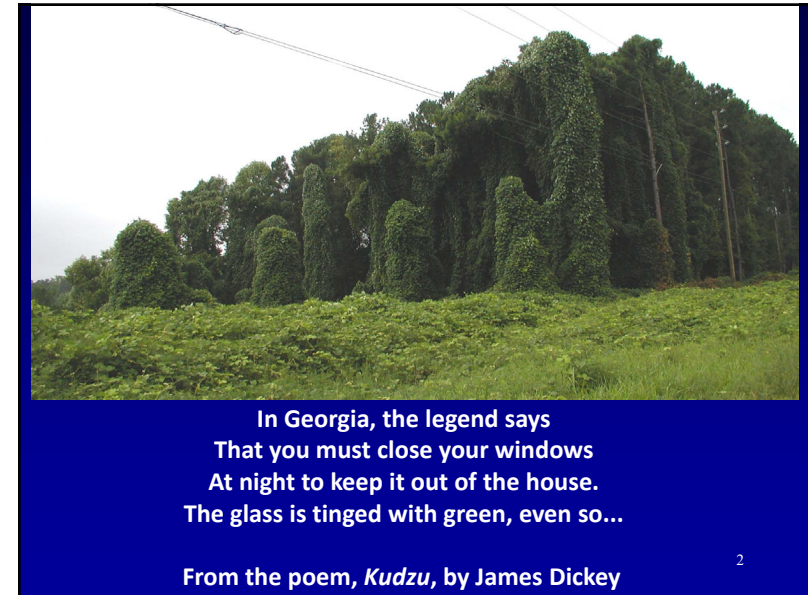


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Problems Associated with Erosion of Construction Sites

- Construction site erosion rates in the US range from about 20 to more than 200 tons per acre per year.
- These rates are about 3 to more than 100 times greater than erosion rates from croplands.
- Construction site erosion rates vary depending on local rain energy, soil, and topographic conditions, plus the use of effective erosion controls.

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Damages Property



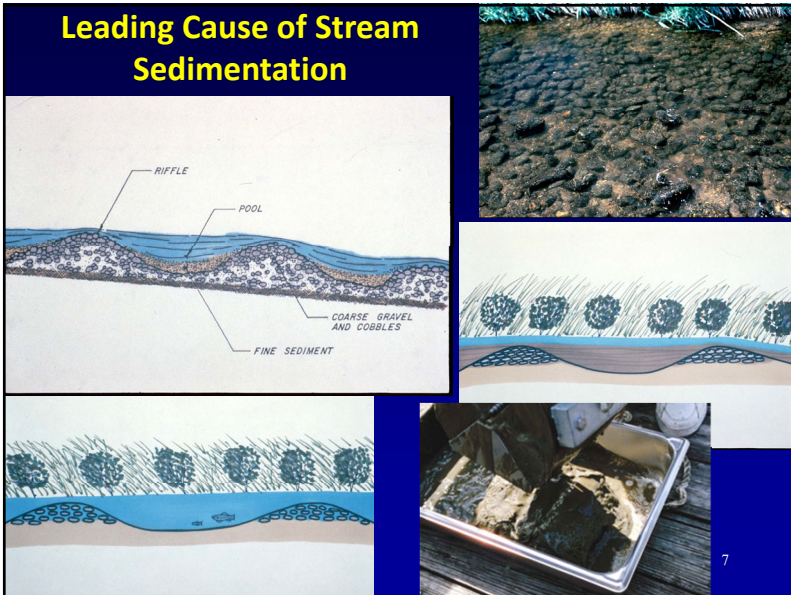
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Causes Bad Publicity and Ill-Will of Neighbors



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Leading Cause of Stream Sedimentation



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Clogs Culverts and Increases Flooding



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Recommended Controls for Small Construction Sites (EPA Guidance)

- Best control accomplished through proper planning, installation, and maintenance of controls.
- Non-Structural Controls:
 - Minimize disturbance
 - Preserve natural vegetation
 - Good housekeeping

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Recommended Controls for Small Construction Sites (cont.)

- Small sites have less space that prevent use of some controls, plus less access to qualified help.
- Structural Controls:
 - Erosion controls (mulch, grass, and stockpile covers)
 - Sediment controls (silt fence, inlet protection, check dams, stabilized construction entrances, and sediment traps)

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Birmingham Construction Site Erosion Runoff Characteristics (Nelson 1996)

	Low intensity rains (<0.25 in/hr)	Moderate intensity rains (about 0.25 in/hr)	High intensity rains (>1 in/hr)
Suspended solids, mg/L	400	2,000	25,000
Particle size (median), μm	3.5	5	8.5

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Characteristics of Construction Site Runoff

- The following table summarizes TSS and turbidity values from several research locations at construction sites.
- The values listed on this table were representative of conditions before any erosion and sediment controls.
- Typical TSS concentrations are about 6,000 mg/L, while typical turbidity values are about 3,500 NTU.
- These values are much greater than desired, with likely needed reductions of about 90 to 95% to achieve 250 mg/L TSS and 250 NTU turbidity, for example.
- The numeric effluent limits are dependent on local regulations and receiving water objectives, but these modest concentration limits are extremely challenging to meet at construction sites.

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Construction Site Runoff Characteristics (no controls)

	number of events X locations per treatment	TSS (mg/L) average	Turbidity (NTU) average
number	17 studies	15	7
average	12 events per site	6,511	3,237
min	1	1,665	2,279
max	42	15,201	3,813
COV		0.53	0.20

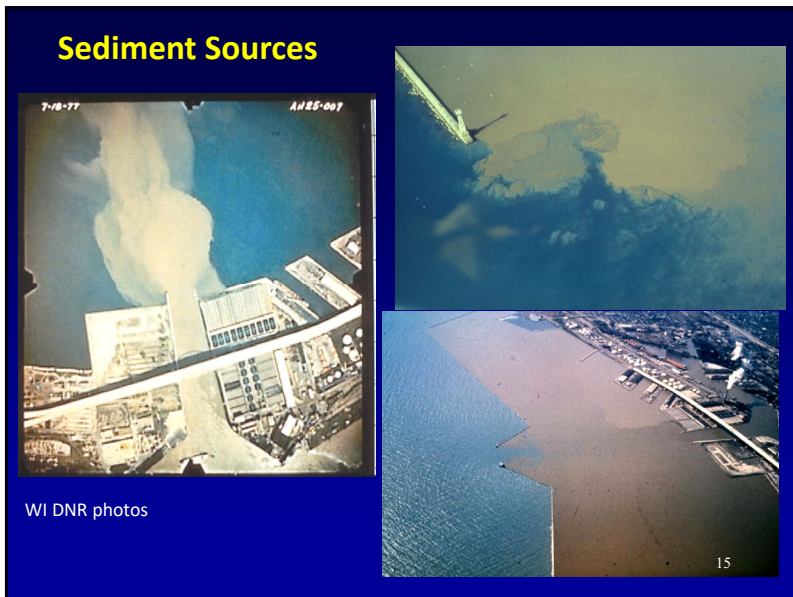
Pitt, et al. 2018)

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- ## Major Sediment Sources at Construction Sites
- Eroded slopes and channels
 - Long-term exposed/bare soil
 - Improper site activities and waste disposal practices
 - Unprotected storage piles
 - Construction activity near roadways
 - Construction in streams
- 16

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Slide 13

B1

Bob, 5/23/2018



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Sediment Sources Eroding Stockpiles



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Sediment Sources Improper On-Site Waste Disposal and Equipment Maintenance



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Sediment Sources Improper Site Clean-up



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Sediment Sources In-Stream Construction



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Erosion Controls General Approach

- Divert upland drainage
- Mulch exposed ground
- Control site discharges
- Good housekeeping
- Proper maintenance

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Typical Local Erosion Control Requirements (Storm Water Management Authority, Inc.)

- All surface waters flowing towards construction areas shall be either passed through the site in protected channels or diverted using berms or channels.
- All slope or fill areas which have been graded shall within 14 days of the completion of grading, or the completion of any phase of grading, be planted or otherwise provided with ground cover to restrain erosion.

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Typical Local Erosion Control Requirements (cont.)

- All upslope and downslope controls must be in place before any on-site construction begins.
- No visible floating scum, oil or other matter allowed in discharge.
- All controls shall be checked and repaired monthly and within 24 hrs after any rainfall at the site of 0.75 inch occurring within 24 hrs.

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Typical Local Erosion Control Requirements (cont.)

- The control plan must include the size of the disturbed areas and a schedule of the starting and completion dates of land disturbing activities.
- Written descriptions of controls and schedule of their implementation
- Description of procedures for proper storage, handling, and disposal of construction materials.

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Typical Erosion Control Plan Contents (Storm Water Management Authority, Inc.)

- Present contours and drainage facilities on property
- Drainage facilities on adjacent property
- Proposed contours after development (intervals of 2 ft, or less)
- Description of existing site conditions (erosion characteristics of soils, potential problem areas, soil stabilization specifications)

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Erosion Controls Diversion Channels and Berms



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Erosion Controls Protect Channels (Check dams and liners)



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Erosion Controls Slope Protection with Surface Roughening



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Erosion Controls Grass Selection Considerations

DISEASE TOLERANCE	DROUTH TOLERANCE
high tall fescue ryegrass kentucky bluegrass red fescue low bentgrass	high tall fescue red fescue kentucky bluegrass ryegrass low creeping bentgrass

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Erosion Controls Supplemental Watering of Grass

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Erosion Controls Temporary Vegetation

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Erosion Controls Slope Protection with Hydroseeding and Blankets

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Erosion Controls

Slope Protection with Blankets



37

Erosion Controls

Control Site Discharges

- Filter fencing for small sites (but only for slope lengths less than about 100 ft). Expect about 10 to 50% control of suspended solids.
- Sediment ponds for areas larger than 10 acres. Expect up to 80% control of suspended solids.

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Erosion Controls

Filter fences create small ponding areas



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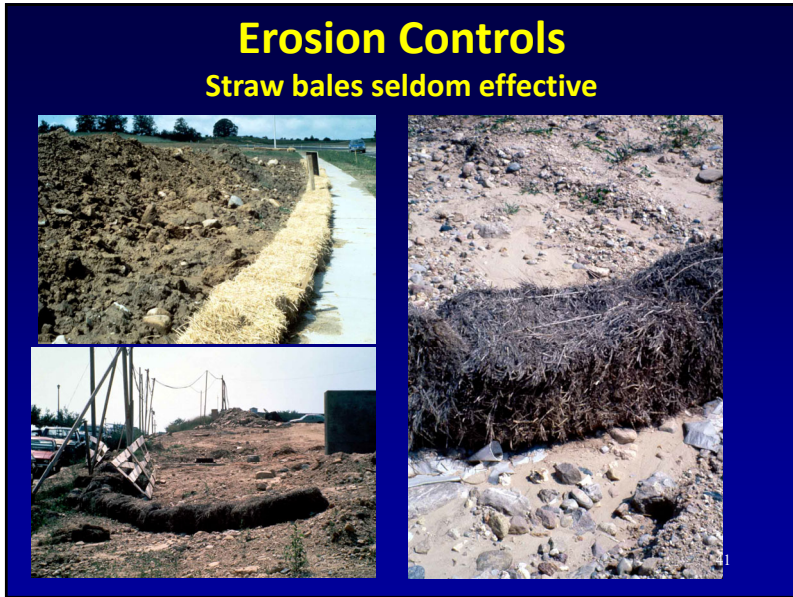
Erosion Controls

Filter fences seldom installed or maintained correctly



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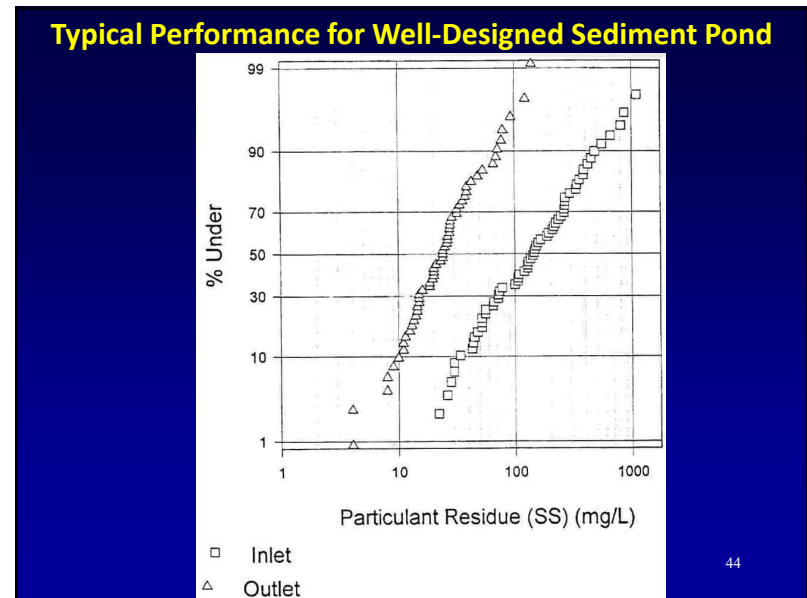
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On-Site Good Housekeeping Controls Inlet Protection



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On-Site Good Housekeeping Controls Gravel Driveways



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On-Site Good Housekeeping Controls Vehicle Cleaning



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Special Controls for Working within Waterways



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Education and Enforcement



Maryland DEP photo

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Conclusions

- Construction erosion major source of sediment to receiving waters.
- Causes wide range of problems at site (unstable land, property damage, decreases value, clogs drainage, etc.).
- In-stream sedimentation destroys habitat.
- Proper planning for all sites:
 - Minimize disturbance
 - Preserve natural vegetation
 - Good housekeeping
 - Education and enforcement

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Conclusions (continued)

- Proper Planning, general approach:
 - Divert upland flows
 - Mulch exposed ground
 - Control site discharges

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