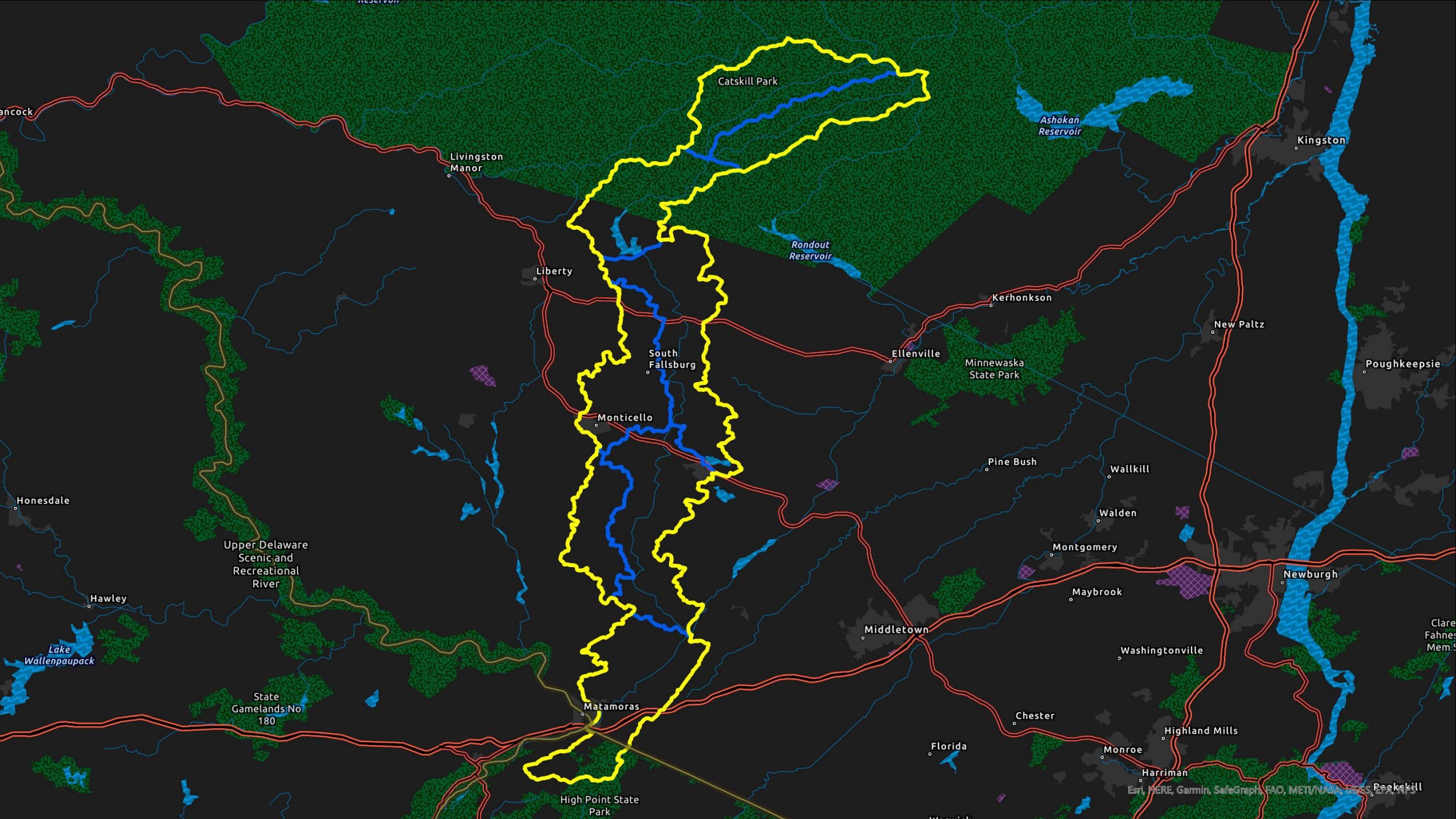




STREAM DYNAMICS

A PRIMER

GIAN DODICI
30 JANUARY 2023



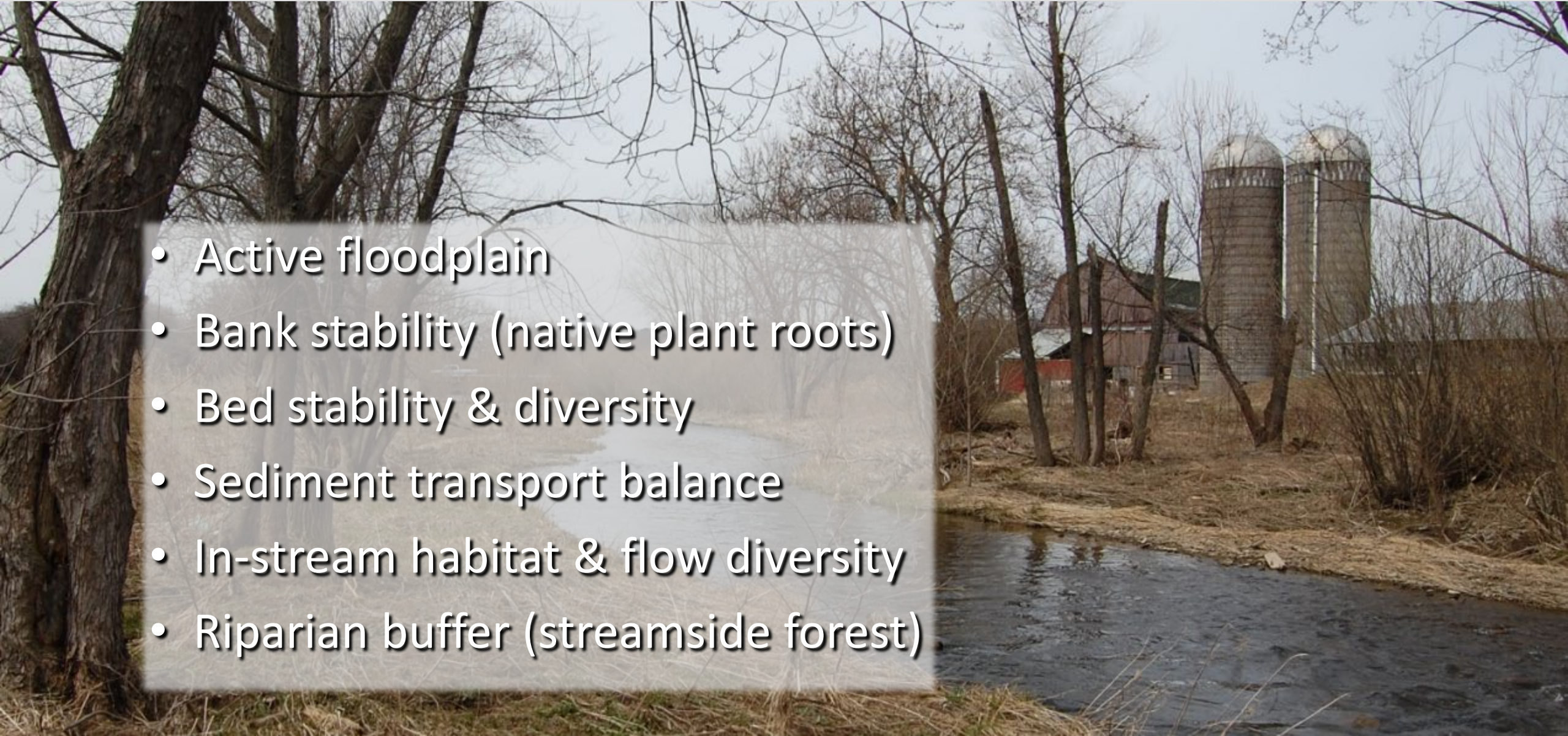
What is Fluvial Geomorphology?



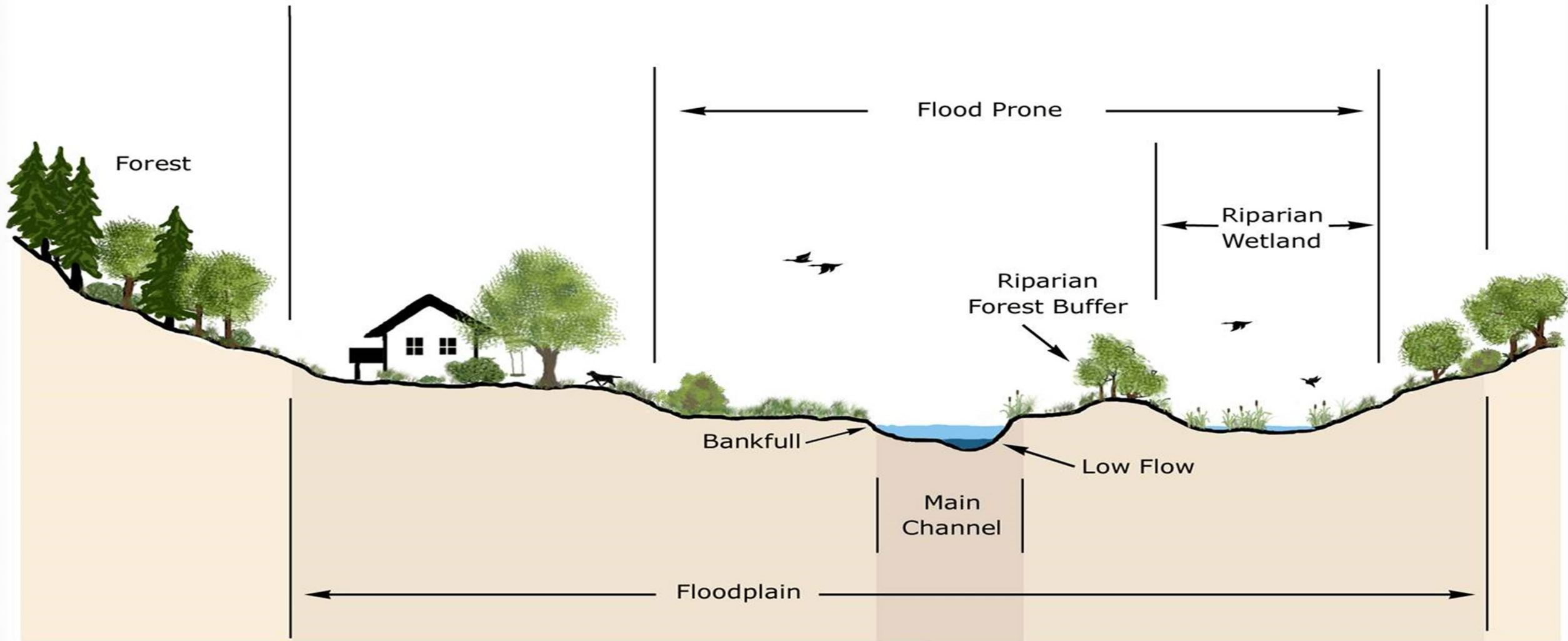
Understanding rivers and how they are influenced by the landscape in which they occur

What Makes a Stream Healthy?

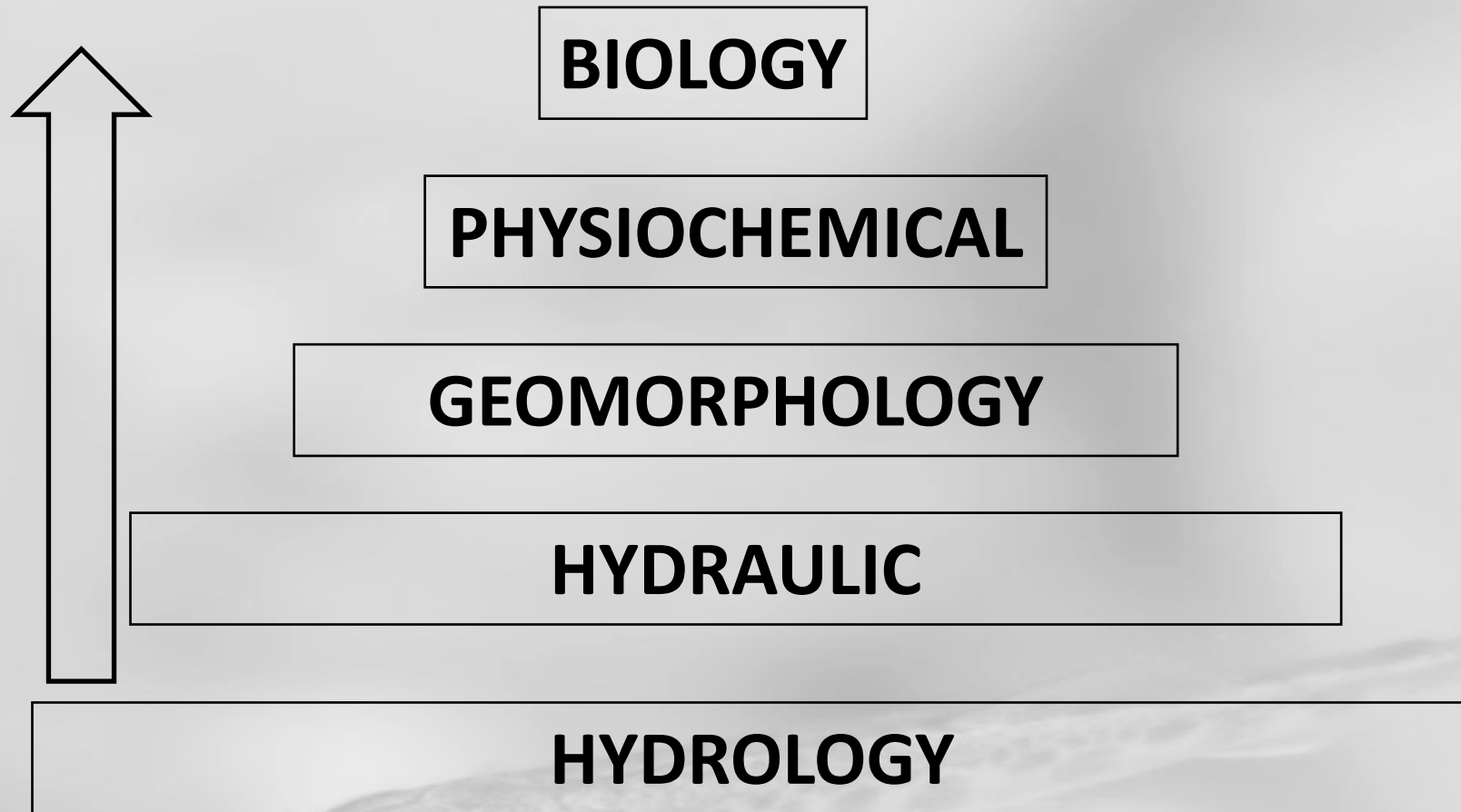
- Active floodplain
- Bank stability (native plant roots)
- Bed stability & diversity
- Sediment transport balance
- In-stream habitat & flow diversity
- Riparian buffer (streamside forest)



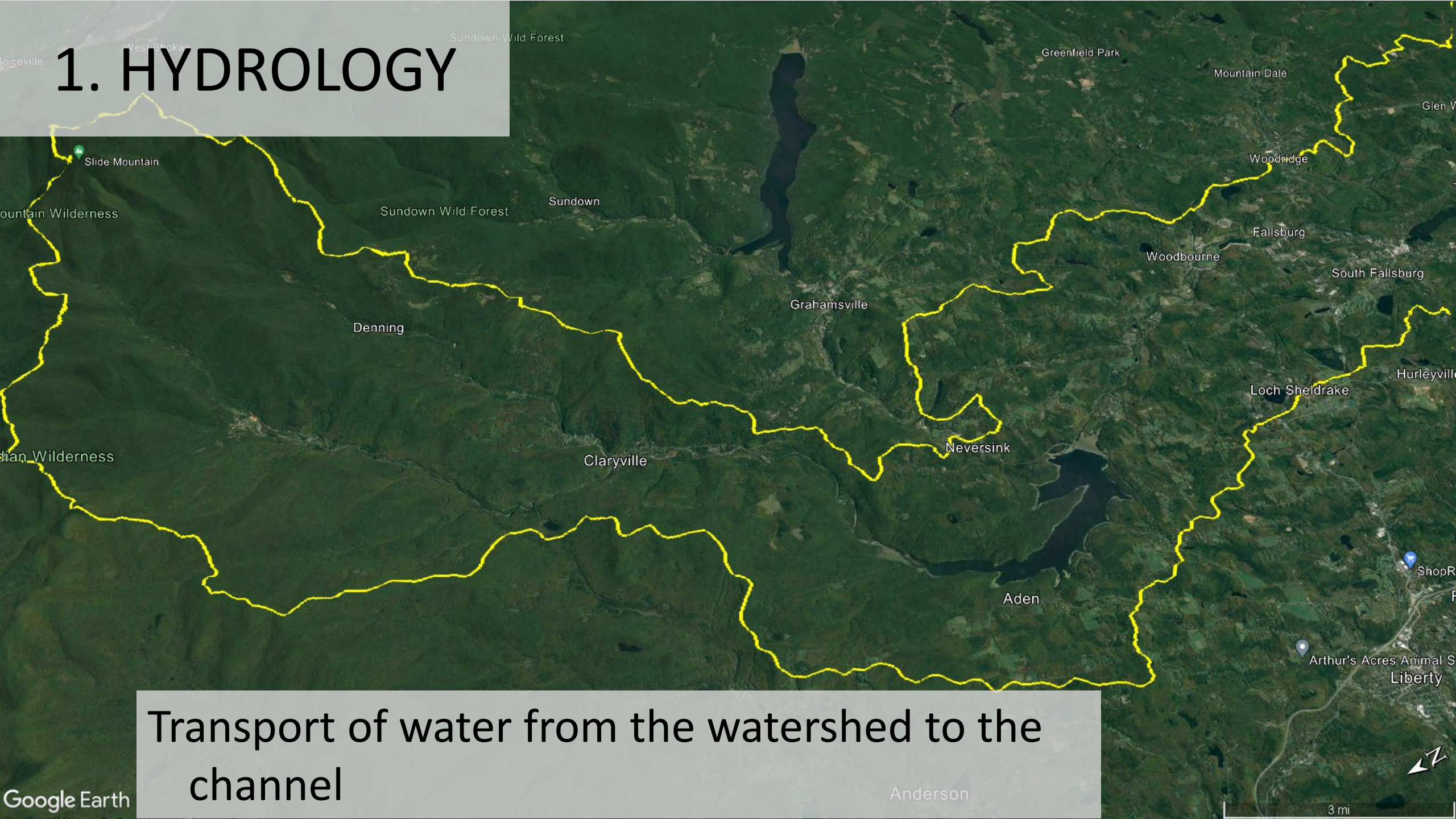
Streams are complex, living systems



Stream Functions Pyramid



1. HYDROLOGY



Transport of water from the watershed to the channel



Flow Duration -- Runoff Hydrograph

Flow (Q) ↑

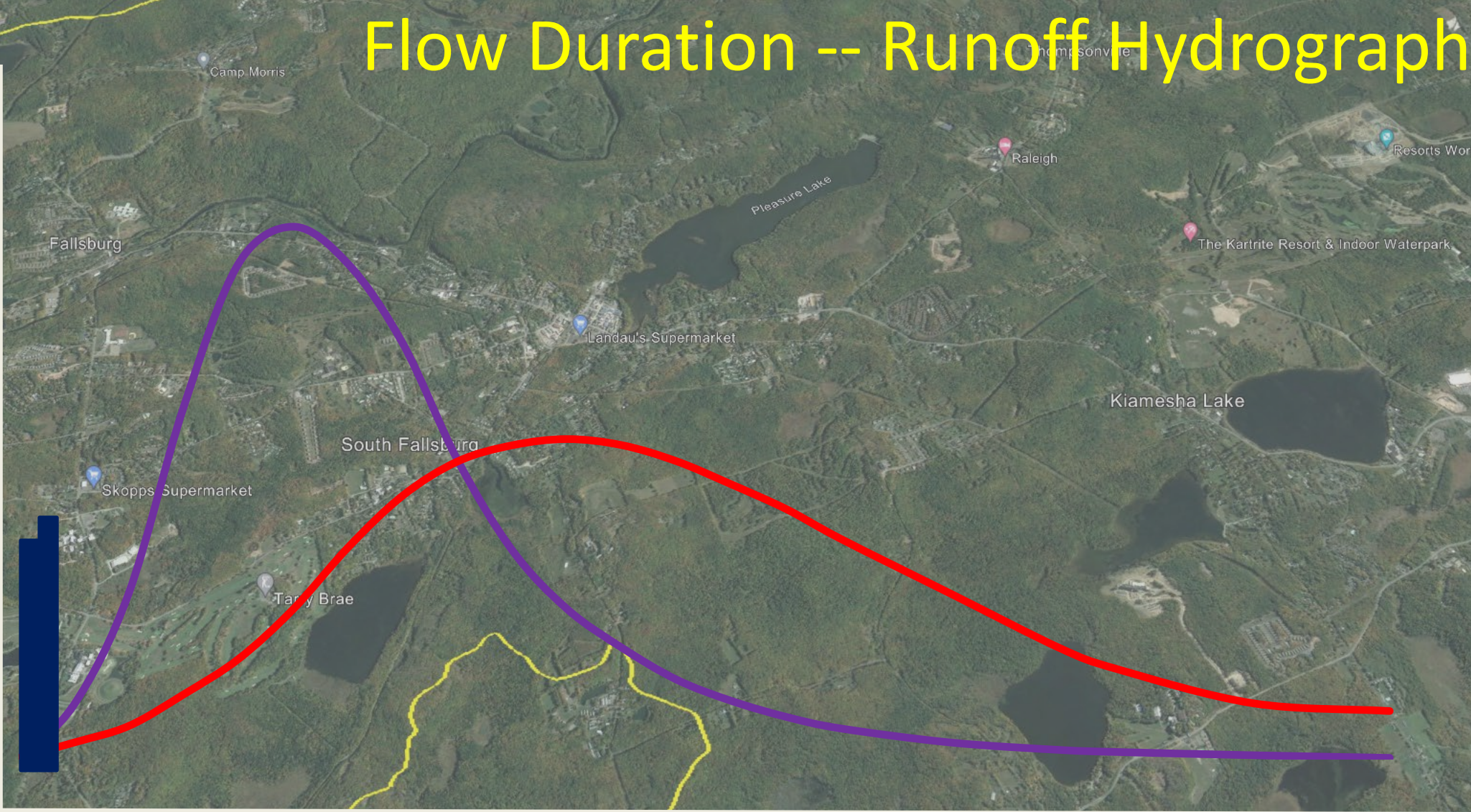


Time →

Flow Duration -- Runoff Hydrograph

Flow (Q) ↑

Time →



2. HYDRAULIC



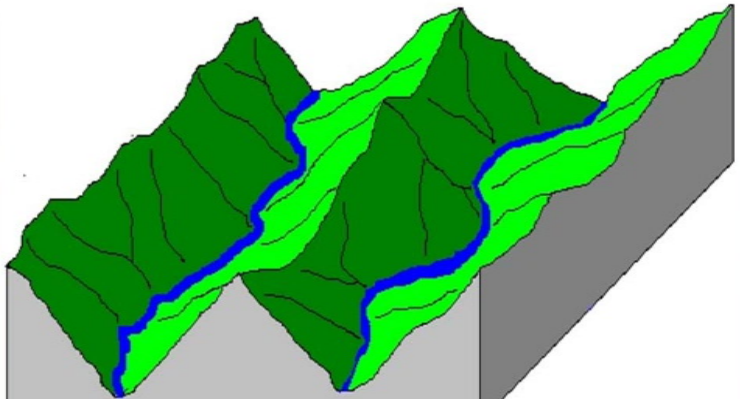
Transport of water in the channel, on the floodplain, and through sediments.



Natural stream corridors are in dynamic equilibrium.



Floodplain



Flood Prone Area

Flow Dynamics

- Interaction of flowing water on the bed, banks and floodplain
 - Stream Velocity
 - Shear Stress
 - Stream Power



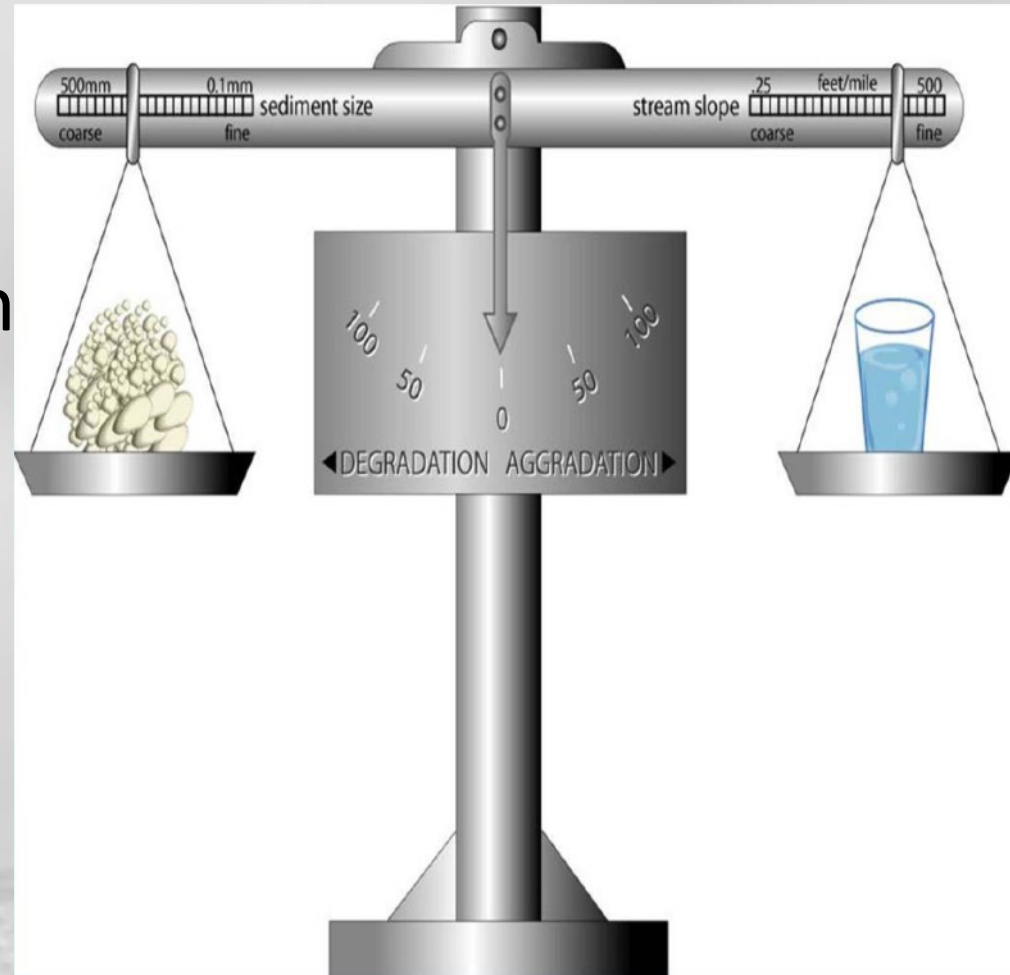
3. GEOMORPHOLOGY



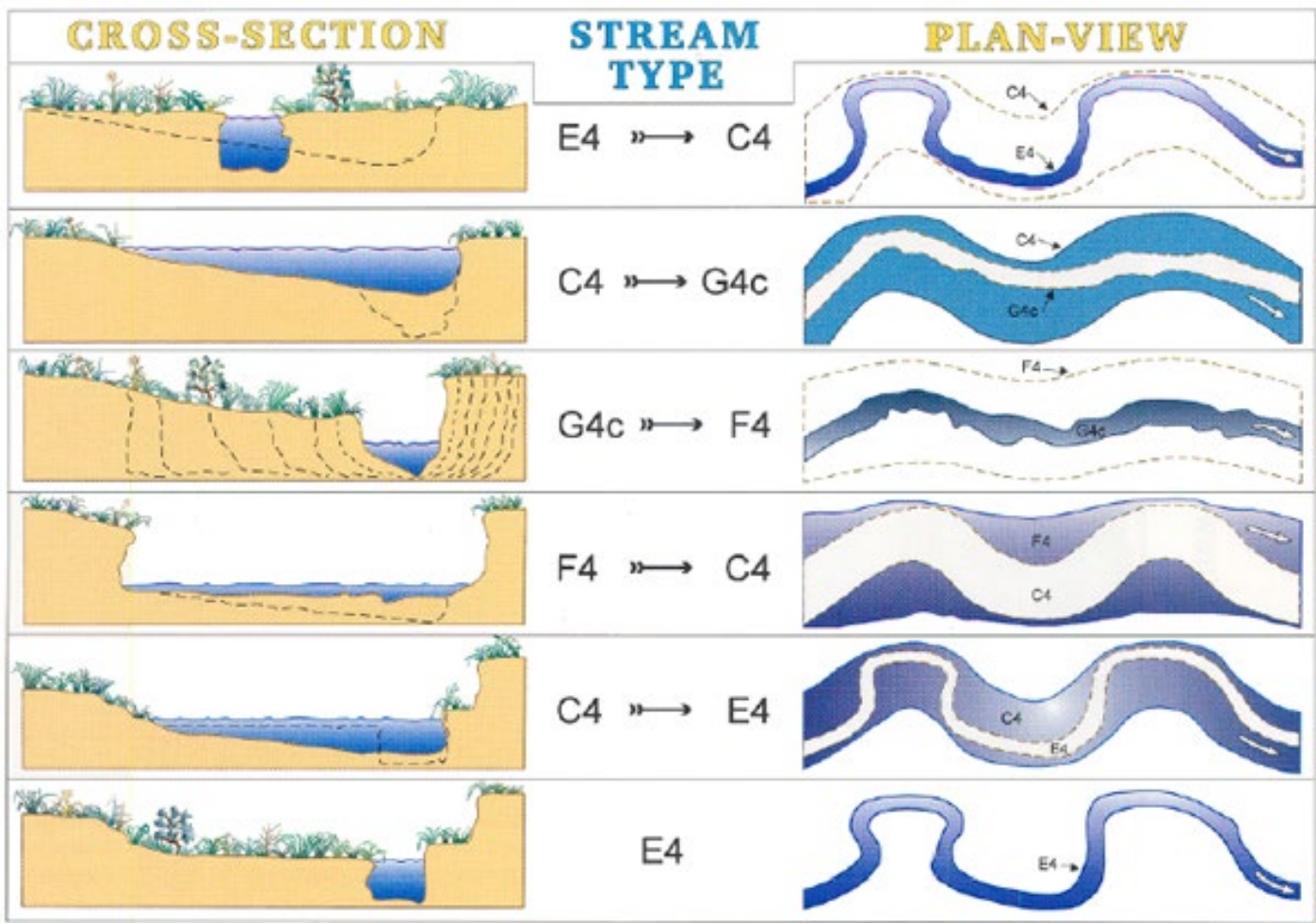
Transport of wood and sediment to create diverse

Channel Evolution

- Changes in stream power (slope & discharge) or stream work (sediment transport) result in channel adjustment



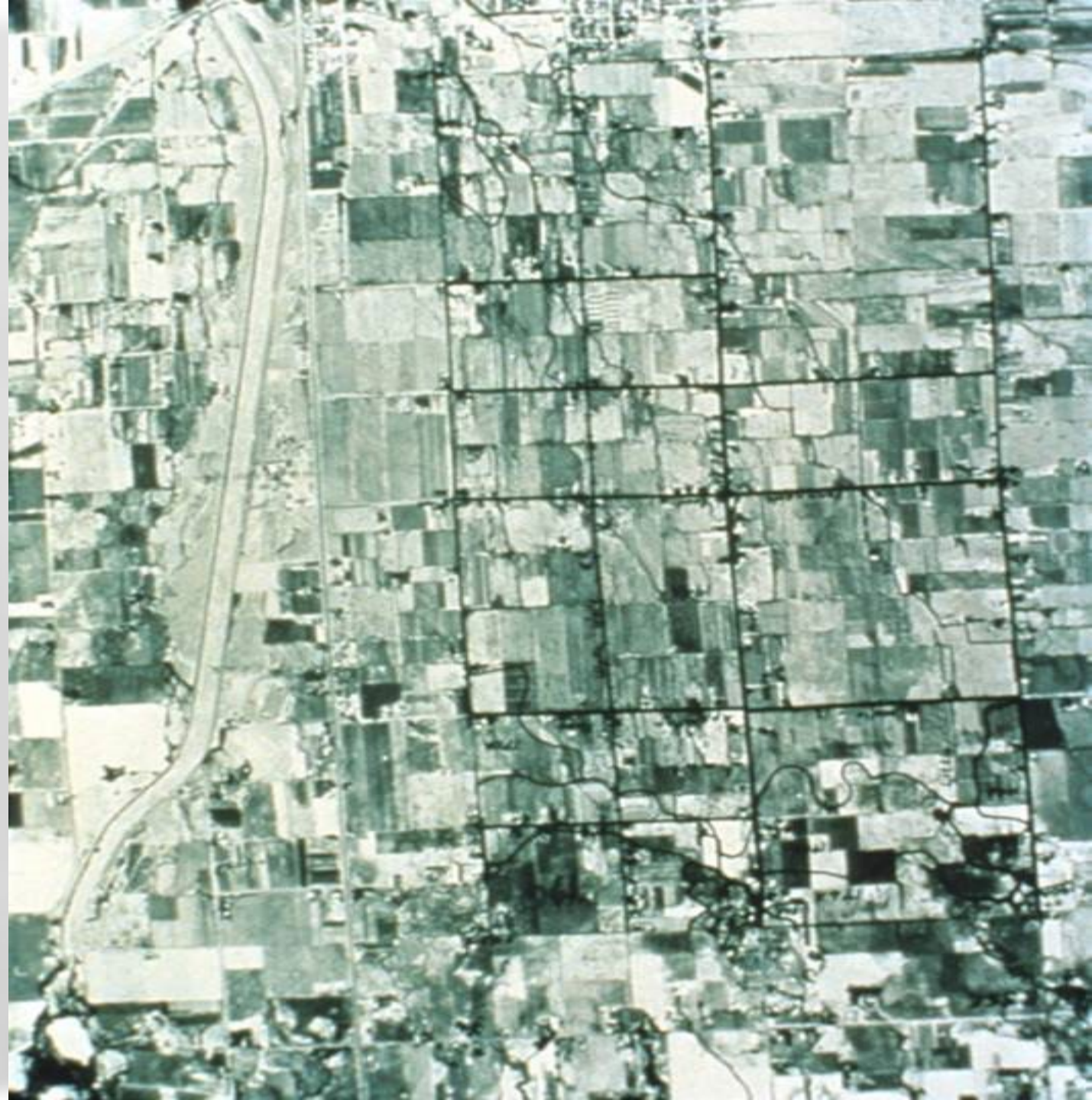
Channel Evolution Model



Adjustments of channel cross-section and plan-view patterns as stream types change or shift through an evolutionary cycle (Rosgen 1996)

Lateral stability (meander migration)







Channel vertical stability (aggradation)



Channel vertical stability (incision)



So, why does it matter?





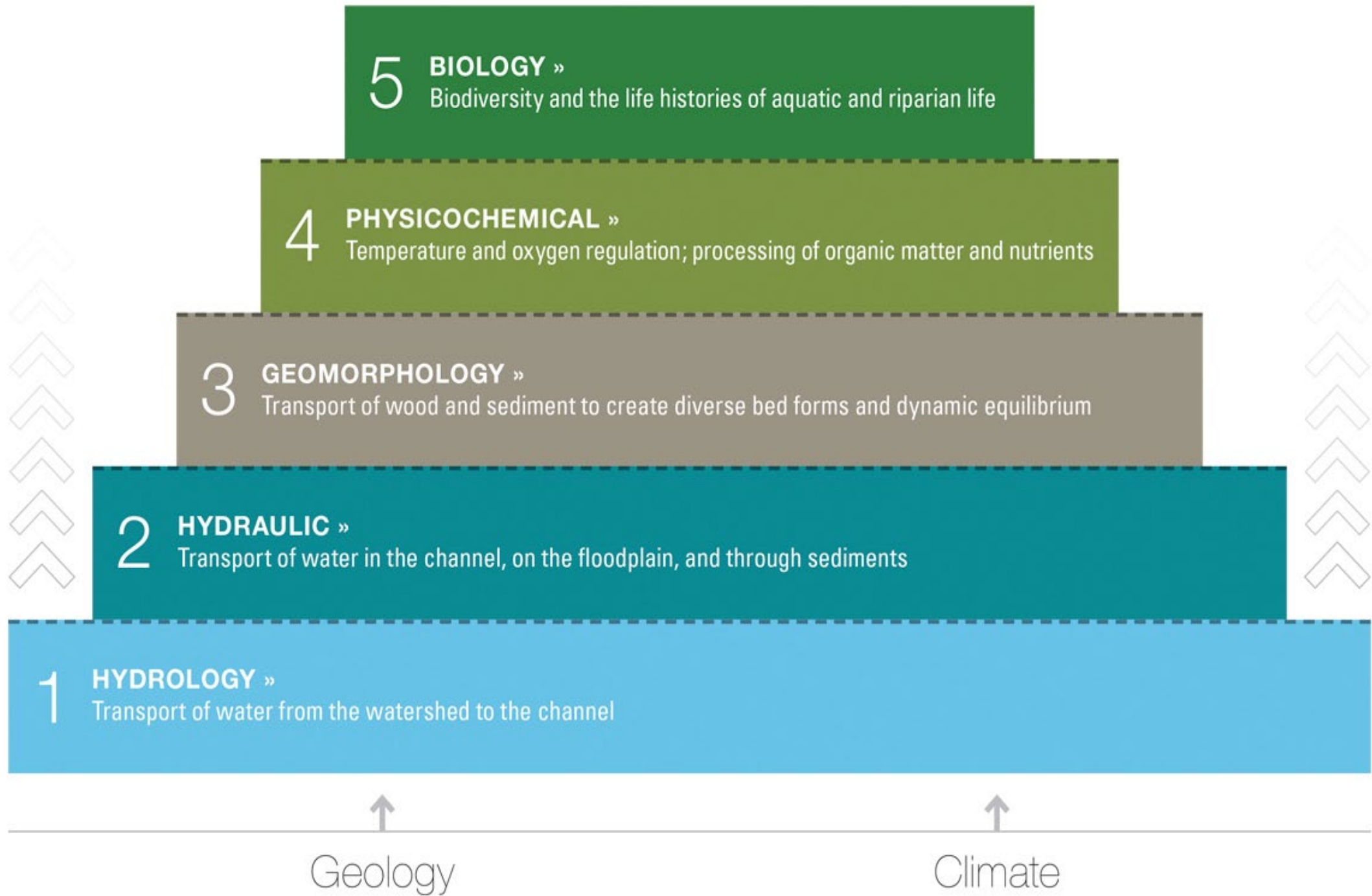












5 BIOLOGY »
Biodiversity and the life histories of aquatic and riparian life

4 PHYSICOCHEMICAL »
Temperature and oxygen regulation; processing of organic matter and nutrients

3 GEOMORPHOLOGY »
Transport of wood and sediment to create diverse bed forms and dynamic equilibrium

2 HYDRAULIC »
Transport of water in the channel, on the floodplain, and through sediments

1 HYDROLOGY »
Transport of water from the watershed to the channel

↑
Geology

↑
Climate



Create a dimension, pattern, and profile that transports water and sediment in a state of equilibrium that existed prior to disturbance.









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