# Assessing Channel Erosion in Arcade Creek

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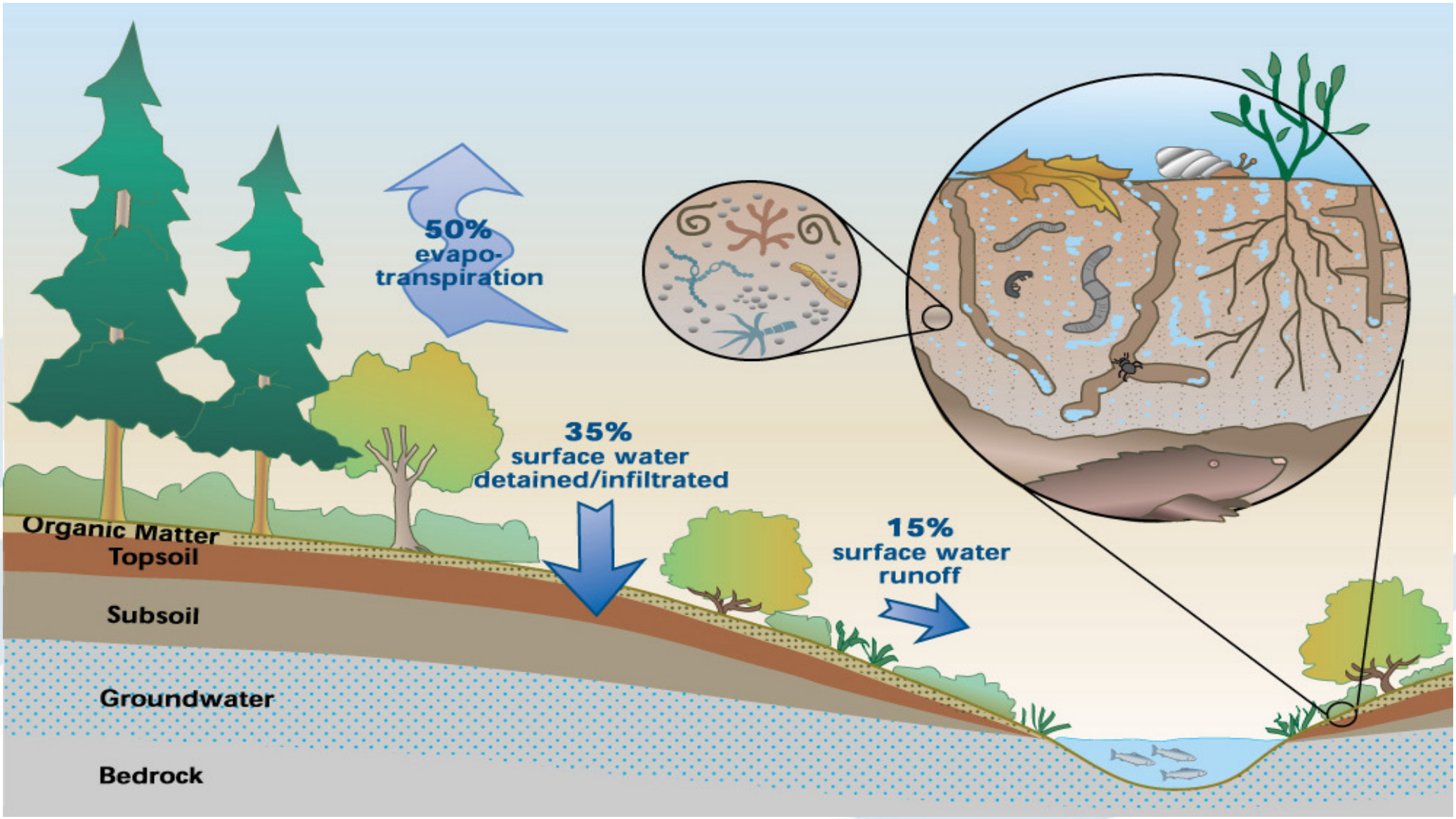
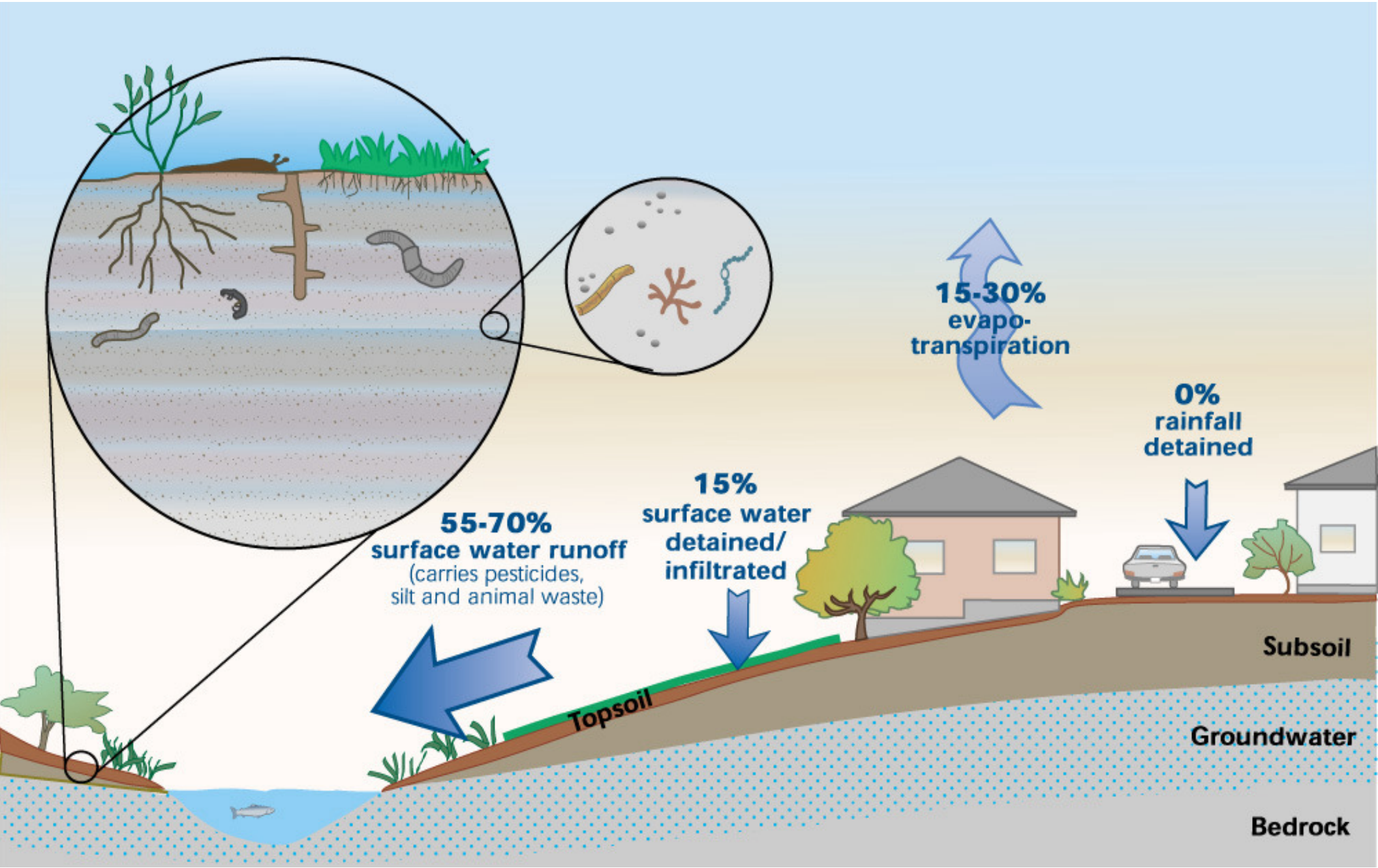
*stormwater program / SWRCB*

# Native Soil




*From King County*

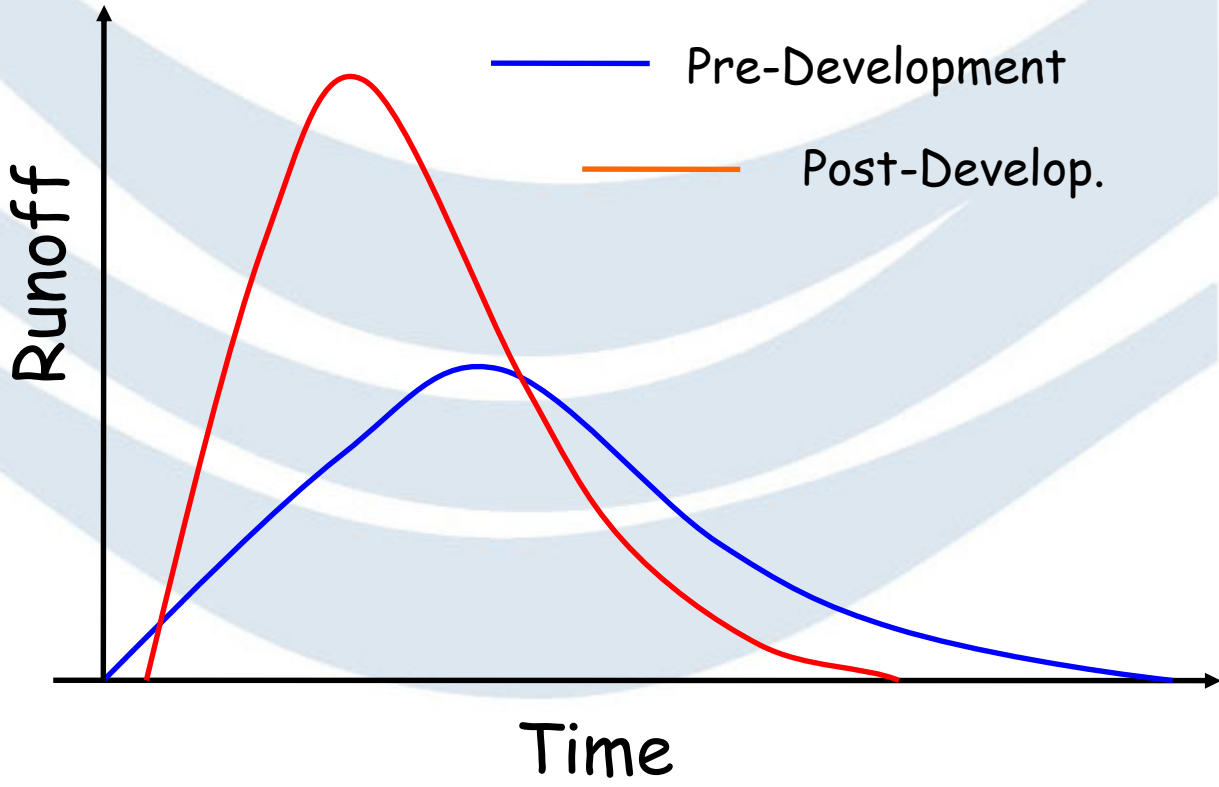
# Disturbed Soil



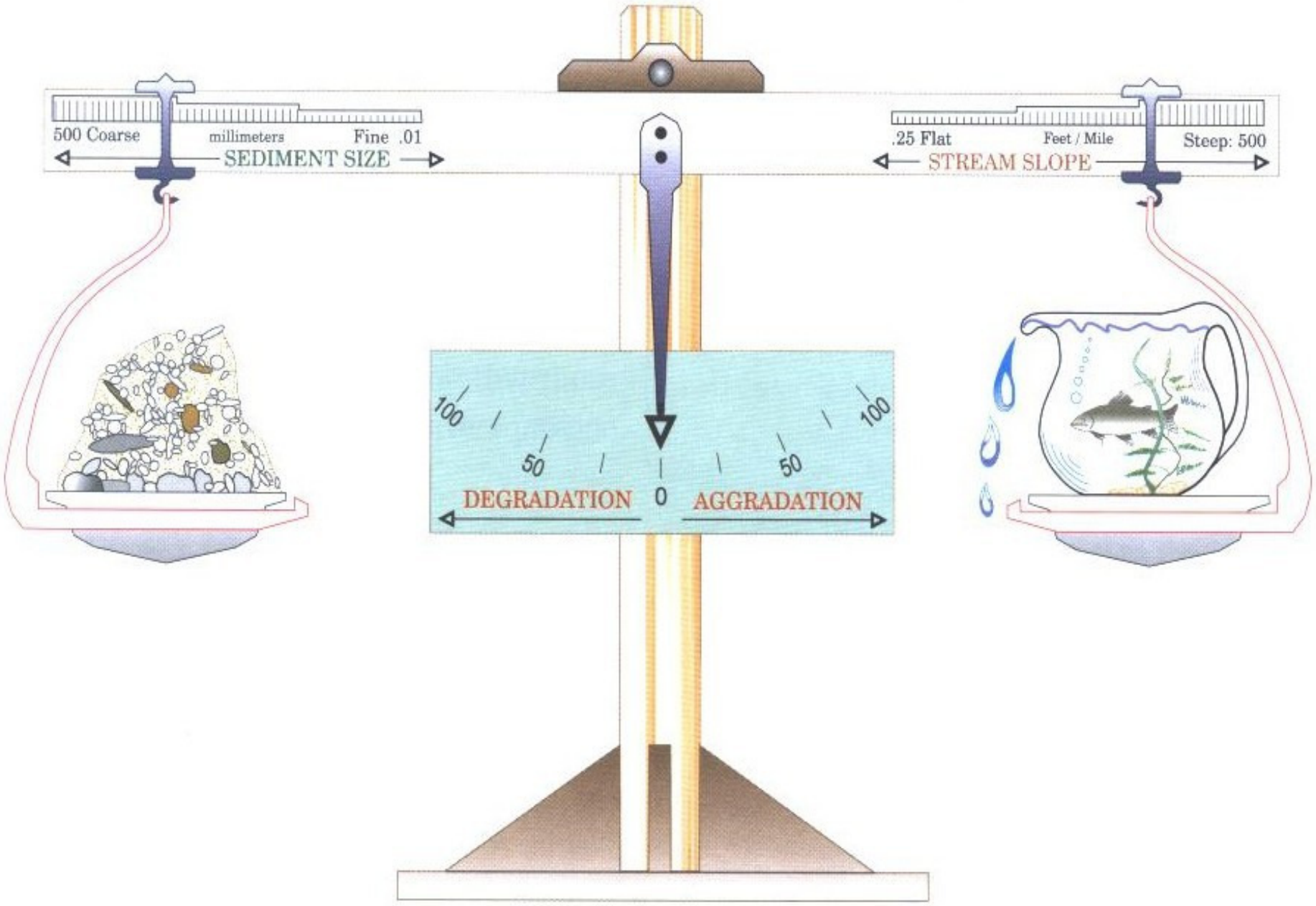
# Hydrologic Changes

Urbanization tends to increase storm water runoff:

- peak flows
- volume
- frequency

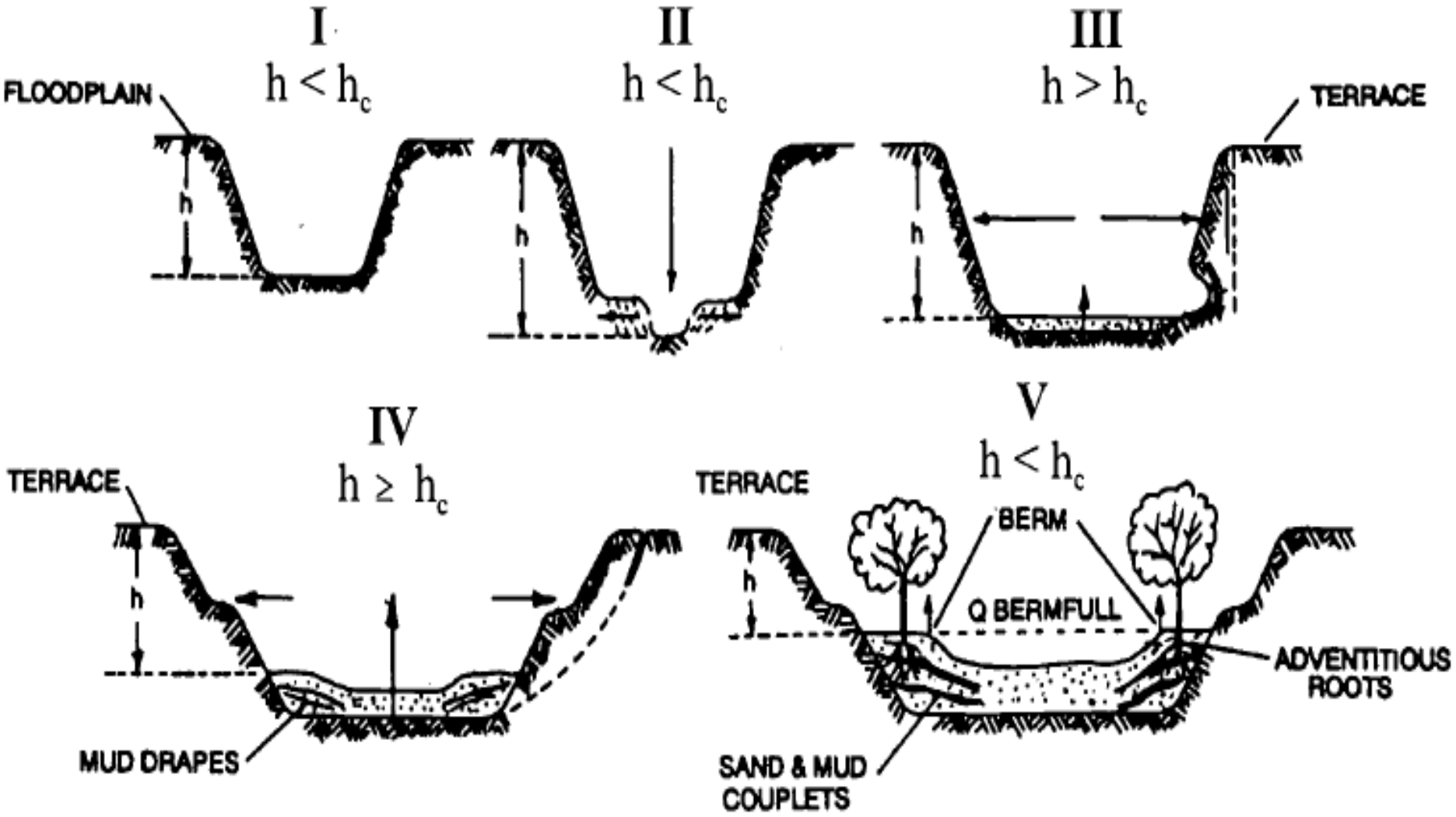



*From Haltiner (2006)*




*After Lane (1955) as cited in Rosgen (1996)*

# Channel Changes Associated with Urbanization




From Schumm et al 1984

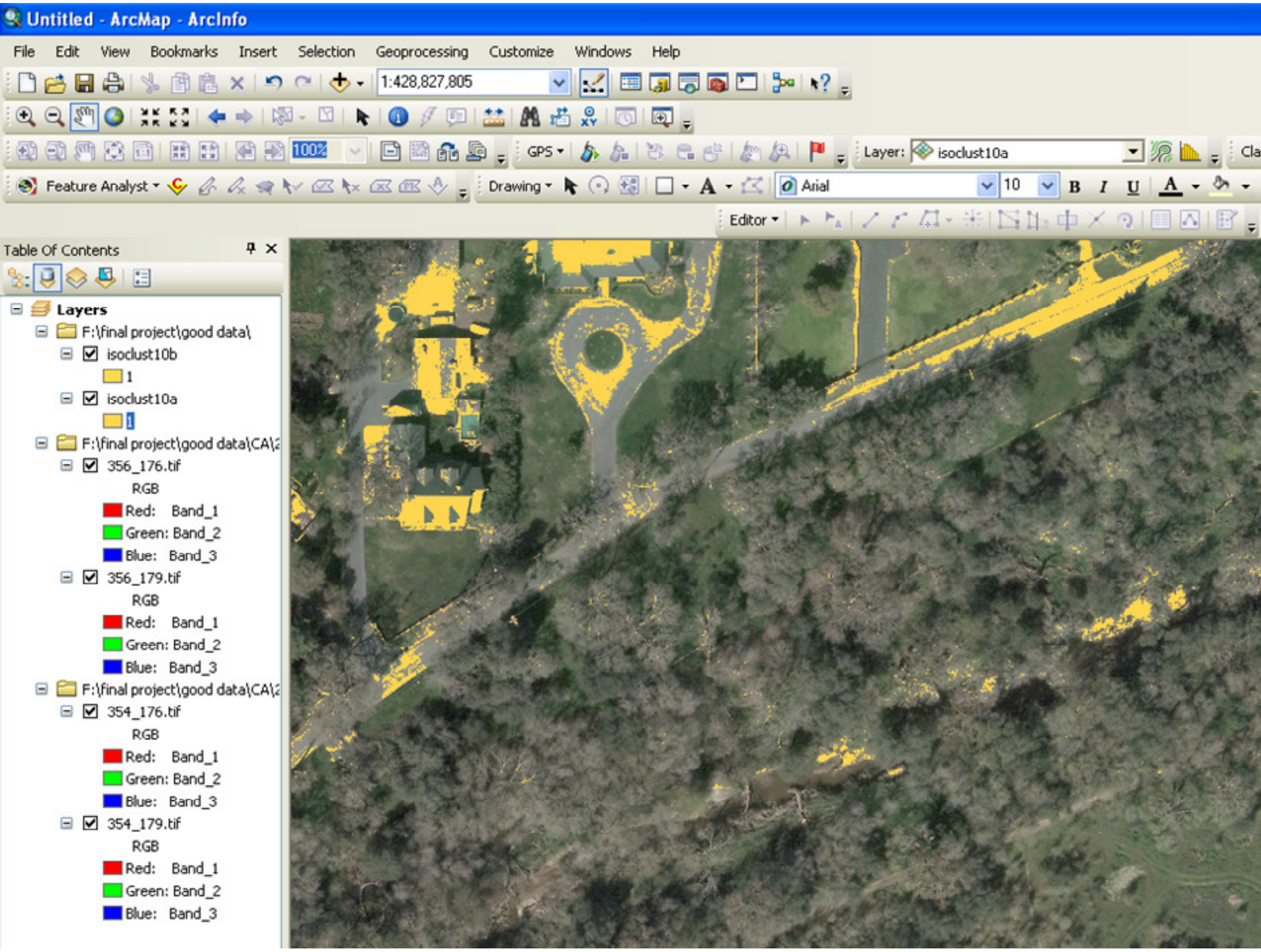
# Sources of Impairment

# (USEPA 2006)

| | Rivers and Streams | Lakes, Ponds, and Reservoirs | Estuaries |
|---|---|---|---|
| Sources[b] | Agriculture (48%)[a] | Agriculture (41%) | Municipal Point Sources (37%) |
| | **Hydrologic Modification (20%)[c]** | **Hydrologic Modification (18%)** | Urban Runoff/Storm Sewers (32%) |
| | Habitat Modification (14%)[d] | Urban Runoff/Storm Sewers (18%) | Industrial Discharges (26%) |
| | Urban Runoff /Storm Sewers (13%) | Nonpoint Sources (14%) | Atmospheric Deposition (23%) |
| | Forestry (10%) | Atmospheric Deposition (13%) | Agriculture (18%) |
| | Municipal Point Sources (10%) | Municipal Point Sources (12%) | **Hydrologic Modification (14%)** |
| | Resource Extraction (10%) | Land Disposal (10%) | Resource Extraction (12%) |

# Project Methodology

- Obtained High Resolution Imagery from USGS Earth Explorer website
- Conducted an isocluster unsupervised classification
- Created ten spectral classes
- Reduced classes to one (non-vegetated areas)
- Still reviewing spectral signatures and supervised classification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Feature Analyst
Drawing
Arial
10
Editor
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Green: Band_2
Blue: Band_3
354_179.tif
RGB
Red: Band_1
Green: Band_2
Blue: Band_3

## Channel Stability Index Rating[1]

| | | | | | | Score |
|---|---|---|---|---|---|---|
| **1. Primary bed material** | | | | | | |
| | Bedrock | Boulder/Cobble | Gravel | Sand | Silt Clay | |
| | 0 | 1 | 2 | 3 | 4 | 3 |
| **2. Bed/bank protection** | | | | | | |
| | Yes | No | (with) | 1 bank protected | 2 banks | |
| | 0 | 1 | | 2 | 3 | 1 |
| **3. Degree of incision** (Relative ele. Of "normal" low water; floodplain/terraces @ 100%) | | | | | | |
| | 0-10% | 11-25% | 26-50% | 51-75% | 76-100% | |
| | 4 | 3 | 2 | 1 | 0 | 4 |
| **4. Degree of constriction** (Relative decrease in top-bank width from up to downstream) | | | | | | |
| | 0-10% | 11-25% | 26-50% | 51-75% | 76-100% | |
| | 0 | 1 | 2 | 3 | 4 | 2 |
| **5. Streambank erosion** (Each Bank) | | | | | | |
| | None | Fluvial | Mass Wasting | (failures) | | |
| Left | 0 | 1 | 2 | | | 1 |
| Right | 0 | 1 | 2 | | | 1 |
| **6. Streambank instability** (Percent of each bank failing) | | | | | | |
| | 0-10% | 11-25% | 26-50% | 51-75% | 76-100% | |
| Left | 0 | 0.5 | 1 | 1.5 | 2 | 1.5 |
| Right | 0 | 0.5 | 1 | 1.5 | 2 | 1.5 |
| **7. Established riparian woody-vegetative cover** (Each bank) | | | | | | |
| | 0-10% | 11-25% | 26-50% | 51-75% | 76-100% | |
| Left | 2 | 1.5 | 1 | 0.5 | 0 | 0.5 |
| Right | 2 | 1.5 | 1 | 0.5 | 0 | 0.5 |
| **8. Occurrence of bank accretion** (Percent of each bank with fluvial deposition) | | | | | | |
| | 0-10% | 11-25% | 26-50% | 51-75% | 76-100% | |
| Left | 2 | 1.5 | 1 | 0.5 | 0 | 0.5 |
| Right | 2 | 1.5 | 1 | 0.5 | 0 | 0.5 |
| **9. Stage of channel evolution** | | | | | | |
| I | II | III | IV | V | VI | |
| 0 | 1 | 2 | 4 | 3 | 1.5 | 4 |
| **10. Composition of adjacent side slope** | | | | | | |
| | N/A | Bedrock | Boulders | Gravel-SP | Fines | |
| Left | 0 | 0.5 | 1 | 1.5 | 2 | 2 |
| Right | 0 | 0.5 | 1 | 1.5 | 2 | 2 |
| **11. Percent of slope (length) contributing sediment** | | | | | | |
| | 0-10% | 11-25% | 26-50% | 51-75% | 76-100% | |
| Left | 0 | 0.5 | 1 | 1.5 | 2 | 0.5 |
| Right | 0 | 0.5 | 1 | 1.5 | 2 | 0.5 |
| **12. Severity of side-slope erosion** | | | | | | |
| | None | Low | Moderate | High | | |
| Left | 0 | 0.5 | 1.5 | 2 | | 2 |
| Right | 0 | 0.5 | 1.5 | 2 | | 2 |
| | | | | | | |
| | | | | | **Total Score =** | **30** |

[1] The length of stream channel to be analyzed depends on the width and length of the channel. Data shall be collected at two sites at each transect within a distance of 30 bankfull channel widths. The sites shall be located in portions of the channel reach with relatively uniform width and gradient. For example, a 20 foot-wide channel would require data from at least two sites within a 600 foot distance. If sections of channel within the 30 bankfull width distance are immediately upstream or downstream of steps, culverts, grade controls, tributary junctions, or other features and structures that significantly affect the shape and behavior of the channel, a distance of longer than 30 bankfull widths must be analyzed. A total score of 10 or less indicates a stable channel; scores of 20 or more are indicative of severe instability.

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