Should we recommend a lower target load for disconnected impervious cover?

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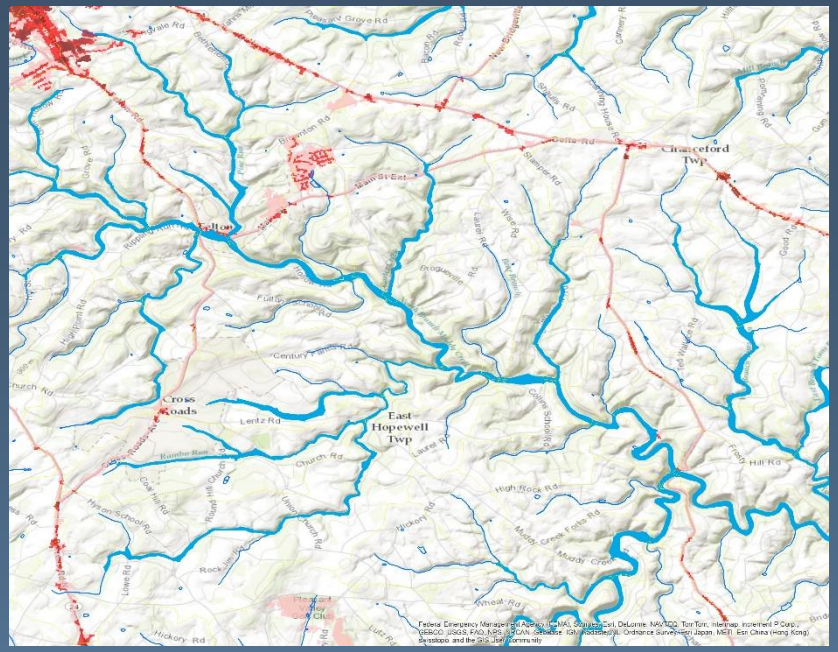
Do all impervious surfaces have the same effect on water quality?

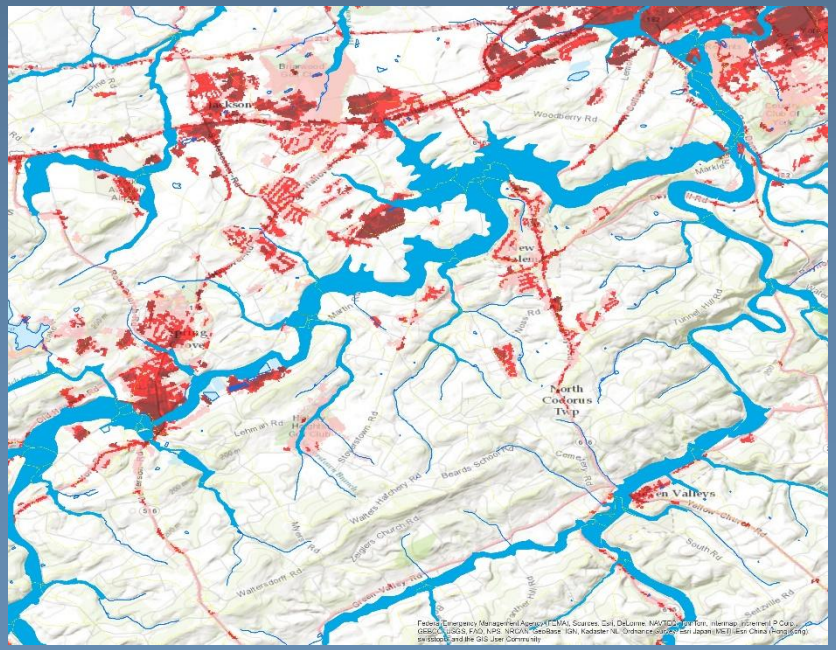


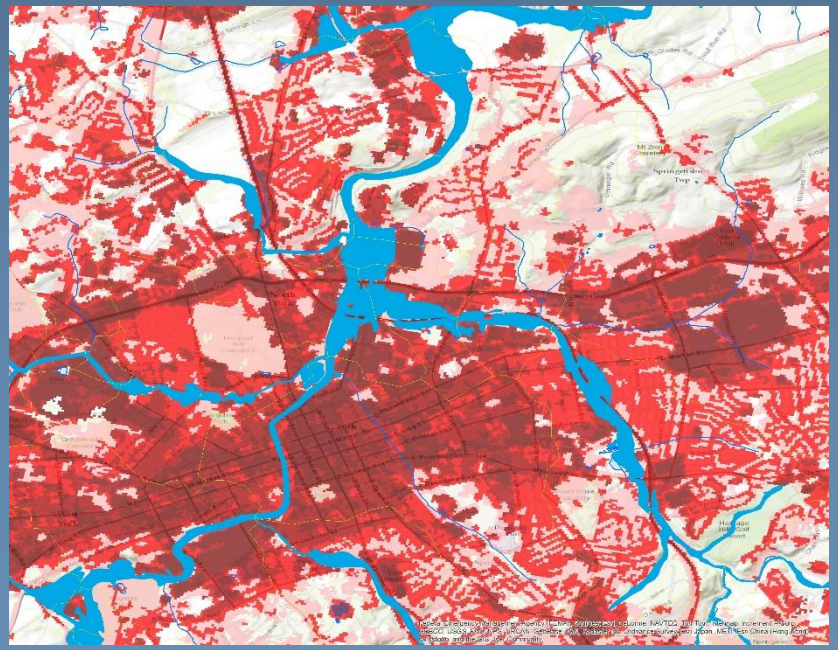
Streams and floodplains

Low

Impervious Intensity

High





Stream flow = *f*(transit time)

Factors affecting stream flow:

Natural

- Storm intensity, duration, and coverage
- Watershed area and shape
- Slope and surface curvature
- Drainage density
- Soil moisture, texture, and depth to water table
- Vegetation (transpiration and surface roughness)
- Geologic faults and resistance to weathering

Rural Urban

Condition Gradient

Stream flow = ƒ(transit time)

Factors affecting stream flow:

Human

- Historic land use practices
- Channelization and bank hardening
- Reservoirs and ponds
- Soil tillage, removal, and/or compaction
- Topographic surface grading
- Vegetation alteration and/or removal
- Groundwater and surface water withdrawals
- Drinking and wastewater infrastructure
- Stormwater detention and conveyance systems
- Impervious surfaces and road/stream crossings

Rural Urban

Condition Gradient

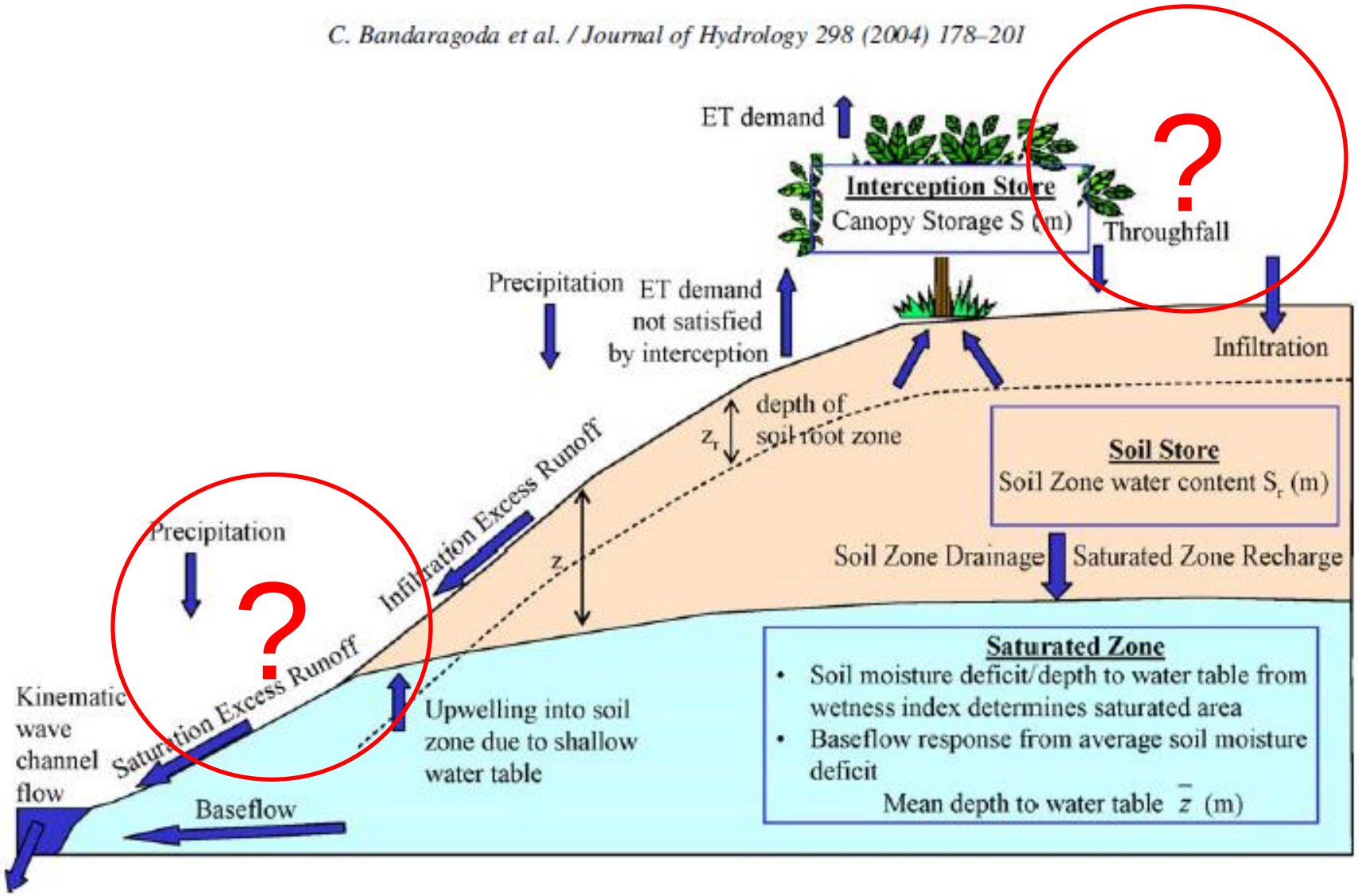


Fig. 1. Schematic of the physical processes represented by the TOPNET modeling system.

Impervious Surface Connectivity Evaluation

1. Unique loads?
   - NO, as a land use. YES, in a watershed context.

2. Can it be mapped (across 64,000 square miles)?
   - YES for estimating total impervious area in small watersheds;
   - NO for mapping per-pixel impervious cover and some other factors related to connectivity

3. Can it be modeled in Phase 6?
   - YES (potentially).

4. Associated with unique BMPs?
   - YES: disconnection of impervious surfaces.

ANSWER

FINDING:

- Impervious surface connectivity is spatially and temporally variable and therefore it is difficult to generalize hydrologic effects based on simple metrics (e.g., presence of stormwater infrastructure, housing density, or spatial proximity). However, numerous studies and physically based process models have confirmed that percent impervious cover in a watershed is related to higher peak flows and more frequent high flows- thereby increasing sediment erosion and transport capacity in streams.

RECOMMENDATIONS:

- Include all stream corridors in the Phase 6 model and parameterize their nutrient and sediment loading characteristics using percent impervious cover, riparian forest cover, floodplain-stream connectivity, slope, stormwater infrastructure, and hydrologic network analysis.

- Finer scale hydrologic and engineering models could be used for determining a disconnection credit as a BMP (developed via a proposed new urban expert panel).

Discussion