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SUSTAINABLE TECHNOLOGIES

Filtrexx FilterSoxx: Performance & Design

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Ecosystem Scientist

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OUTLINE

- Stormwater Management
- Compost - What, Why, & How it Functions
- Performance of FilterSoxx™
- Design for FilterSoxx™

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Land Use = Hydrology = Pollutant Load = Water Impairment

Source: Sego Jackson, 2001

*water that travels just below the surface

75% of Us Live Near Polluted Water

- Turbidity/TSS - Clay & Fine Silt Sediment (5100 streams)
- Coliform bacteria
- Metals – Cu, Cd, Cr, Ni, Pb, Zn
- Nutrients – N & P
- Petroleum Hydrocarbons - Motor Oil, Diesel Fuel, Gasoline (polycyclic aromatic hydrocarbons)

During construction why do we target only sediment?

- No Stabilization (disturbance) = Big Load,
- Other pollutants attach to sediment,
- Post-construction, however….
- Sedimentation is #1 source of water pollution in the US (USEPA)

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Sediment Control/ Stormwater Filter BMPs

- Silt Fence
- Straw Bale
- Mulch Berm
- Fiber Rolls
- Straw Wattles
- Active Treatment Systems
- Chemical Treatment
- Stormwater Ponds

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Federal & State Agency Approval

- US Environmental Protection Agency (EPA) National Menu of BMPs
- USDA Natural Resources Conservation Service (NRCS)
- US Army Corp of Engineers
- American Association of State Highway Transportation Officials (AASHTO)
- Nearly all State DEP/EPA/DNR & State DOT Agencies

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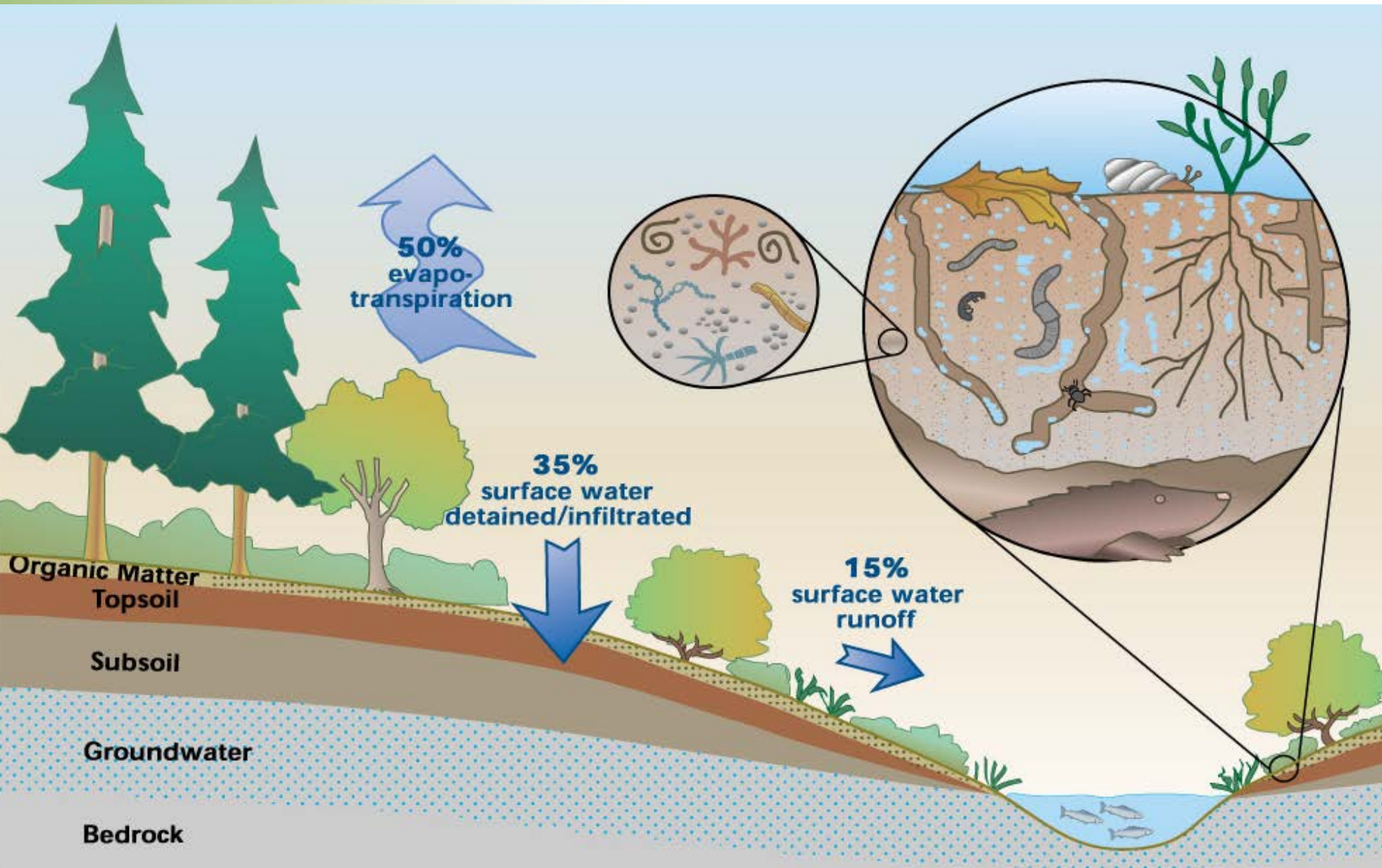
Natural Stormwater Management



Filtrexx Compost BMPs

Erosion & Sediment Control

1. Perimeter Control
2. Inlet Protection
3. Ditch Check
4. Filter Ring/Concrete washout
5. Slope Interruption
6. Runoff Diversion
7. Vegetated Cover
8. Erosion Control Blanket
9. Sediment Trap
10. Pond Riser Pipe Filter

Low Impact Development

11. Runoff Control Blanket
12. Vegetated Filter Strip
13. Engineered Soil
14. Channel Liner
15. Streambank Stabilization
16. Biofiltration System
17. Bioretention System
18. Green Roof System
19. Living Wall
20. Green Retaining Wall
21. Vegetated Rip Rap
22. Level Spreader
23. Green Gabion
24. Bioswale

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What is a Compost Filter Sock?

Sock Specifications

Diam.	8 in	12 in	18 in	24 in	32 in
Weight	13 lbs/ft	32 lbs/ft	67 lbs/ft	133 lbs/ft	200 lbs/ft
Flow	7.5 gpm/ft	11.3 gpm/ft	15 gpm/ft	22.5 gpm.ft	30 gpm/ft
Mesh openings	1/8-3/8 in	1/8-3/8 in	1/8-3/8 in	1/8-3/8 in	1/8-3/8 in

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Compost Tools

Filter Media

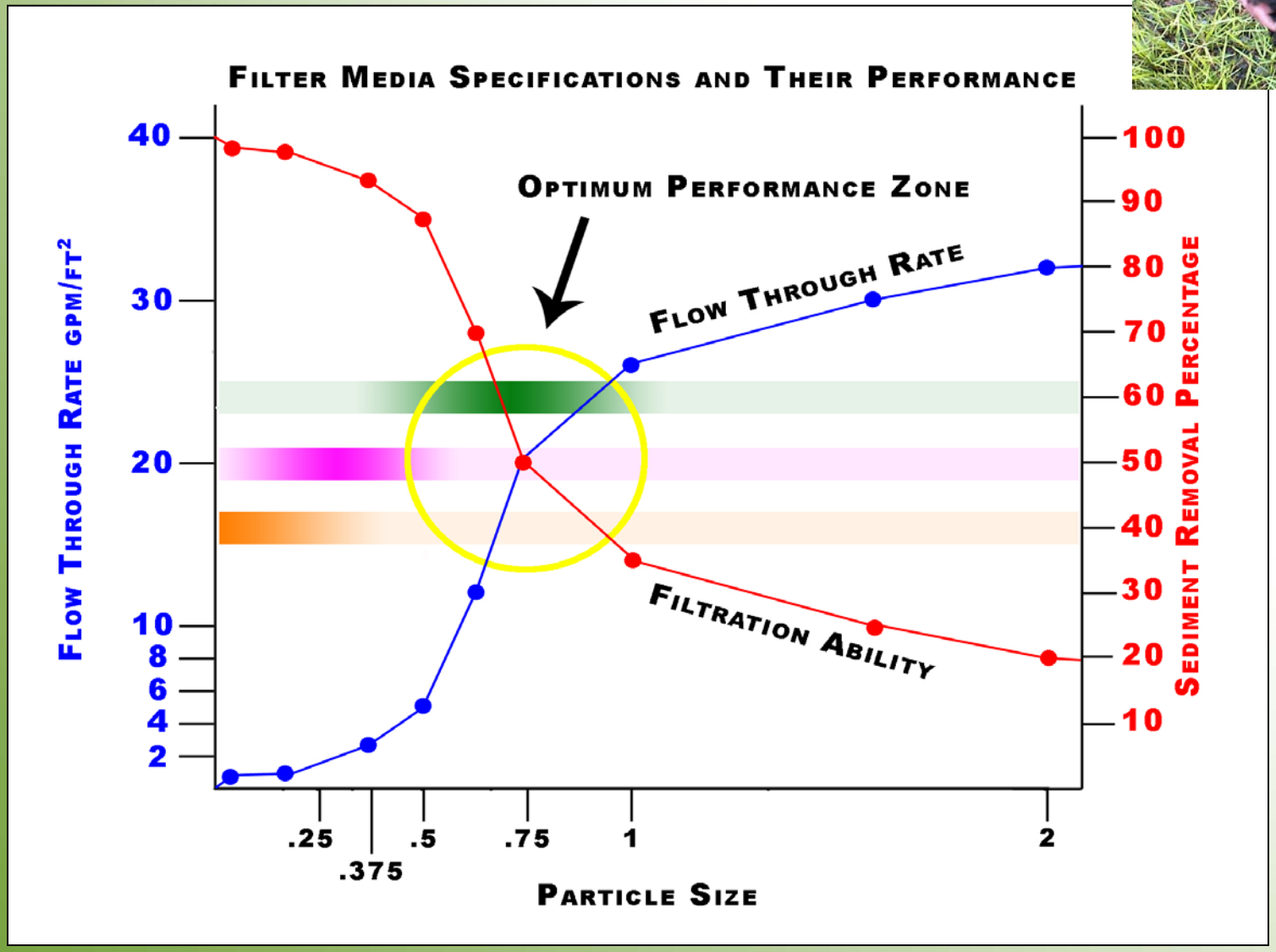
- Designed for Optimum Filtration & Hydraulic-flow

Growing Media

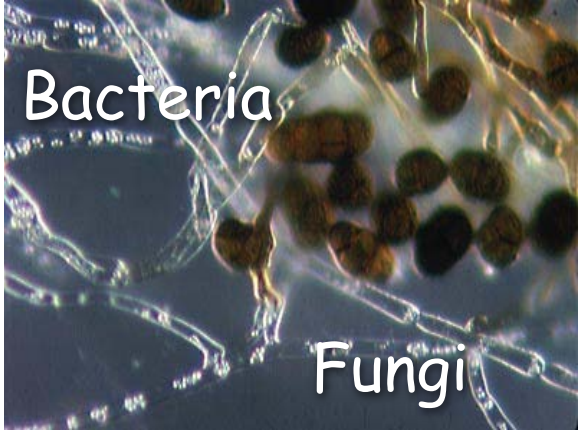
- Designed for Optimum Water Absorption & Plant Growth


Filtration
Devices use
Filter Media

Particle Size Specifications



Compost Sock 3-Way Biofiltration



- Physical
  - Traps sediment in matrix of varying pore spaces and sizes
- Chemical
  - Binds and adsorbs pollutants in storm runoff
- Biological
  - Degrades various compounds with bacteria and fungi

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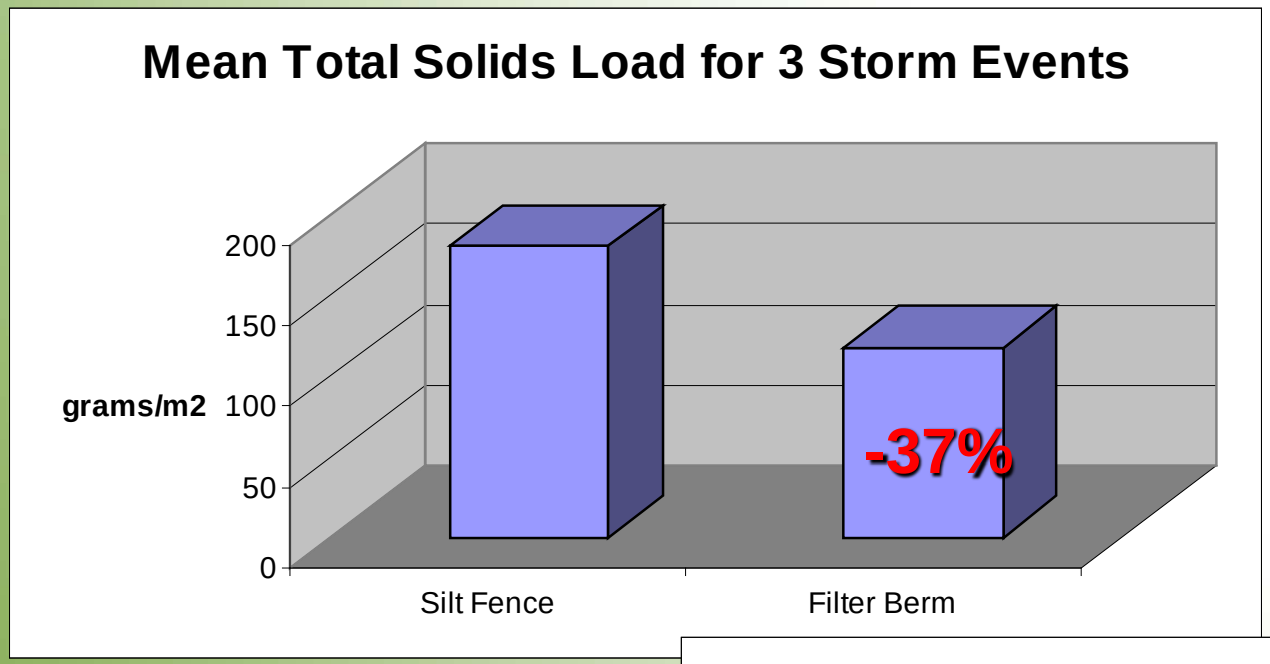
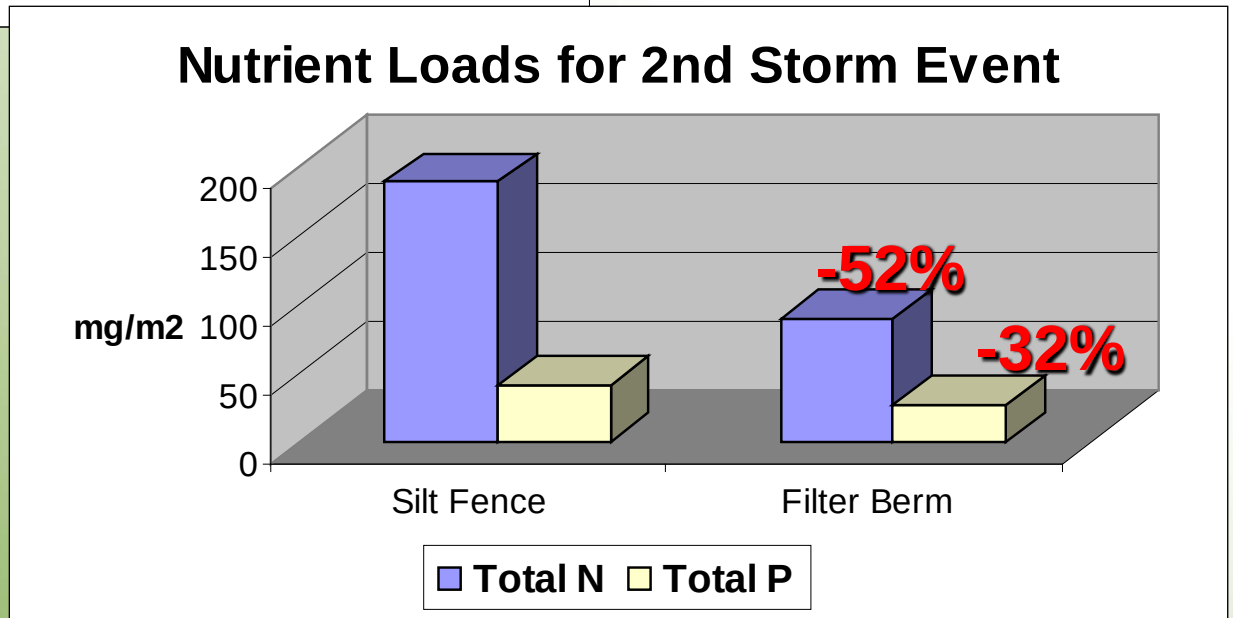
Silt Fence vs. Filter Berm



The University of Georgia

✓All Plots used Hydromulching



Sediment Summary

% Reduction of TSS & Turbidity

Treatment	TSS	Turbidity
Silt Fence	67	52
Filter Sock	78	63

* Based on rainfall of 3.0 in/hr for 30 min; runoff sediment concentration (sandy clay loam) of 70,000 mg/L.

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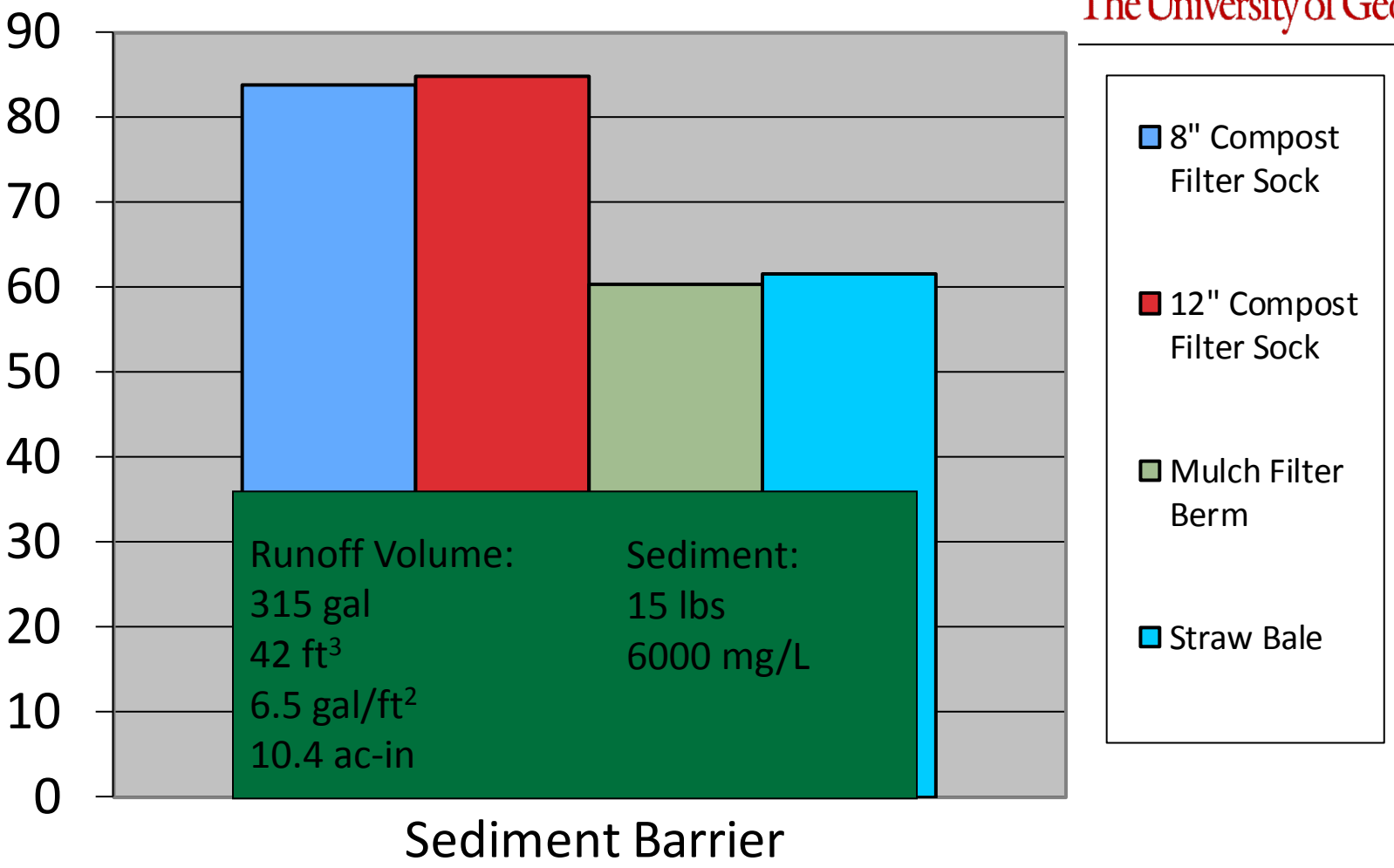
% TSS Reduction of Sediment Barriers

The University of Georgia



TS Reduction of Sediment Barriers

SAN DIEGO STATE UNIVERSITY	Runoff Exposure	Sediment Exposure	Removal
Filter Sock	•260 gal •1.7 g/ft^2 •2.75 ac-in	•850 lbs •150 lbs/ft^2 •125 t/a	77%
Silt Fence	•260 gal •1.7 g/ft^2 •2.75 ac-in	•850 lbs •150 lbs/ft^2 •125 t/a	72%
Straw Wattle	•260 gal •1.7 g/ft^2 •2.75 ac-in	•850 lbs •150 lbs/ft^2 •125 t/a	59%

ASTM 6459 for RECPs

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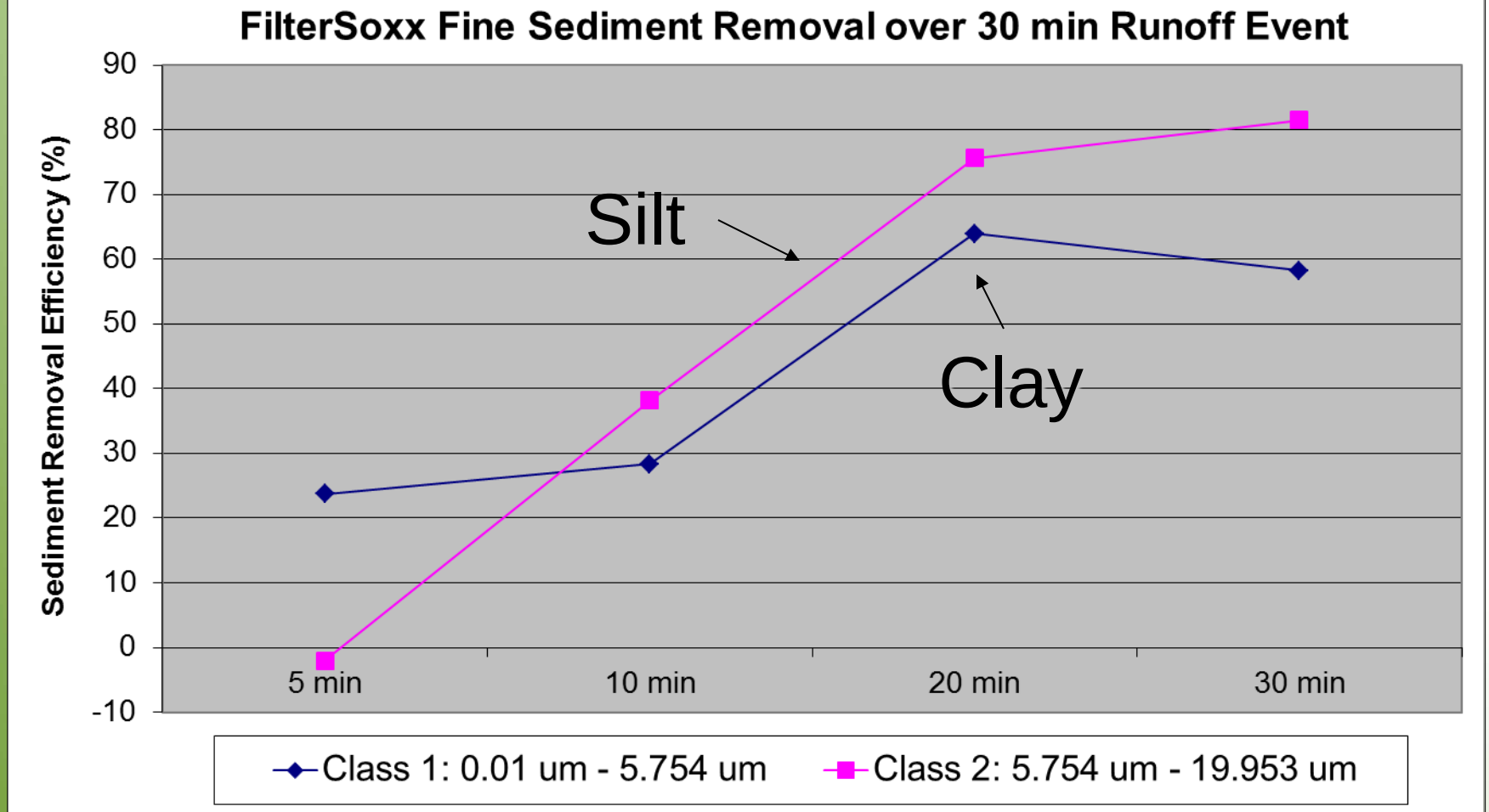
Fine Sediment Removal



Stormwater Pollutant Removal

	TSS	Turbidity	Total N	NH_4-N	NO_3-N	Total P	Sol. P	Total coli.	E. coli.	Metals	Oil	Diesel
Filter Sock	80%	63%	35%	35%	25%	60%	92%	98%	98%	37-78%	99%	99%

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Compost + Sorbents

- To target specific runoff pollutant
  - Fine Sediment
  - Nutrients (N & P)
  - Bacteria
  - Metals
  - Petroleum Hydrocarbons

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Hydraulic Design Capacity of Filter Socks & Silt Fence in Runoff Control Applications

H. Keener, B. Faucette, M. Klingman

Flow through rates were **<u>50 %</u>** greater for filter socks

12” Compost sock = 24” silt fence
18” Compost sock = 36” silt fence

THE OHIO STATE UNIVERSITY OARDC

Filter Sock Design Tool

Step 1: Choose units, **ft** or m		ft				
Step 2. Choose input: **Tr** or **I**		Tr				
total rainfall	**inches**	1.5	**storm duration**	**hours**	24	
Step 3. Choose input: **A** or **W**		W				
width of area	**ft**	400.00	**length of slope**	**ft**	250	43560
Step 4. Input slope	**%**	10				452.588
Step 5. Input reduction runoff percent	**%**	10				
		siltsoxx (8,12,18)	silt fence(24,30)			
Step 6. Input effective length of filter	**ft**	400	400			
Step 7. Input diameter/height of filter	**inches**	12	36			

Step 8. Find time to overflow filter and total flow/ft the filter can handle

Step 9. On figure find for given flow expected time to overflow filter.

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Part A. Evaluation of q_i

I inches/hr	A acres	s percent	Q gpm	L_{ss} ft	q_i gpm/ft
0.063	2.2957	10	58.15	400	0.145

Part B. Predicted time and total flow to top filter.

	q_o gpm/ft	D inches	Effective D inches	time overflow hr	total flow gal/f	Filter Okay time > tr
SiltSoxx™ (Coarse Material)	0.145	12	9.6	99.1	865	OKAY
Silt Fence	0.145	36	30.6	97.5	851	OKAY

USLE

Universal Soil Loss Equation

Predict Site Soil Loss!

$$A = R \times K \times \underline{LS} \times C \times \underline{P}$$

A = amount of soil loss (tons/ac/yr)

LS = Slope Interruption Socks

P (Compost Sock) = 0.25

Developed by USDA NRCS

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Sediment Trap Design

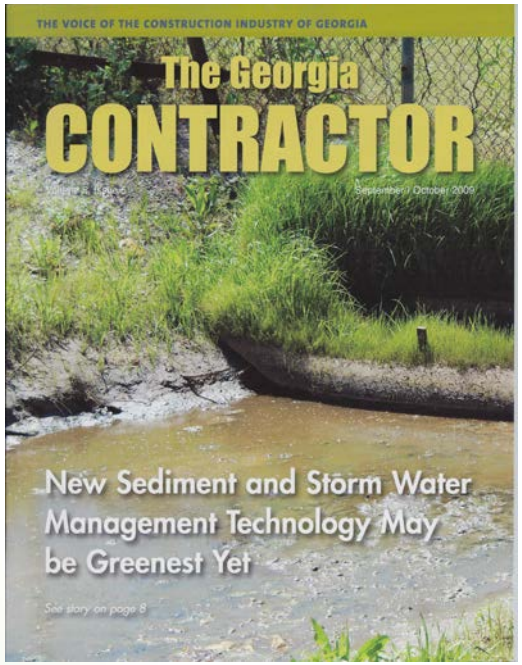
- Replaces conventional Sediment Traps
- Sediment barrier vs trap vs basin
- No excavation/earthmoving required
- Uses filtration AND deposition
- Pyramid stacking construction design

Reduce Footprint!

Save Land Area!

The Sustainable BMP

- 100% Recycled (compost)
- Bio-based, organic materials
- Locally manufactured
- Reduces Carbon Footprint
- Uses Natural Principles
- (Natural Capital & Ecosystem Services)
- High Performance



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*"....*an essential tool for engineers, designers, architects, regulators, planners, managers, contractors, consultants, policymakers, builders, and water resource managers."

– Forester Press

The Sustainable Site

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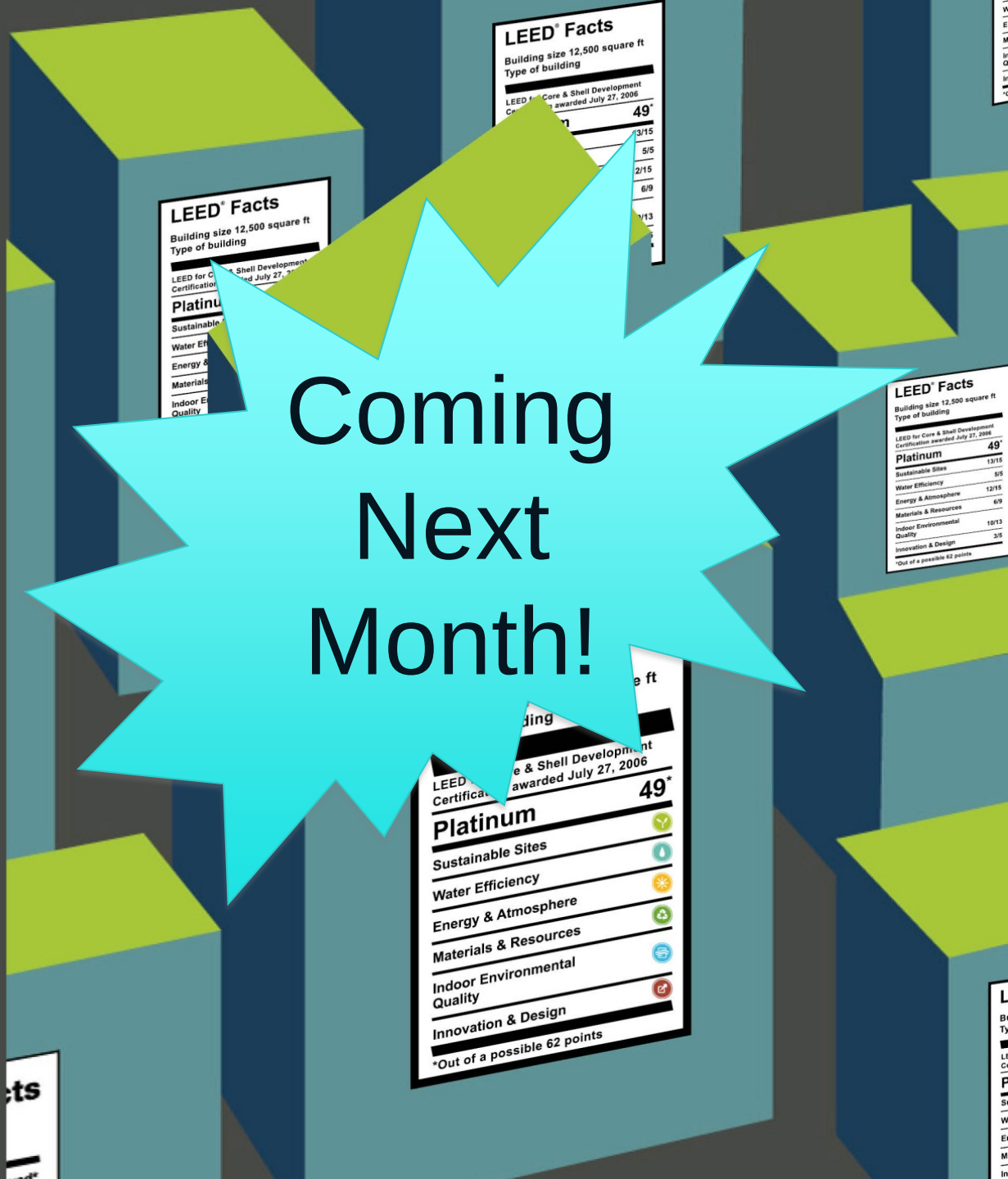
Leadership in Energy and Environmental Design

A leading-edge system for certifying the greenest performing buildings in the world



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