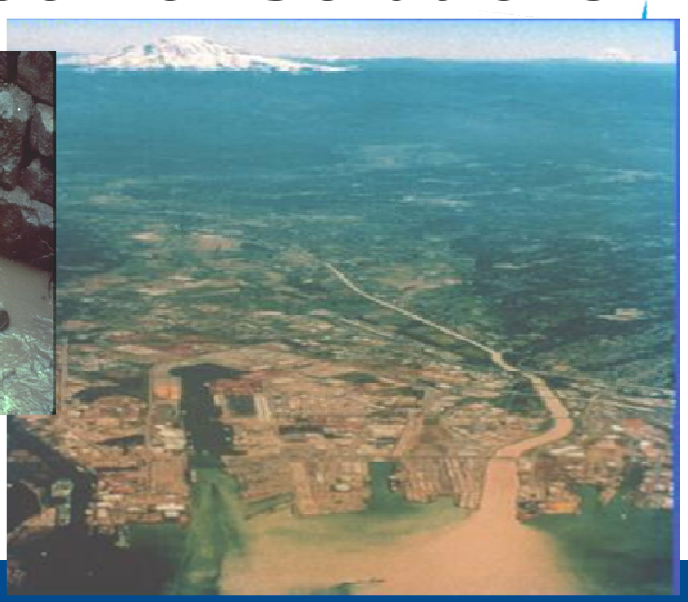
Stormwater Challenges, and the Rain Wise Toolbox of Solutions



David McDonald
Seattle Public Utilities

Installing Rain Gardens & Cisterns

Training for contractors, Nov. 3, 2011

www.seattle.gov/util/rainwise

reduce flooding

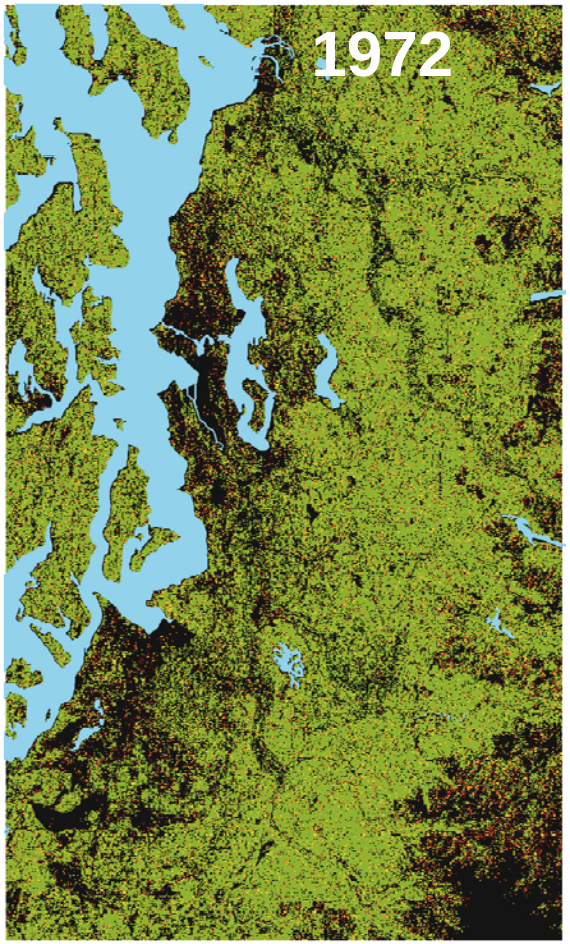
protect property

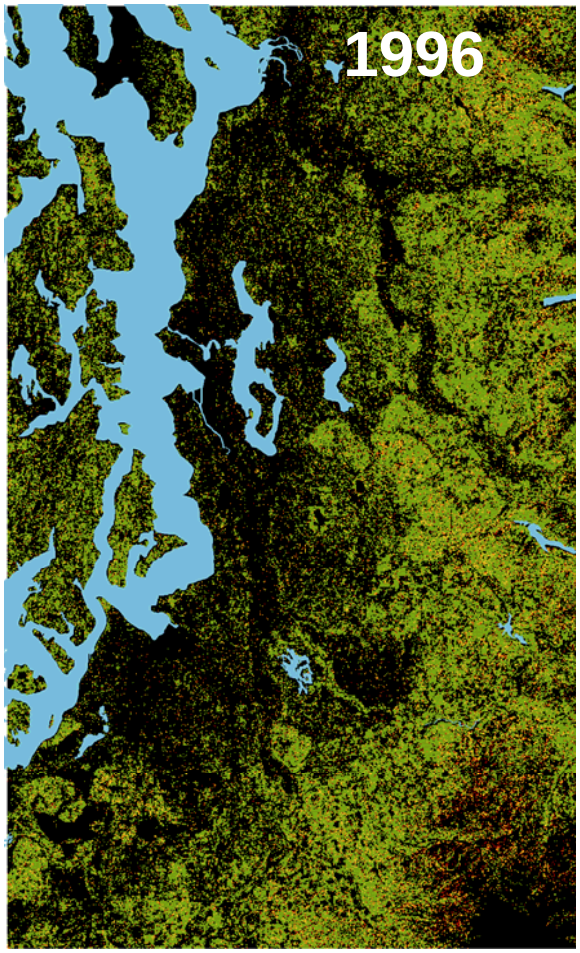
restore our waters for people...

...and wildlife

The Stormwater Problem: Impacts of turning spongy forests into cities

1972-1996: Amount of land with 50% tree cover decreased by 37% in Puget Sound region (from 42% of land down to 27%).





American Forests

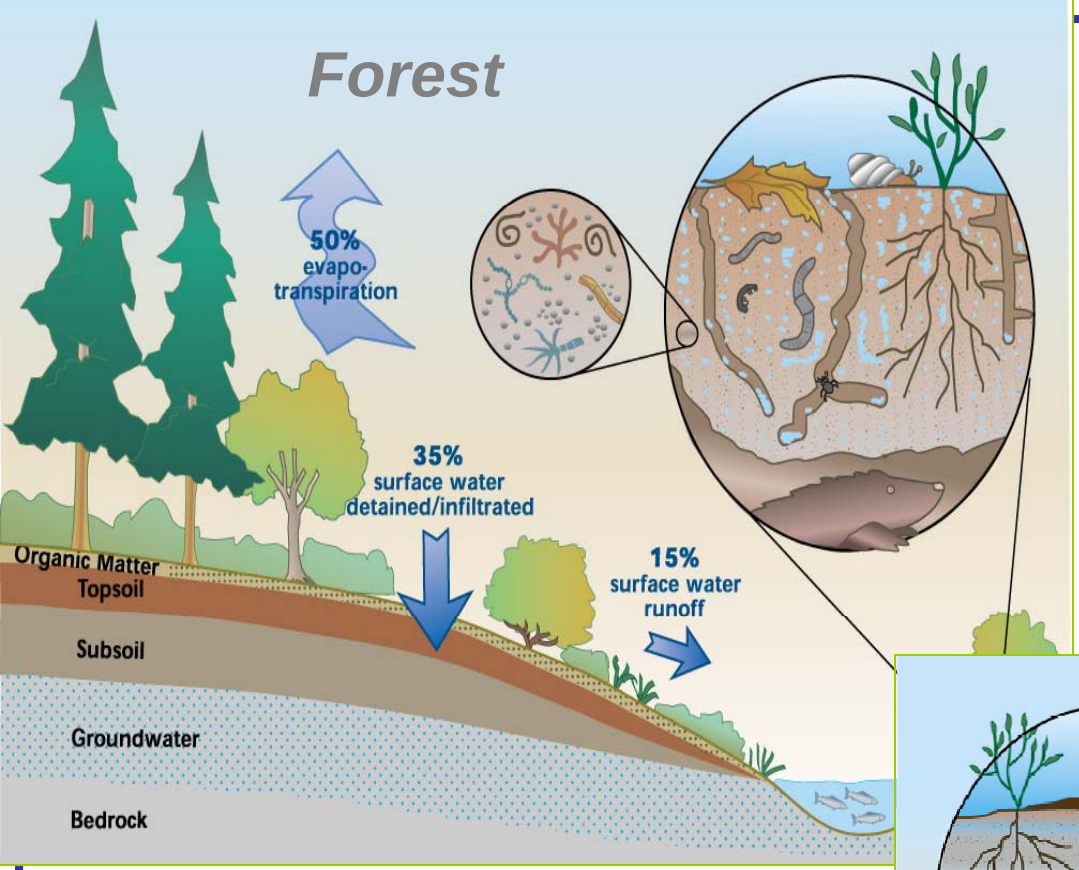
<u>Impervious surface</u> (roads, buildings) increasing proportionately

More people moving into Puget Sound region and Seattle = denser development

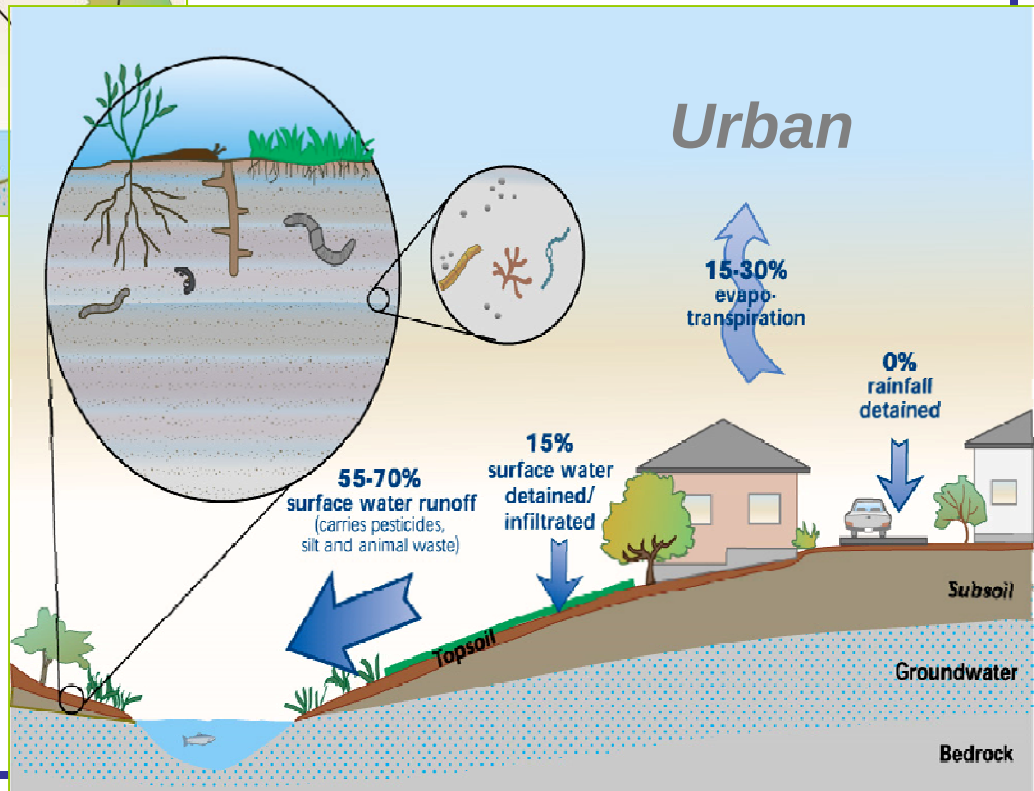
Our climate is changing: more high rainfall events

Development Effects

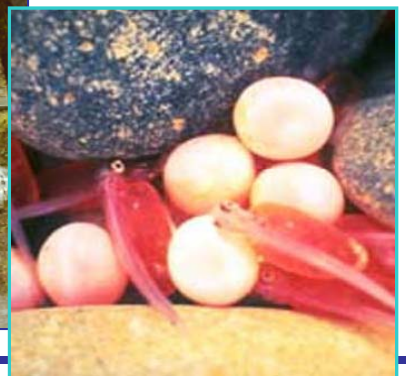
Before development: forest soils absorb rainfall – release it slowly



After development: rainfall rushes off roofs, roads, and compacted soils

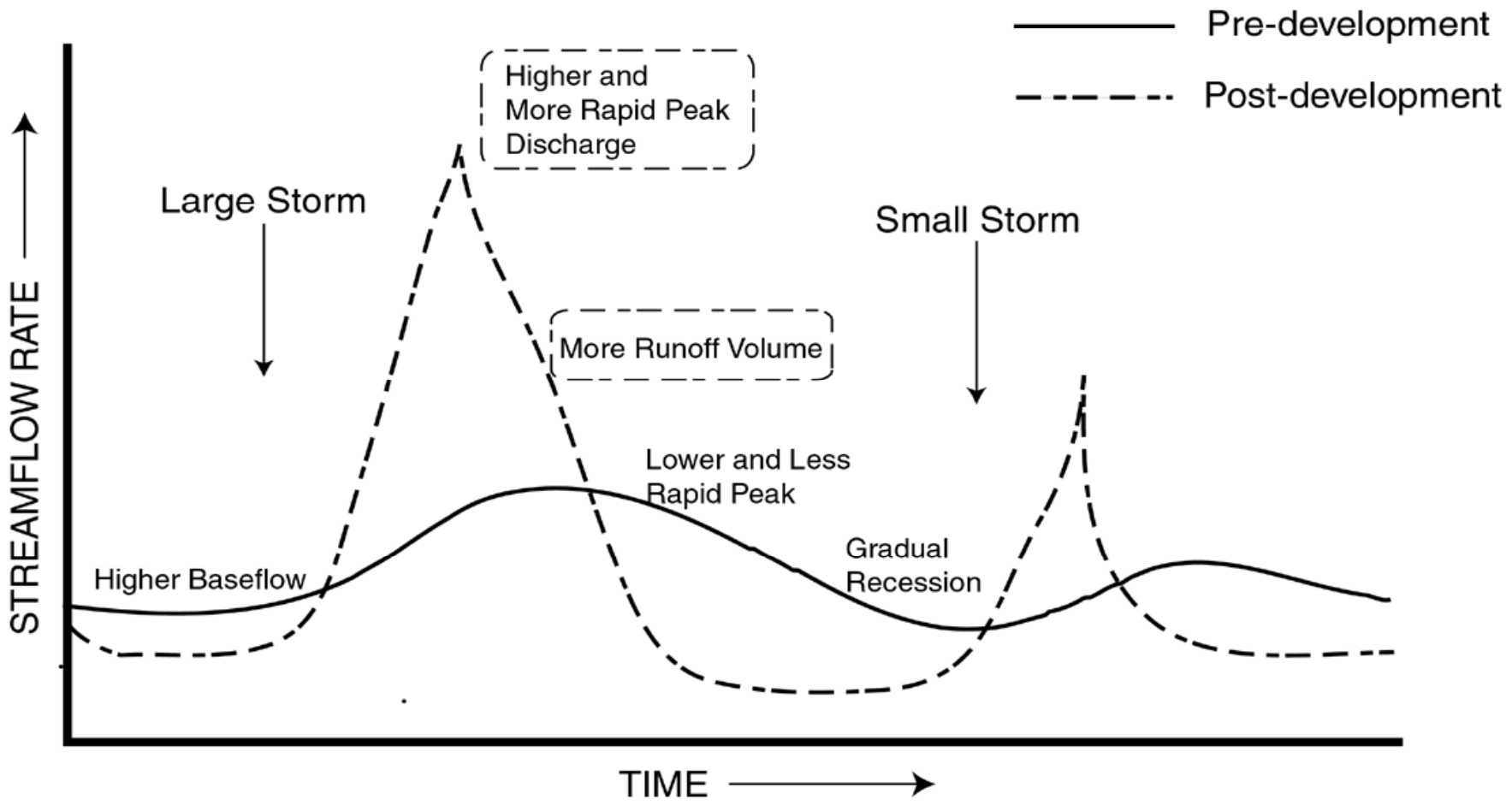


Development Impacts
– from lost soil infiltration and increased impervious surface



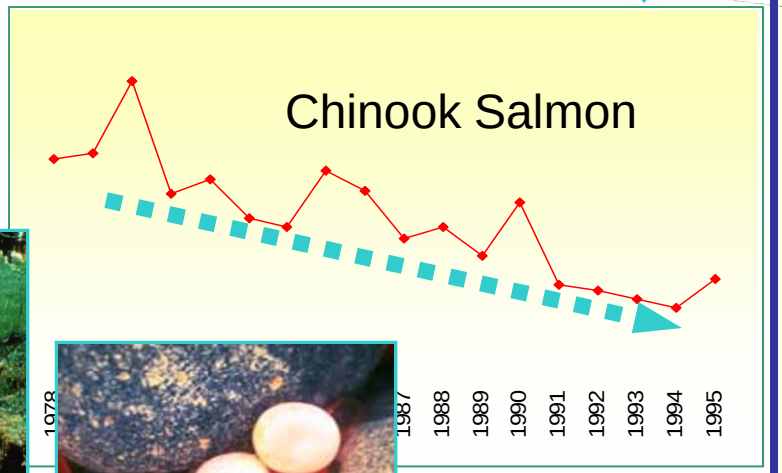
- ↑**runoff = ↑peak storm flows**
- ↑erosion of stream bank and bed
- ↑fine sediment choking spawning gravels
- ↑pollutants (from cars, landscape chemicals)
- ↓**groundwater recharge**
- ↓summer low flows in streams
- ↑summer stream & estuary temperature
- ↓oxygen
- ↓habitat and food supply for young salmon

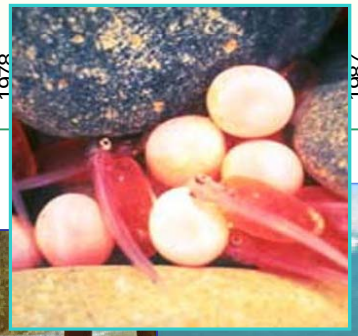
Changes in hydrology (runoff vs. infiltration) after development



Changes in stream hydrology as a result of urbanization (Schueler, 1992).

What are the impacts?





- Salmon decline
- Pollution
- Erosion
- Flooding & property damage
- Failing landscapes:
  - more chemical use,
  - higher summer water needs
- Combined sewer overflows (CSO's):
  - Where storm and sanitary sewers are <u>combined</u>, high rainfalls can cause overflows into nearest water body

How can we make our cities function hydrologically more like forests?

Make this…

Work like this

The solution: “Low Impact Development”

= “Green Stormwater Infrastructure”, required in new Seattle code

= “Natural Drainage Systems” in City projects

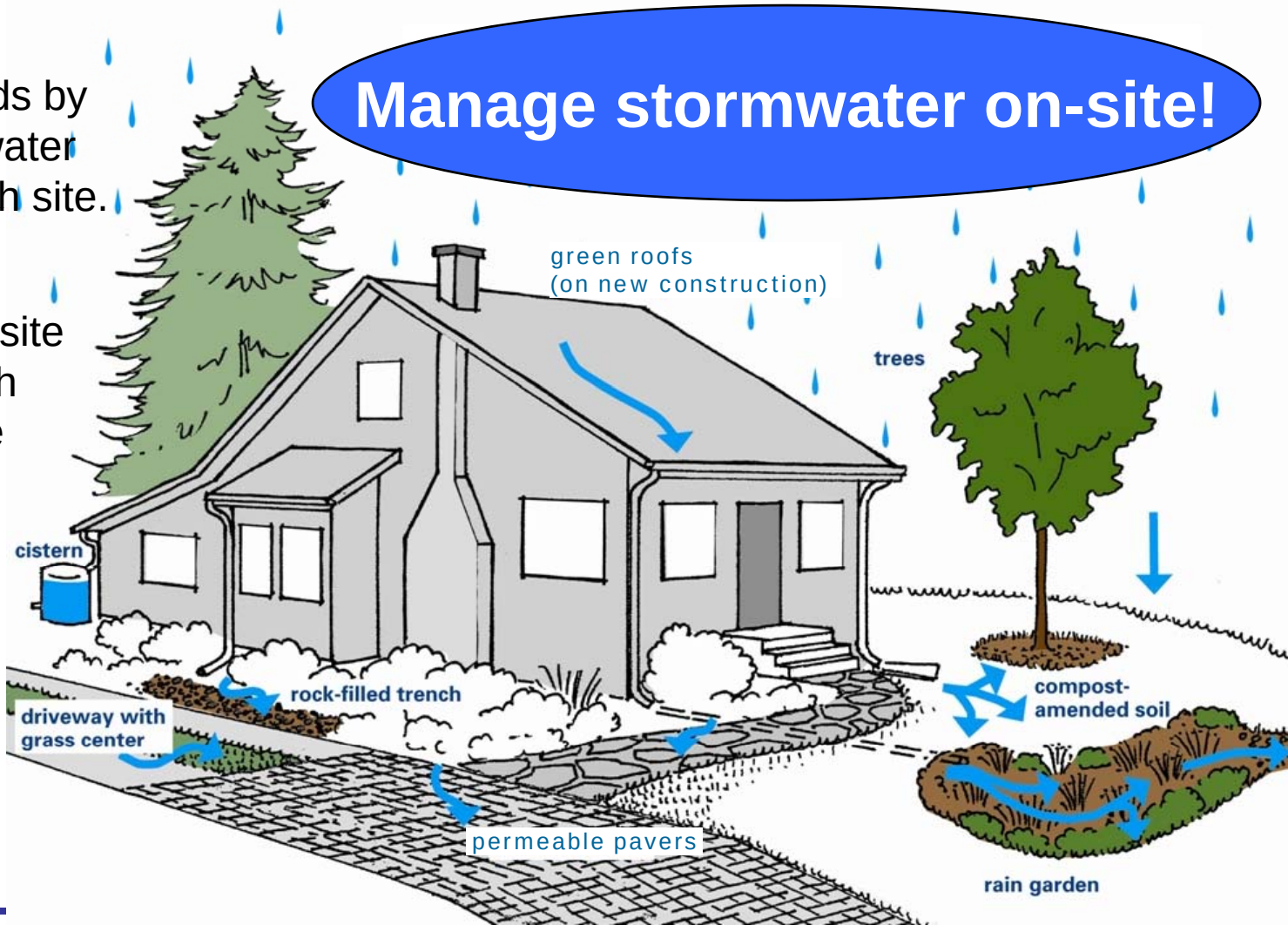
= “**Rain Wise**” for homeowner retrofits

Protect watersheds by managing stormwater upstream, on each site.

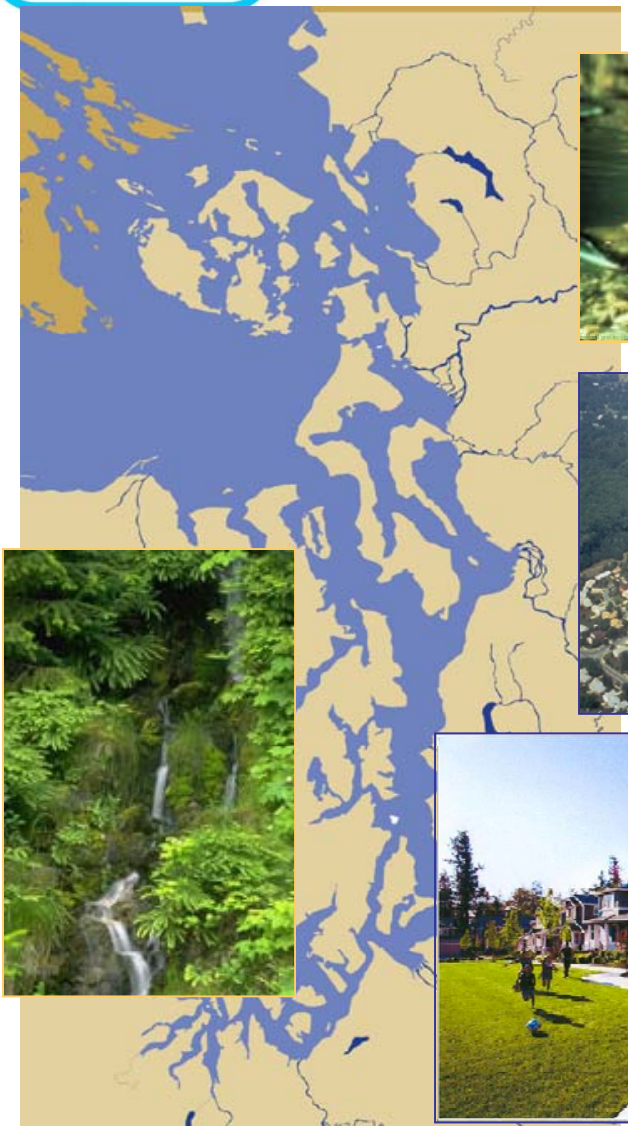
Try to restore pre-development site hydrology, through distributed on-site detention and infiltration.

Rainfall:

- *slow it*
- *spread it*
- *filter it*
- *soak it in.*



Why We Need Low Impact Development around Puget Sound

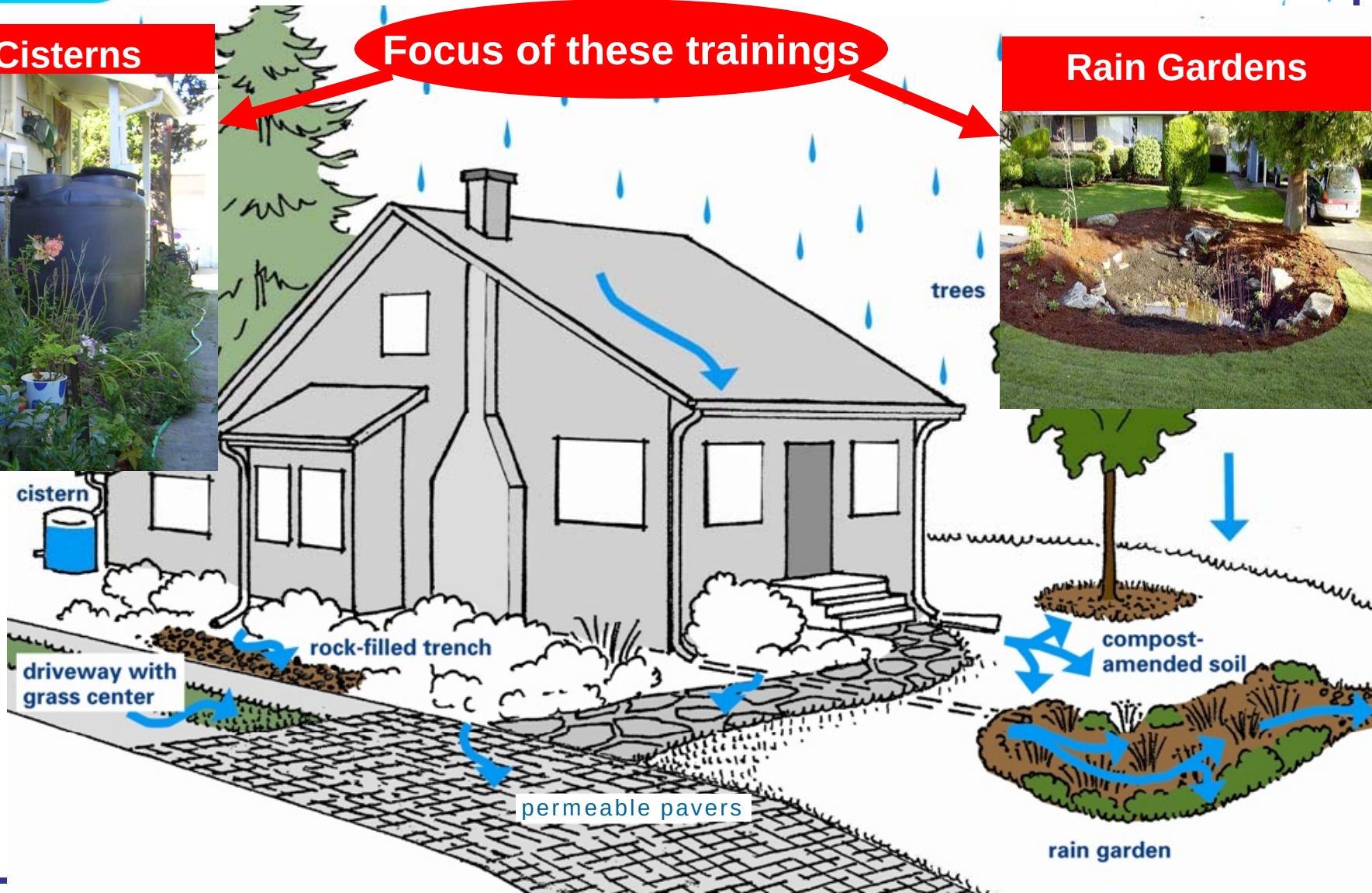


- Protect our streams, lakes, & Puget Sound
  - Fish & wildlife habitat
  - Watershed hydrology
  - Water quality
- Reduce stormwater infrastructure costs
  - CSO reduction
  - Flood protection
  - Water quality treatment
- Reduce both flooding and drought damage
- Make our communities more attractive & livable

The Rain Wise Toolbox in Seattle

for homeowner stormwater retrofits

Cisterns

Focus of these trainings

Rain Gardens