Why Green Roofs and Cisterns?
Stormwater Challenges in Urban Landscapes, and the Toolbox of Solutions

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Introduction to the seminar:
Green Roofs and Cisterns: A Practical Design Workshop
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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:

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

↑ 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)

What happens as we turn forests into cities?

Forest
Urban

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• Loss of tree interception and evapotranspiration

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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.

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