

The Influence of Land Use on Stream Condition

Tess Wynn

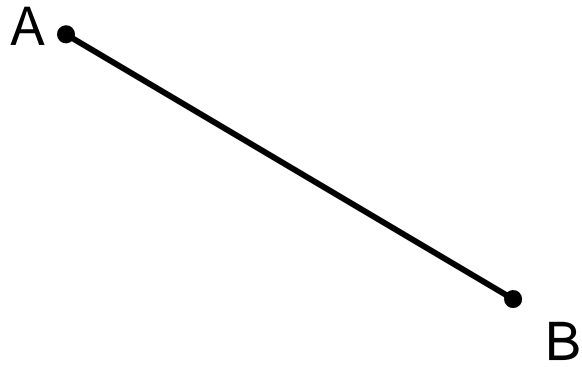
Assistant Professor

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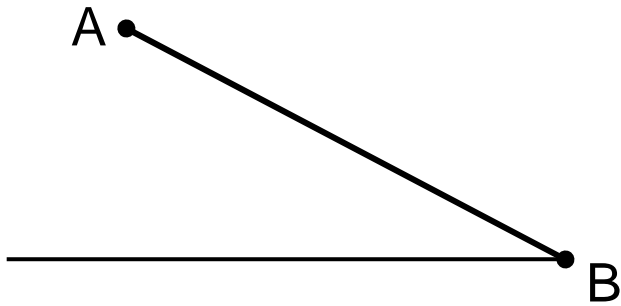
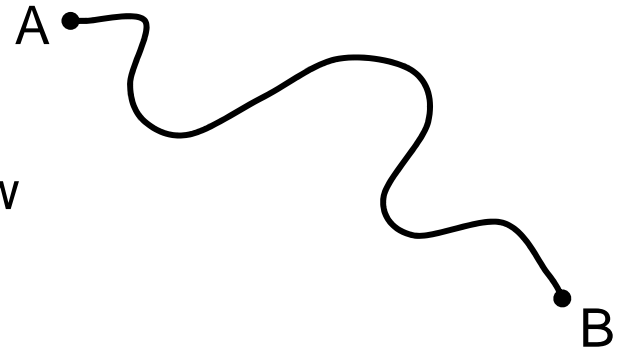
Virginia Tech

What are the functions of a stream?

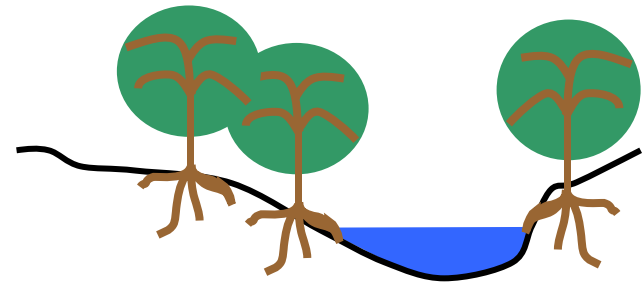
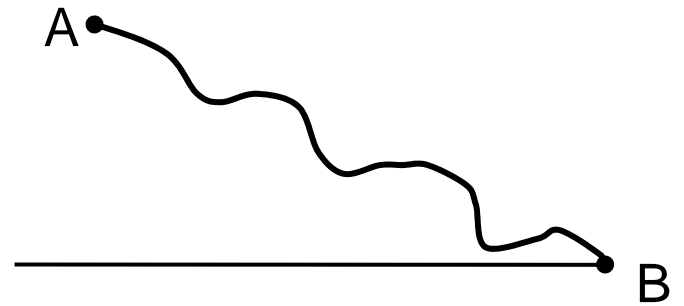
- Transport water
- Transport sediment
- Support aquatic ecosystems
 - ◆ Provide cover
 - ◆ Moderate environment
 - ◆ Transport and cycle food (carbon)
 - ◆ Transport and cycle nutrients



Plan View



Side View



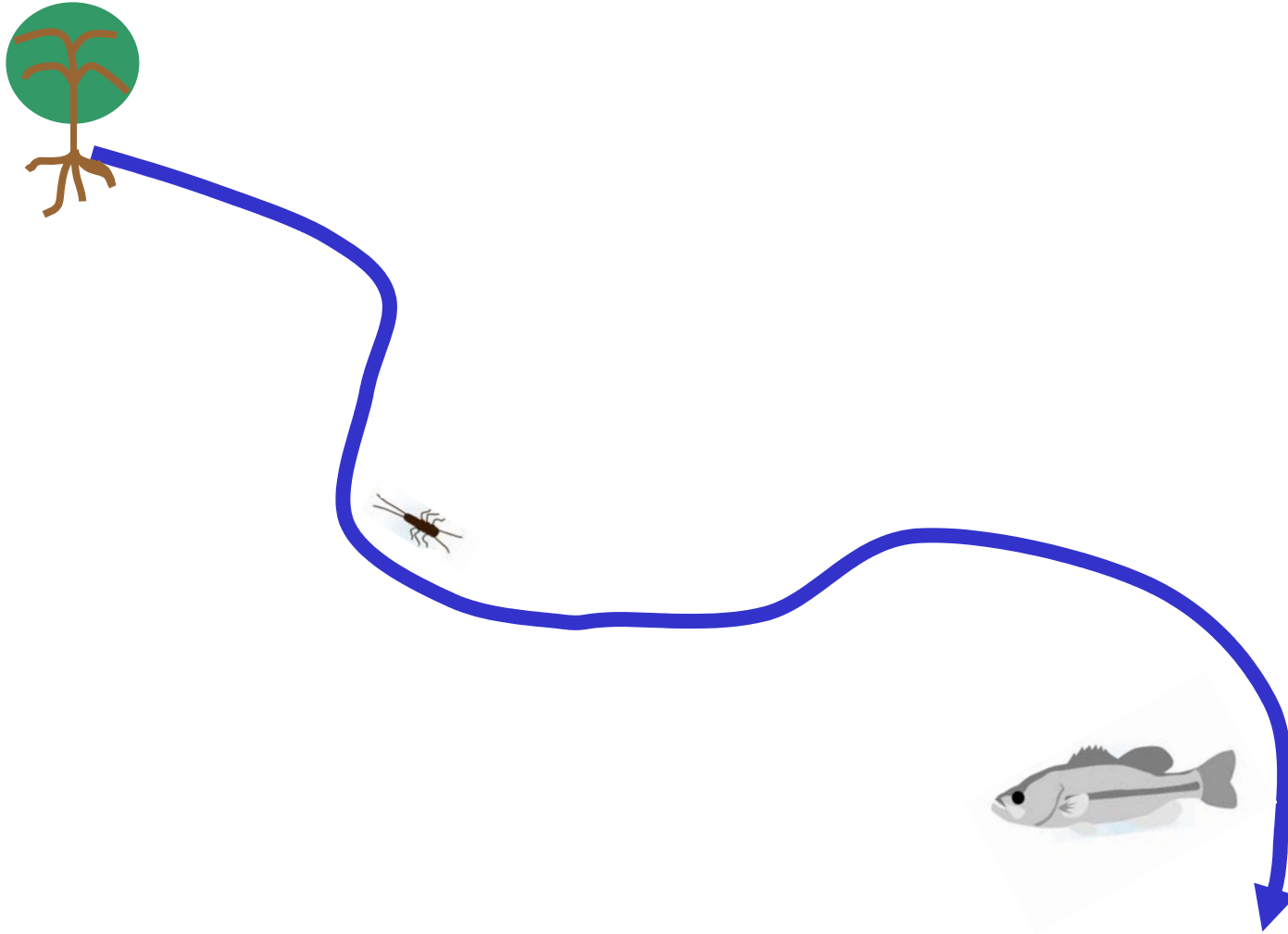
Channel Cross Section

Flooding is good!

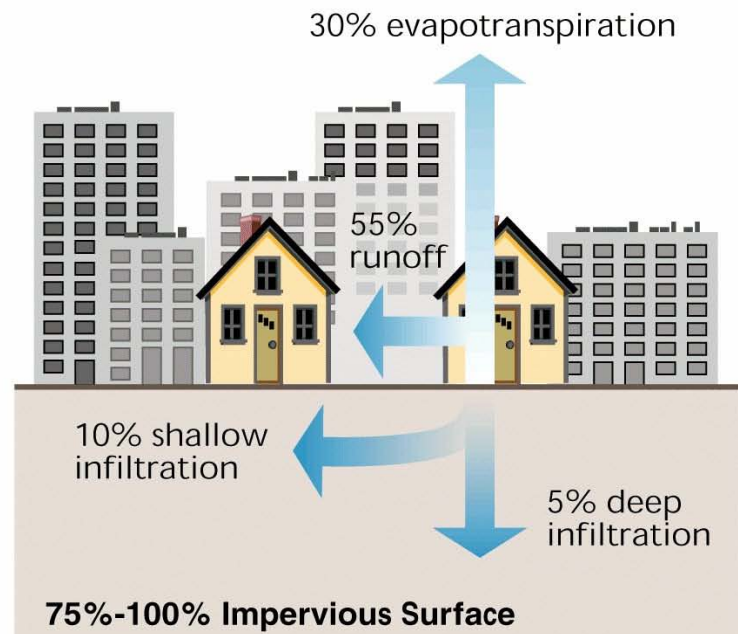
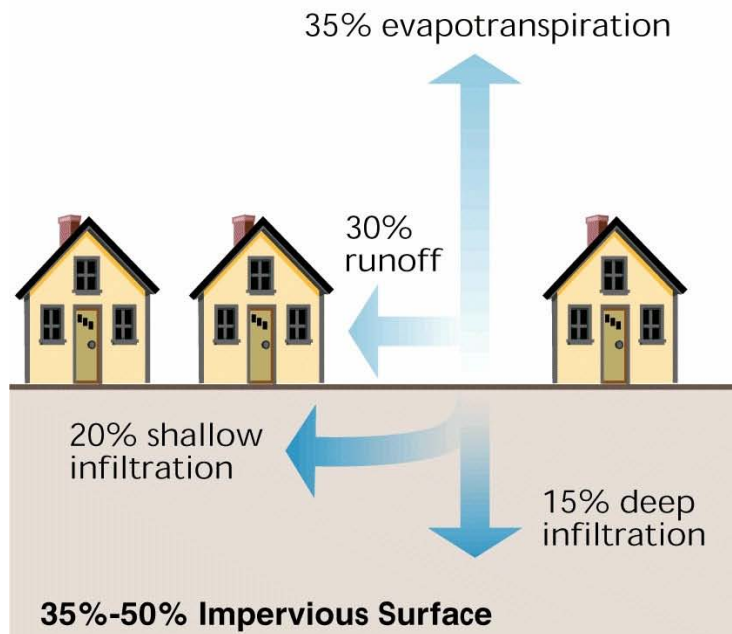
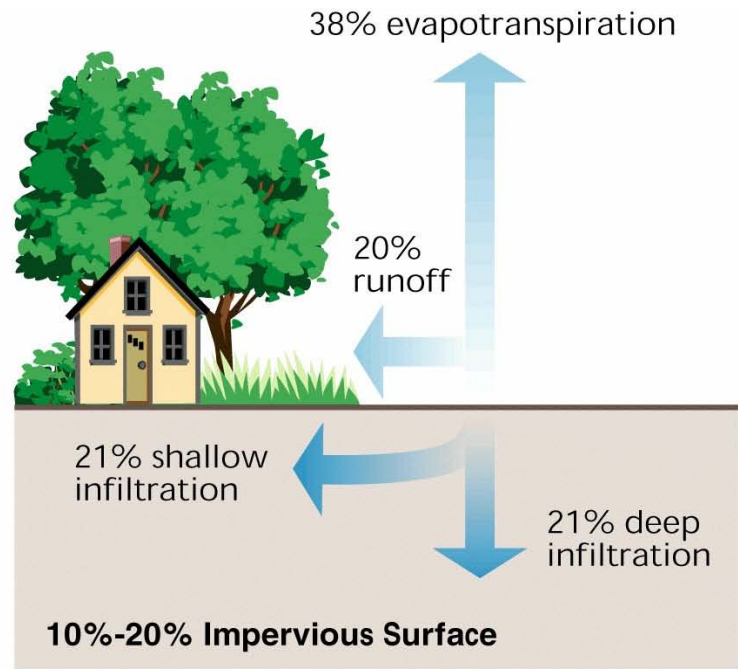
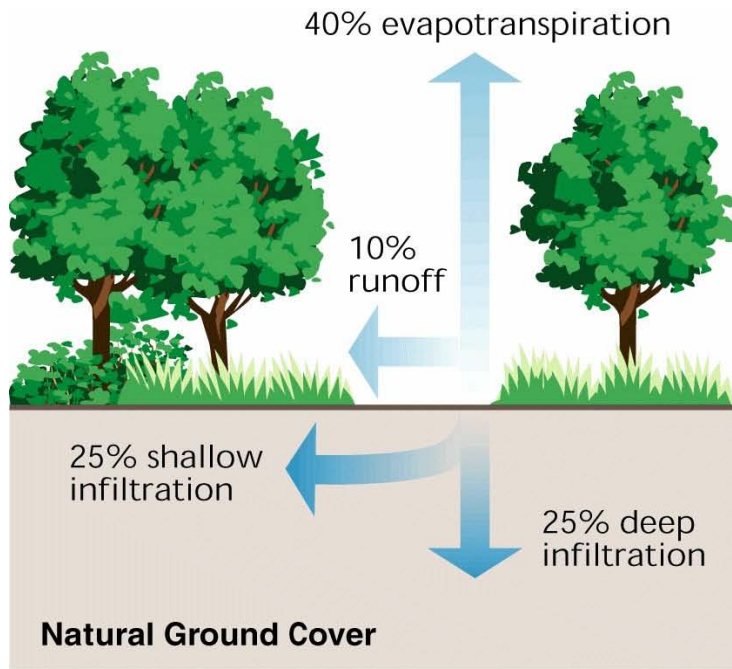
Water and sediment transport are balanced

Sediment moved \propto Water power

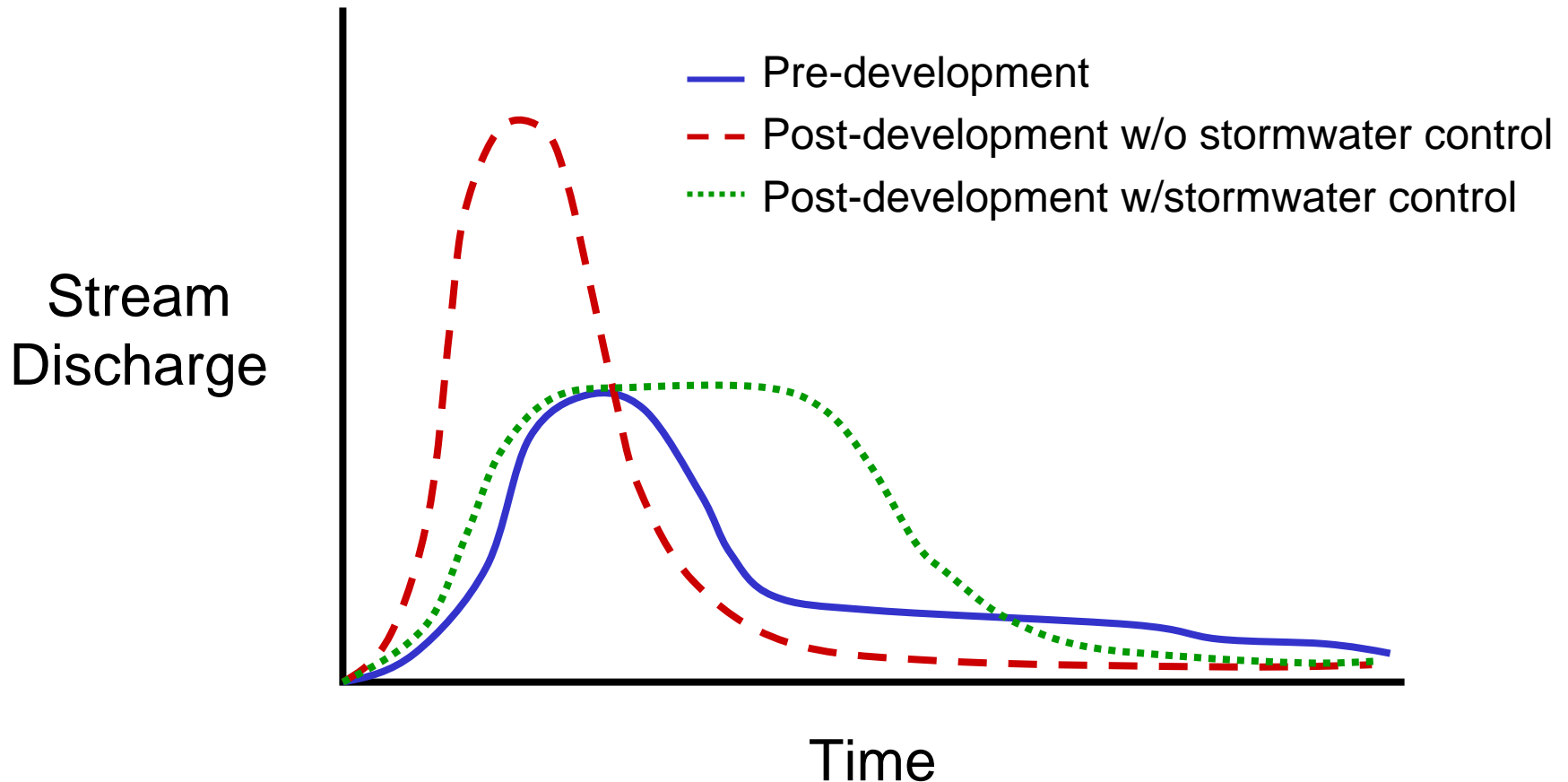
Streams are linear ecosystems



How does urban development affect stream ecosystems?



Changes in hydrograph with urbanization





Source: Stream Corridor Restoration, 1998

Water and sediment transport are balanced

$$Q_s \cdot D_{50} \propto Q_w \cdot S$$

Q_s = Sediment discharge rate

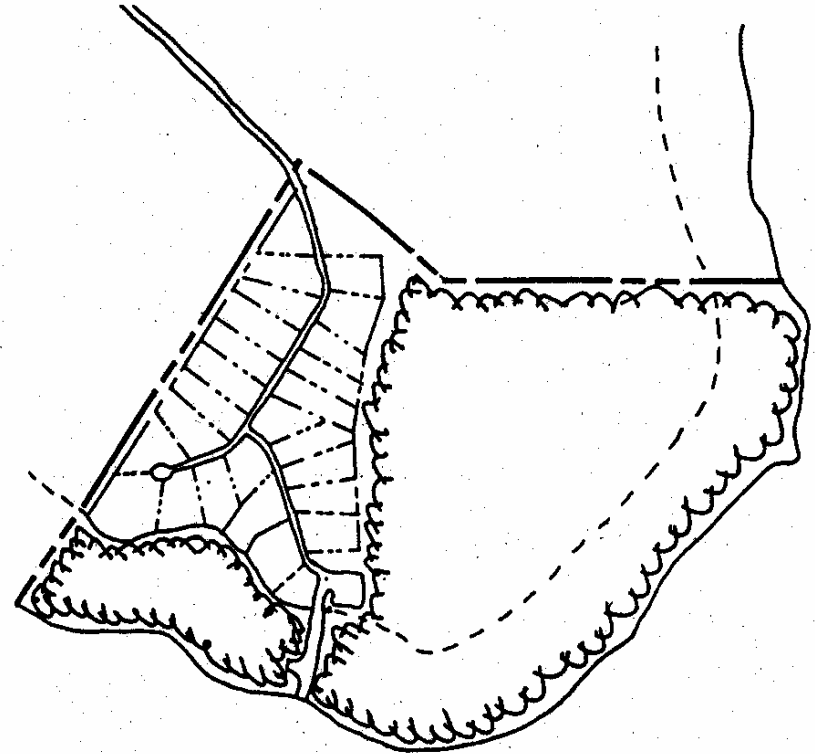
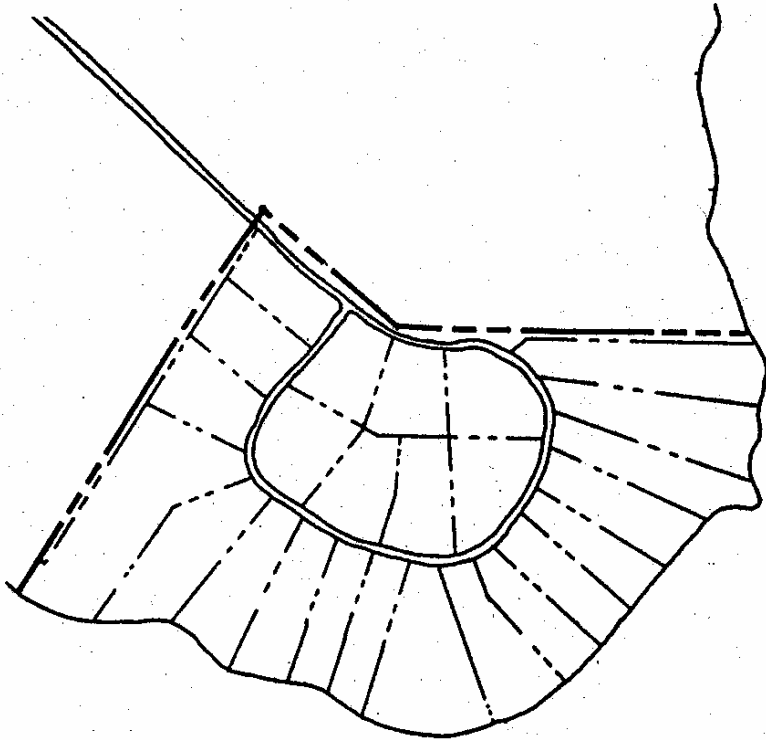
D_{50} = Median bed sediment diameter

Q_w = Stream discharge

S = Stream slope

How do you balance
development and stream health?

Cluster development minimizes disturbance



Metropolitan Washington COG, 1995



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STORM WATER
MANAGEMENT DIVISION

NC STATE UNIVERSITY

The important things to remember

- Streams are ecosystems
- There is a balance between water and sediment transport
- Changing land use changes watershed hydrology
- Changing watershed hydrology, channel shape, or channel roughness changes sediment transport

Questions...
Comments...