

Oregon's Phytotechnology Toolbox for Urban Stormwater Management



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SPROut Director

Photo: PDX Bureau of Environmental Services' Water Lab

So, once upon a time . . .



We developed a problem





IMPERVIOUS LAYER
(i.e. Roads, Parking Lots, Rooftops)

NATIVE SOIL

Conventional Grey Infrastructure

Portland's Tunnel System for Sanitary and Storm Flows





We developed a problem





A single green plant can simultaneously link together 4 major media systems that define our world- water, soil, air, and sun energy

The Oregon Garden Wetlands





The Oregon Garden Wetlands



2000



2008



2002/3

'Putting Plants to Work'

for environmental sustainability and economic development



Mission:

- To develop and promote the strategic use of plants (phytotechnology)
- To provide ecosystem services and solve environmental challenges in managed landscapes
- To serve as Oregon's phytotechnology resource center

SPROut integrates resource networks

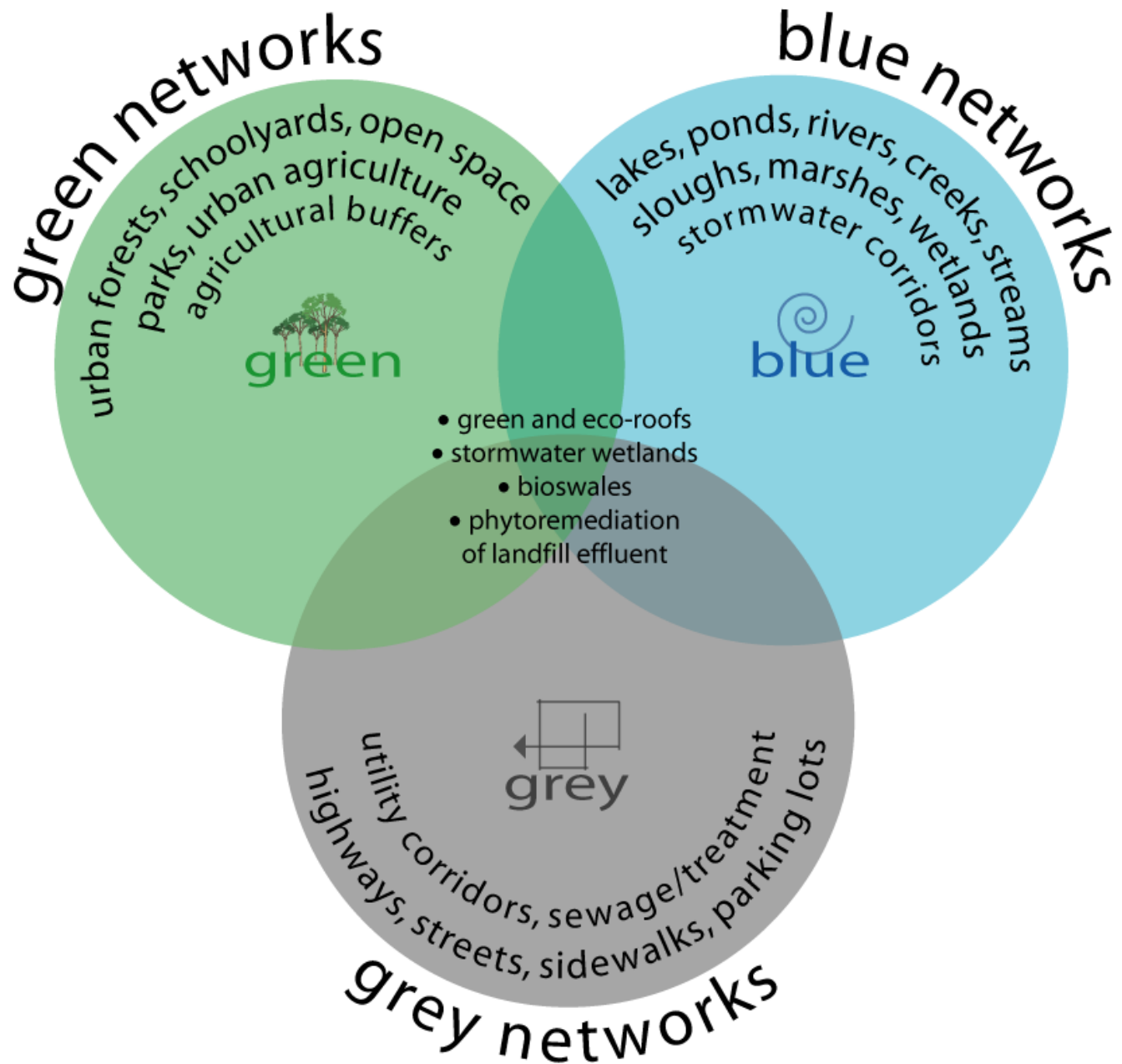
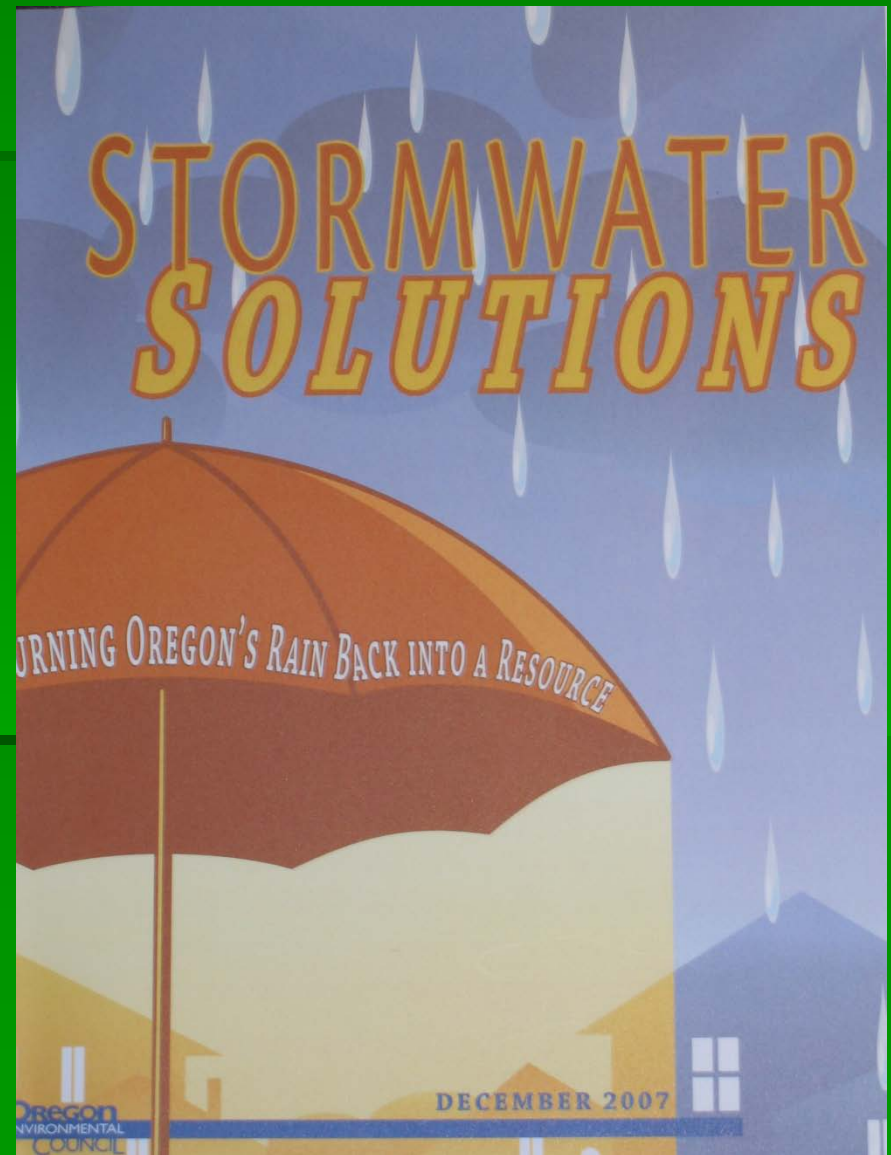


Diagram by
Rene Kane
for SPROut

Oregon Environmental Council

- Input from statewide professional team
- Two-pronged solution
- Regulatory context
- Barriers to overcome
- Recommendations
- Potential funding sources



Edible Skylines- Erin Altz

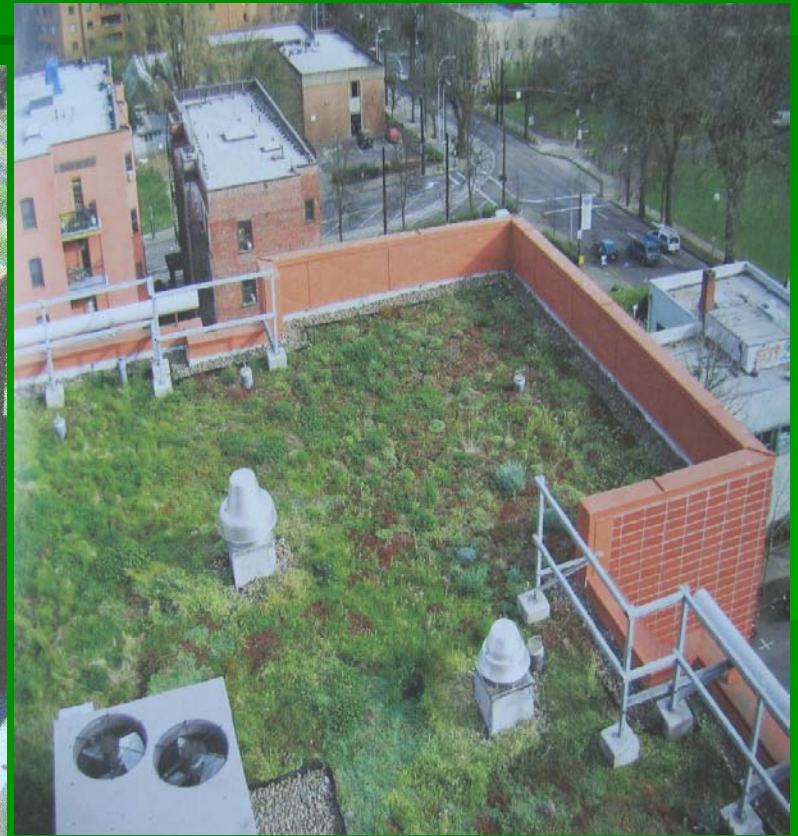


- A psychology alumna from PSU saw an opportunity to create a business using growing greenroof infrastructure for multiple benefits

Tom Liptan's Garage Ecoroof installed 1996



Green Roof Examples



Hamilton Apartments in Portland, Oregon

Photos courtesy of the City of Portland



Portland Building Ecoroof

Portland Building Penthouse Ecoroof





M Financial Ecoroof

Pushing the Envelope on Low-Tech



- Pringle Creek greenroof has an unheard of price tag at \$5/sq ft
- PVC membrane plus growing media plus plants

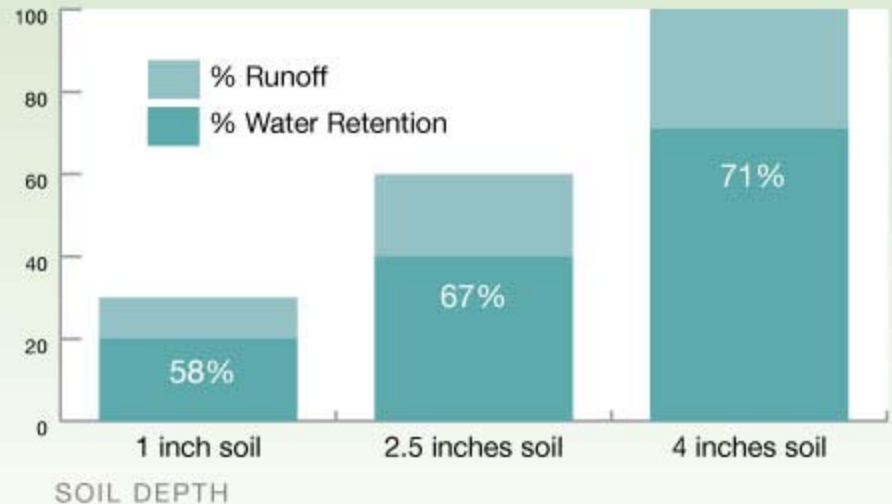
Columbia Green-Made in Oregon

- Modular greenroof tray system that promotes SW retention rather than drainage
- Downtown Library Greenroof
- City Hall might be next



Green Roof Water Retention

Annual Water Retention Capacity



OR Greenroof Research Nuggets

- City of PDX has 2 monitored roofs
- OSU Greenroof Research Center
 - Plant performance beyond sedum
- OR BEST
 - Built Environment and Sustainable Technologies-Signature Research Center
 - Current focus on patentable hard products and energy
- PSU
 - Energy performance of wet vs dry greenroofs and the use of biochar
- Regional Research Collaborative
 - Organizing and publicizing small research, such as the SPROut roofs

SPROut Greenroofs



Pump house roof
featured in National
Geographic's GR
spread in May 2009!





Beyond greenroofs

Other forms of LID and sustainable stormwater tools

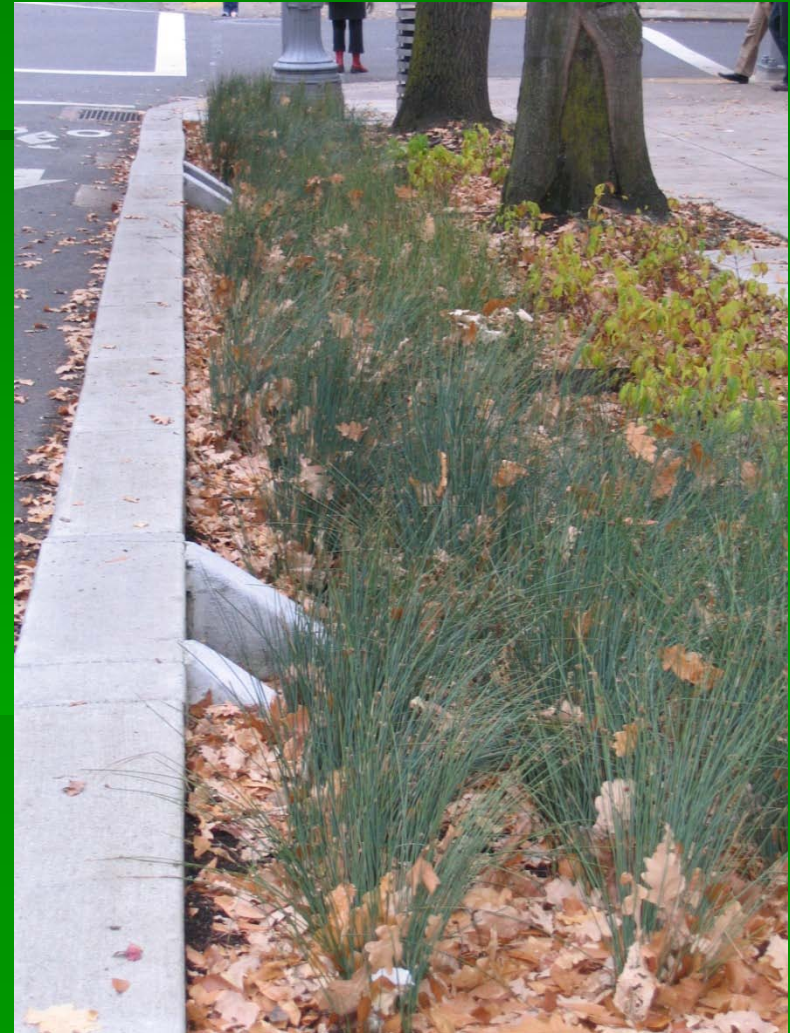
Focus on SW quantity reduction with assumption that WQ is also improved, referencing work by the Center for Watershed Protection (in MD) and the intl LID database by EPA

Demonstration Greenstreet



NE 35th and Siskiyou

Downtown PDX Greenstreets



Flow Testing

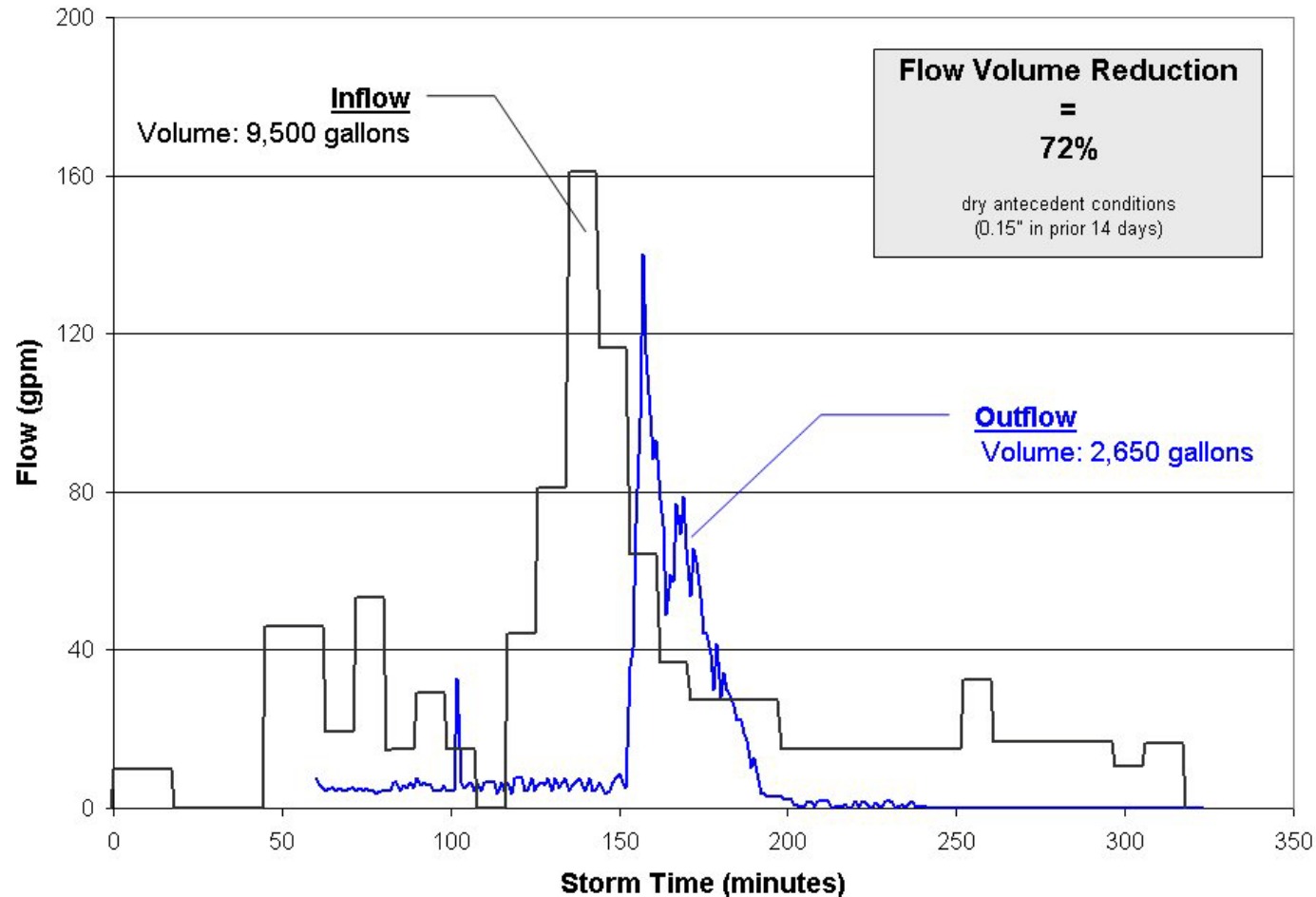


Flow Testing Results

SW 12TH & MONTGOMERY GREEN STREET

DATE: August 31, 2006

TEST: Summer 6 (CSO) Simulation



Fred Meyer remodels



Modifications on the Tom Liptan flow-through planter design

There are over 1,000 of these in PDX

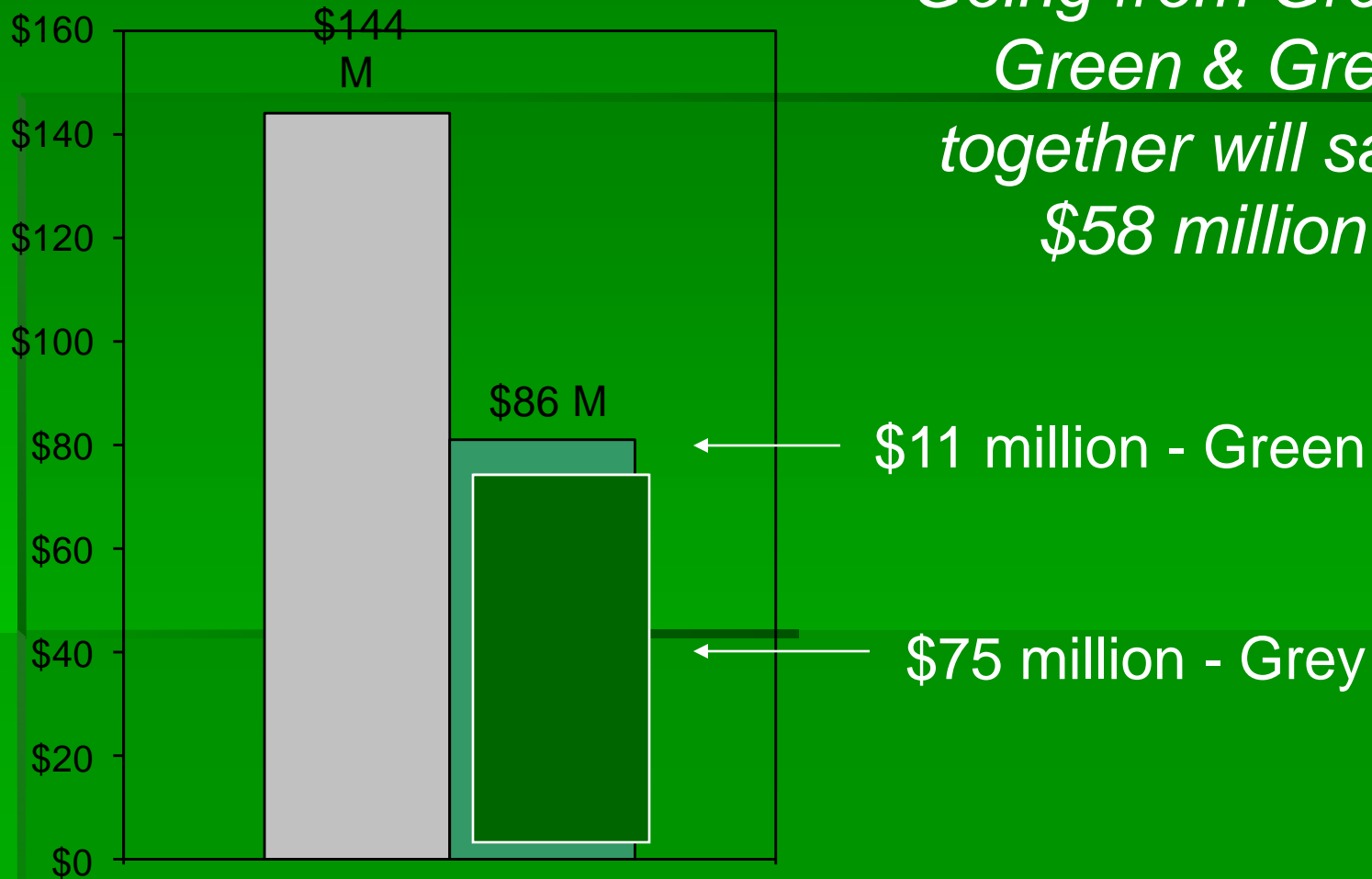


A Few of the Incentives

- Points toward LEED certification
- FAR bonus for greenroof development tax credit
- Clean River Rewards Program
- \$5/ sq ft for greenroof construction
- Cost savings

Portland - Brooklyn Creek Basin

*Going from Grey to
Green & Grey
together will save
\$58 million*



OSU Extension-

The Oregon Raingarden Guide: landscaping for clean water and healthy streams

Design guidelines:

- 10% rule with min 0.5
inch/hr infiltration rate and
min 6 inch depth
- designed to dry out in 24 hrs
- amended soil
- do not plant like a wetland



Glencoe Elementary Raingarden



East Multnomah SWCD Raingarden



PCC Annex Bioswale



PSU swale



Mt Tabor School Rain-garden

Before

reduces city sewer
Infrastructure rehab.
costs and improves
school property and
reduces heat island
effect...



After



Headwaters Raingarden and daylighted creek

Headwaters Raingarden





Living Walls



Rogue Six-Pack Experiment with SW

- Built by Rogue Water and students
- Water treatment plus crop production



Results: Water

	Input	Output	Change
Cu	0.0817 mg/l	0.0055 mg/l	- 93%
Pb	ND	n/a	
Zn	0.134 mg/l	0.012 mg/l	- 91%
pH	7.62	7.78	
TSS	336 mg/l	ND <4 mg/l	- 99%+

Detention time = 11 days (rationale for timing was convenience)



Eco-Reactor Research System



To treat agricultural SW run-off while producing crops

Floating Island Loan Program

- Coming in 2010
- Allows nurseries and farmers to test solution before investing in capital infrastructure
- We get research data



Soak It Up 2009

Water and ecology experts were
Keynote Speakers!

- Gerould Wilhelm, Conservation Design Forum, Inc.
- Dave Maciolek, Worrell Water Technologies
- Eli Cohen, Ayala Water and Ecology, Israel
- Paul Stamets, Fungi Perfecti LLC

70 attendees; 16 presenters;
Greenroofs 101; Raingarden
Workshop; Constructed Wetlands Tour

Conference Announcement

Soak It Up:

Phytotechnology Solutions for Water Challenges

March 30, 31, April 1, 2009

at The Oregon Garden Resort, Silverton, Oregon

Wastewater and stormwater management practices can benefit from the strategic use of plants.

Are you an Engineer, Landscape Designer, Environmental Consultant, City Planner, Scientist, or Grower?

Connect and converse with industries that affect your work.

Hear presentations on plant science (physiology of uptake, nutrient cycling), current research (regional and international), design and practical applications, regulations, and incentives.

Attend a rain garden workshop, a green roof workshop, and a constructed wetlands tour.

Hear from world-renowned water and ecology experts:

Gerould Wilhelm, Conservation Design Forum Inc.
Dave Maciolek, Worrell Water Technologies
Eli Cohen, Ayala Water and Ecology
Paul Stamets, Fungi Perfecti LLC

To view the entire agenda and register for the conference, visit

www.SPROutOregon.org/events

Questions? Call Renee Stoops at 503-584-7252

Register before March 6 for the early bird discount!

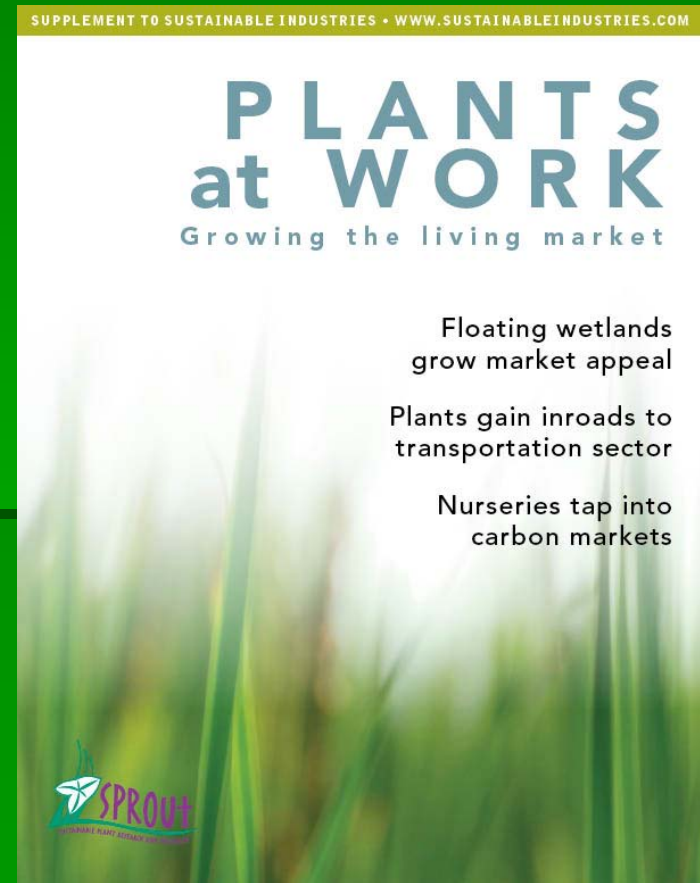
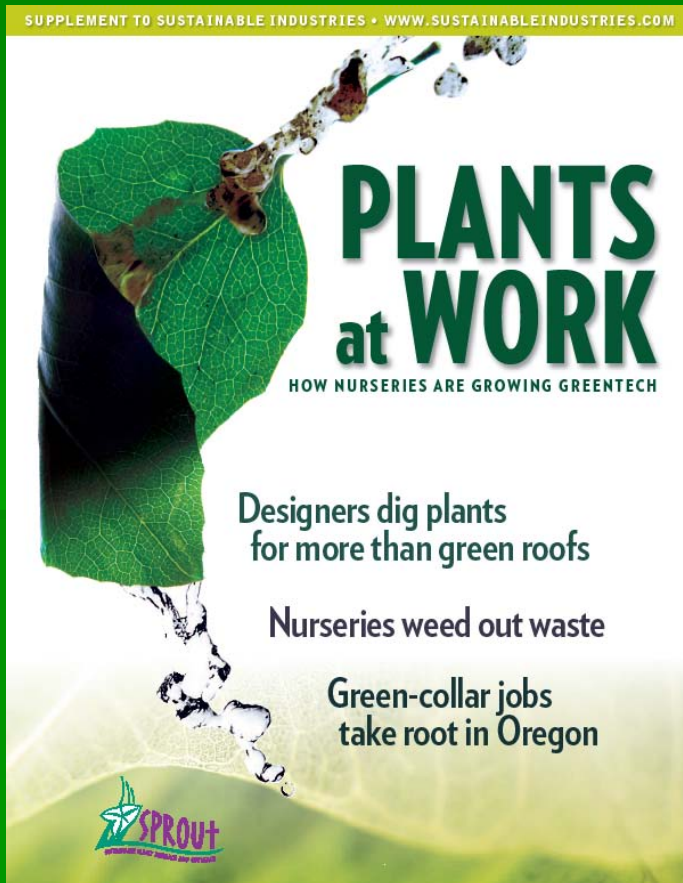


Putting Plants to Work: An Oregon Phytotechnology Resource Guide for Clean Water, Clean Soil, Clean Air



- Plant physiology primer/mechanisms of phytoremediation
- History and international context
- Oregon's efforts
- Water
 - Stormwater
 - Conventional treatment
 - Pollutants of concern
 - Plant mechanisms
 - Tools at landscape scale
 - Research
 - Laws and regulations and incentives
 - Wastewater
- Soil / Air
- Organization profiles
- Education / Training / Certifications

PAW Supplements to SIJ





Listen to their stories . . .





Thank-you!

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