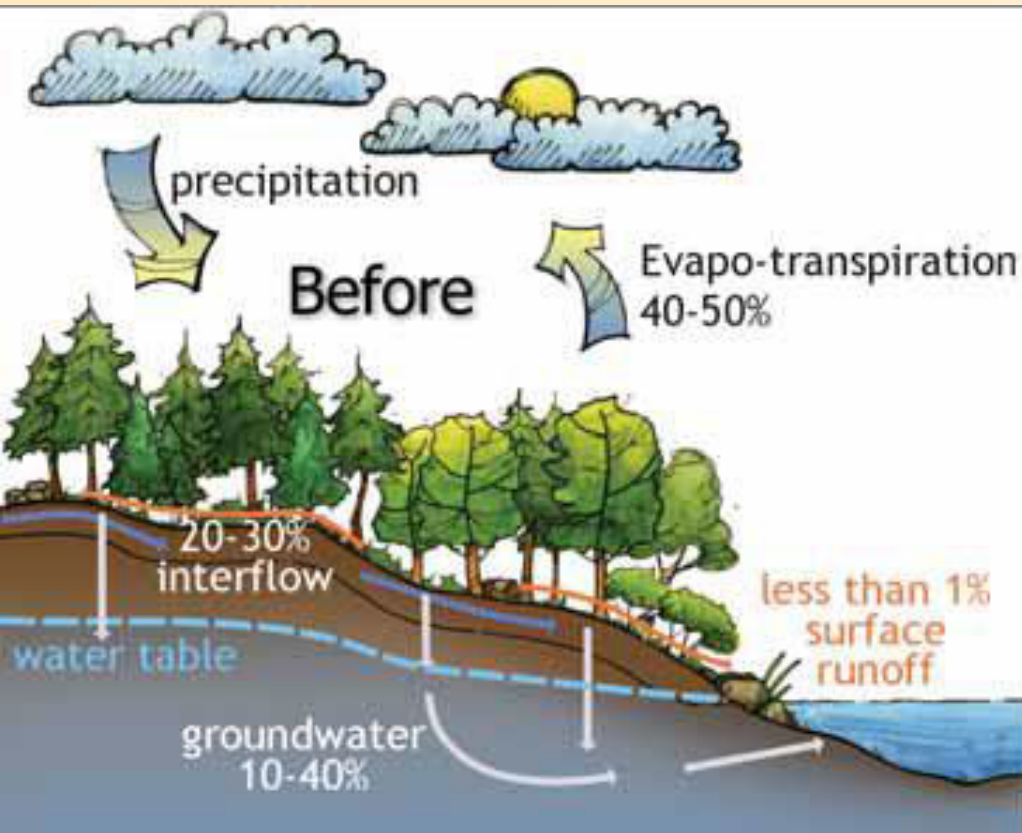




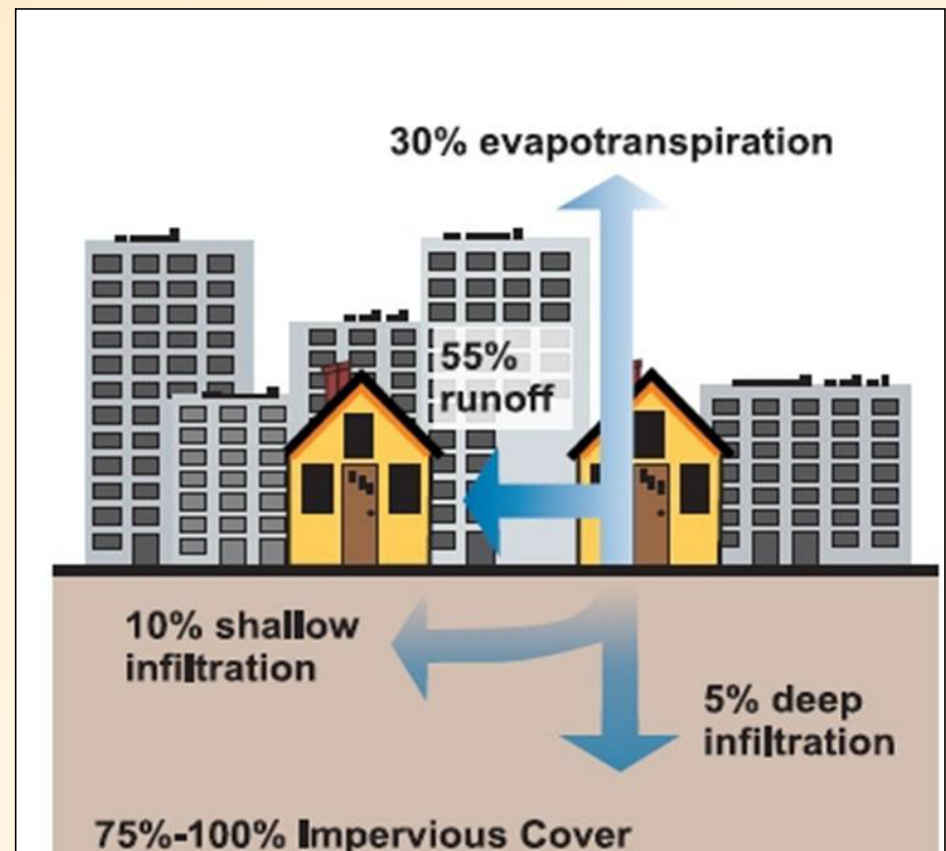
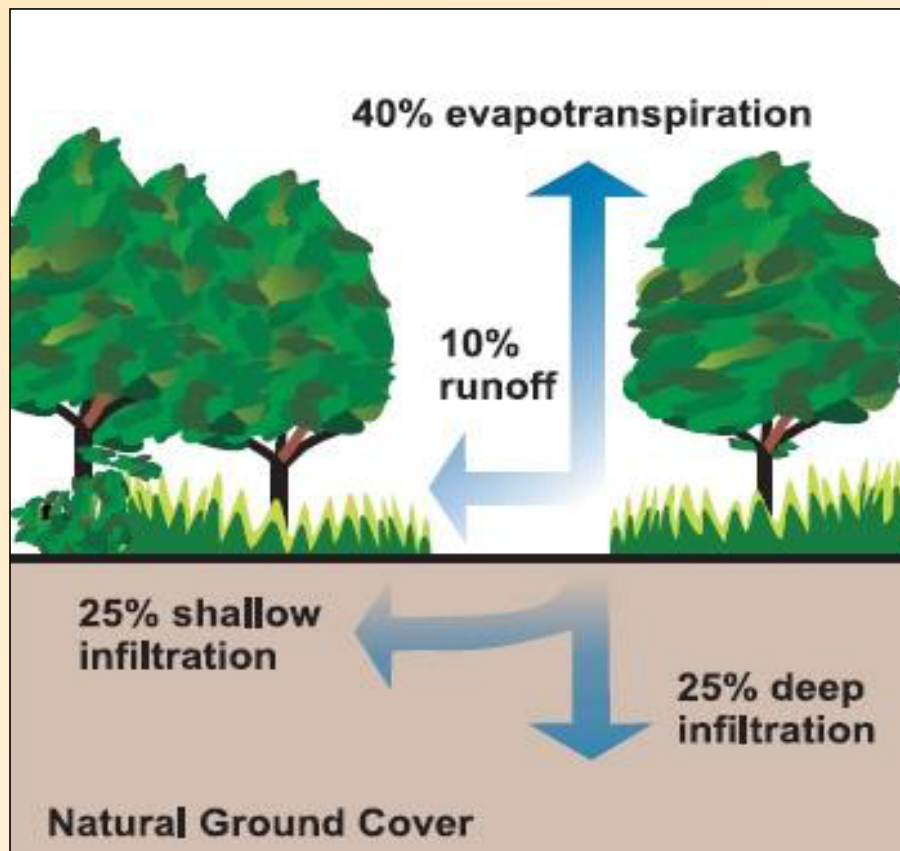
# Natural



# Residential reality



# Urban reality







What does that look like?

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# MUNICIPALITY STORMWATER MANAGEMENT



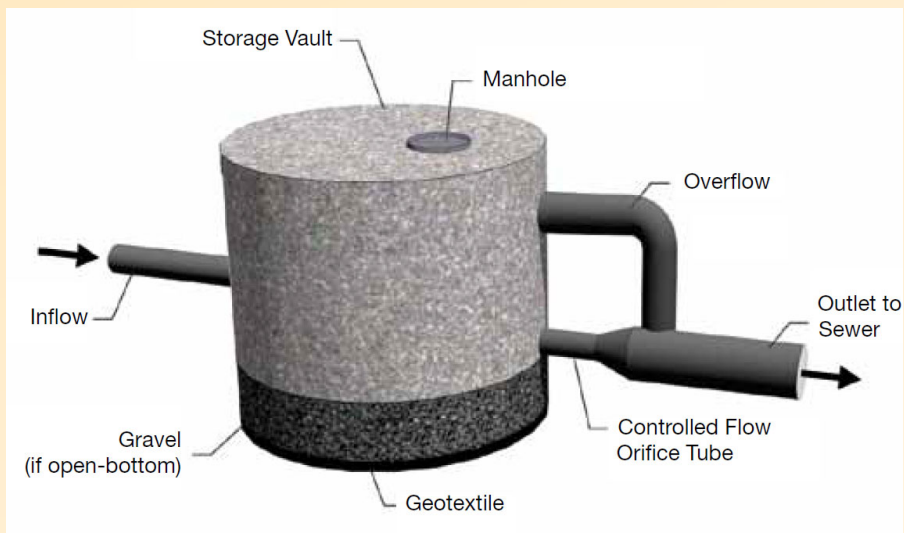
# (Dry and wet) detention ponds



# Retention ponds



# Vaults and CD's



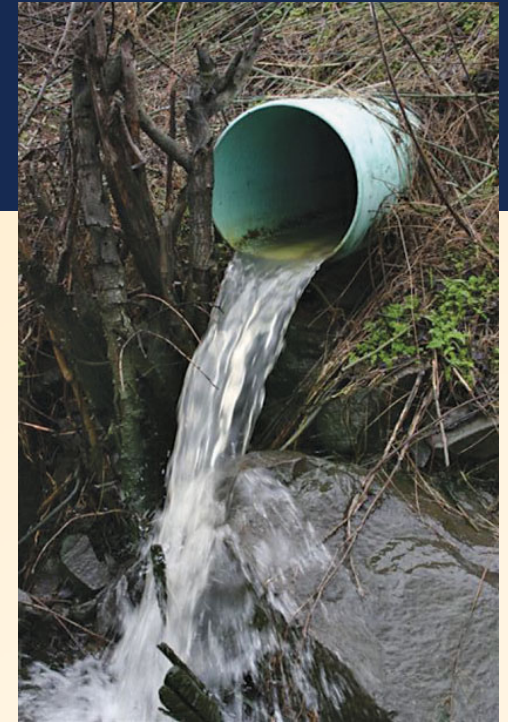


# What's in stormwater?

“Stormwater is the MAIN source of toxic contaminants to our surface waters. And over 30% of the state’s waters are polluted due to stormwater.” – Department of Ecology



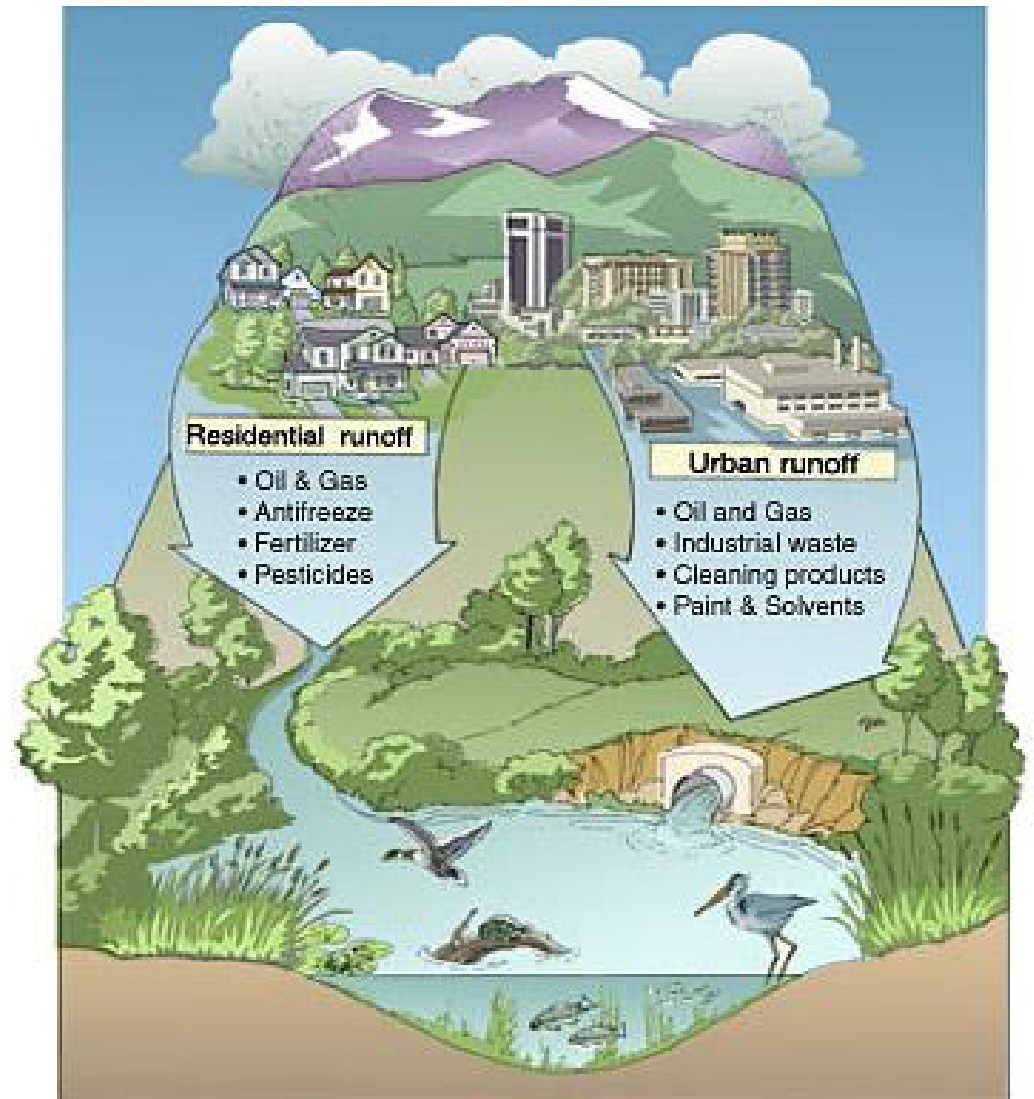
“About 14 MILLION pounds of dangerous pollutants wash into Puget Sounds each year. The toxic cocktail is a threat to our drinking water and marine wildlife alike.” - Sightline Institute



# Where are these pollutants coming from?



# Urban vs. Residential runoff





What you see...

Combined sewer overflow  
November 19, 2012







... and the pollution  
you don't see

*Photo by Blake Feist. NOAA Fisheries*

# Outfall example



<https://vimeo.com/channels/rwff2013/51603152>





# Typical stormwater pollutants

- Nutrients (nitrogen and phosphorous)
- Bacteria and pathogens
- Temperature
- Pesticides/Herbicides
- Soaps and detergents
- Sediment
- Road runoff contaminants
  - Metals (copper, zinc, lead and chromium
  - PAH's (oil, grease, car exhaust)



## Nutrients

---

- Fertilizers have nitrogen and phosphorous
- Promote algae growth
- Decreases oxygen in waterways





A photograph of a person wearing blue pants and a green glove, bending over to pick up a dog's waste in a grassy field. A light-colored dog is visible in the foreground, looking towards the camera. The background shows green trees and a clear sky.

## Bacteria

- Pet waste (and wildlife, especially goose poop!)
- Snohomish County has 173,000 dogs. That equals 47.5M lbs. of pet waste annually.
- Leaky sewer/septic tanks



## Pesticides

- Insecticides (Organophosphate carbamates, pyrethroids)
- Herbicides (atrazine, glyphosate)

Pesticides that target weeds and insects may also affect aquatic plants and invertebrates that are food source for fish, birds and marine mammals.





## Pesticides & salmon

Organophosphates and carbamate pesticides may have sublethal effects on salmon behavior;

- Homing
- Feeding
- Reproduction
- Predator Avoidance




# Heavy metals & PAH's

---

- Cars brakes, tires and exhaust
  - PAH's
  - Copper
  - Zinc
- Other metals found in stormwater runoff include:
  - Arsenic
  - Cadmium
  - Lead
  - Mercury





## Other sources

---

- Surfactants  
(soap and detergents)
- Sediment loading
- Temperature





Point

Non  
Point



# Laws

The Clean Water Act **NPDES** (National Pollutant Discharge Elimination System) permit regulates certain discharges

- ✓ Municipal wastewater treatment plants
- ✓ Municipal stormwater
- ✓ Industrial wastewater
- ✓ Industrial stormwater





## Public Education & Outreach



# STORMWATER AS A RESOURCE

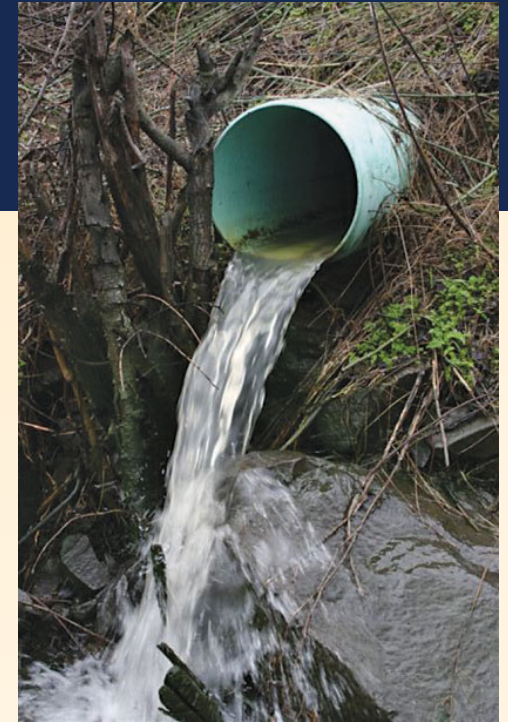


# Stormwater as a resource

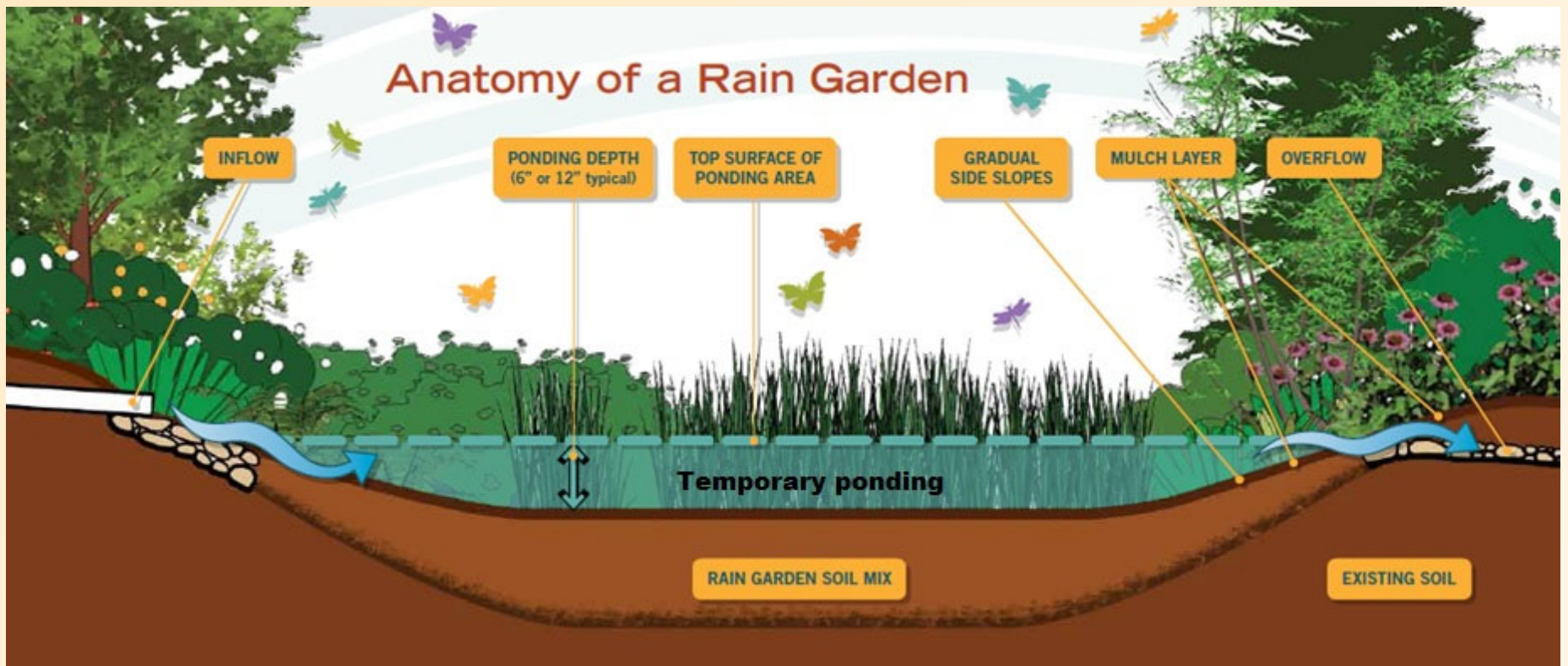
Old way: looked at stormwater as something to get out of the way, as quickly as possible. Flood and erosion control



New way: Stormwater is a resource. Mimic nature and infiltrate where possible. Reuse stormwater.



# Rain gardens



# Pervious surfaces

East Grand Ave., Everett WA





# Bioretention



# YOU can make a difference



## At home

- Maintain your septic system
- Pick up your pet's waste frequently
- Practice Natural Yard Care
- Store toxic chemicals off the ground
- Cover any toxic chemicals and keep out of the elements
- Take unused chemicals to Hazardous Waste Facility
- Install green stormwater infrastructure at home
- Use drug take-back facilities



# YOU can make a difference



- **With car**
- Check for leaks often and fix them
- Use professional car washes
- When washing at home, direct car wash water to landscape and not the nearest storm drain





# YOU can make a difference

## In the community

- Scoop it, bag it and place pet waste in trash
- Pick up litter
- Adopt your neighborhood storm drain
- Volunteer and educate the public



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City of Everett, Public Works

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