

Why Green Roofs and Cisterns?

Stormwater Challenges in Urban Landscapes, and the Toolbox of Solutions



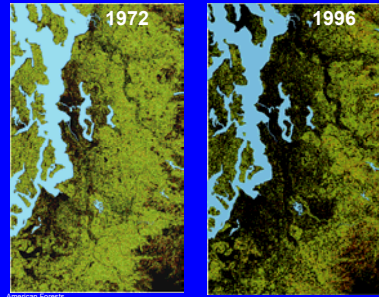
David McDonald
Seattle Public Utilities
david.mcdonald@seattle.gov
introduction to the seminar
**Green Roofs and Cisterns:
A Practical Design Workshop**
UW Center for Urban Horticulture 3/15/06

- 1. GREEN ROOF
- 2. GREEN ROOF WITH CISTERN
- 3. GREEN ROOF WITH CISTERN AND PERMEABLE PAVEMENT
- 4. GREEN ROOF WITH CISTERN AND PERMEABLE PAVEMENT AND BIOMAT
- 5. GREEN ROOF WITH CISTERN AND PERMEABLE PAVEMENT AND BIOMAT AND BIOMAT
- 6. GREEN ROOF WITH CISTERN AND PERMEABLE PAVEMENT AND BIOMAT AND BIOMAT AND BIOMAT
- 7. GREEN ROOF WITH CISTERN AND PERMEABLE PAVEMENT AND BIOMAT AND BIOMAT AND BIOMAT AND BIOMAT
- 8. GREEN ROOF WITH CISTERN AND PERMEABLE PAVEMENT AND BIOMAT AND BIOMAT AND BIOMAT AND BIOMAT AND BIOMAT

The Stormwater Problem:

Impacts of turning spongy forests into cities

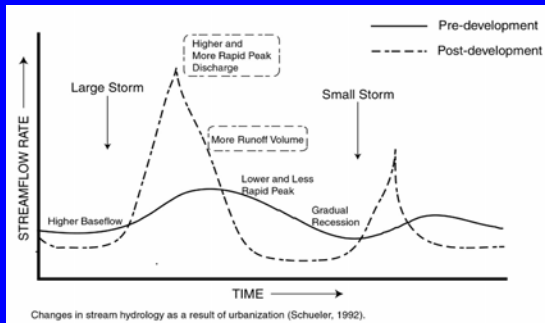
1972-1996: Amount of land with 50% tree cover decreased by 37% in Puget Sound region (from 42% of land down to 27%).



Impervious surface (roads, buildings) increased proportionately.

WA population doubled 1962-98.
2.7 million more people by 2020!

Changes in hydrology (runoff vs. infiltration) after development

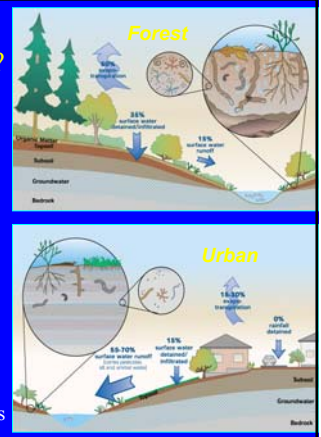


What happens as we turn forests into cities?

- Soil compaction and topsoil loss = much less infiltration
- Loss of tree interception and evapotranspiration

cause:

- ↑ runoff
- ↑ peak flows
- ↓ groundwater recharge
- ↑ bank erosion, sediment
- ↓ summer flows
- ↑ summer stream temperature
- ↓ biofiltration of pollutants
- ↑ need for irrigation, chemicals



What are the impacts?

- Salmon decline
- Pollution
- Erosion
- Flooding & property damage
- Failing landscapes



What does current science tell us?

- Biological integrity of streams decreases rapidly when total impervious area in watersheds exceeds 5-10%.
- Traditional stormwater detention structures in developed areas are insufficient to prevent storm damage to streams.
- Salmon are in trouble unless we change our development practices.
- We need to:
 - decrease construction footprint
 - preserve native soils and forests
 - maintain natural “buffer zones” along streams
 - restore ability of disturbed soil and vegetation to detain and infiltrate rainwater
 - decrease effective impervious area (roads & roofs)



The solution: Turning Stormwater into an Asset

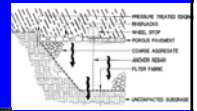
- **The Goal:** Onsite management of stormwater quantity and quality that mimics predevelopment site function

Try to make this..... function like this.



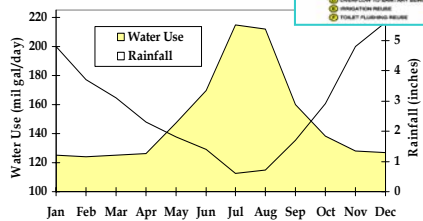
Low Impact Development: A Toolbox of Solutions, for a Variety of Sites

- Site protection and soil amendment
- Swales for infiltration and bio-filtration
- "Rain gardens" (bio-retention cells)
- Permeable paving
- Cisterns
- Green roofs



Added benefits of Cisterns

Harvest rainwater for reuse, inside and outside



Use water from our wet winters to supplement our dry summers

Added benefits of Green Roofs

- Slow and filter runoff
- Cooler and warmer:
 - reduces heat-island effect
 - reduces heating and cooling needs
- Quieter inside
- Extends life of roof membrane (protects from UV and thermal expansion/contraction)
- Improved health, well-being, productivity of inhabitants (documented in offices, hospitals)



More benefits

- Regulatory/code: credits being defined in Seattle and elsewhere, mainly in stormwater code.
- Green building: credits in both LEED® and Built Green®
- Marketing advantages to green customers.

download and share these presentations, online at:

<http://depts.washington.edu/urbhorth/html/education/stormwater.htm>

