riversmart communities

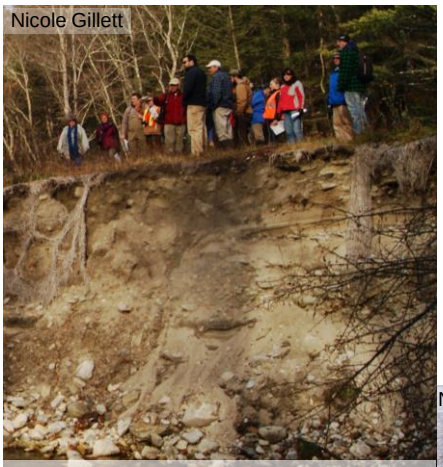
supporting ecologically restorative flood prevention and remediation in New England

What makes a River?

Rivers are much more than just water. They are sources of energy, food, drinking water, and irrigation. They are spaces for sports and recreation. They are ecosystems that connect mountains to oceans. River science recognizes the complexity of rivers, and strives to understand and quantify their behaviors.

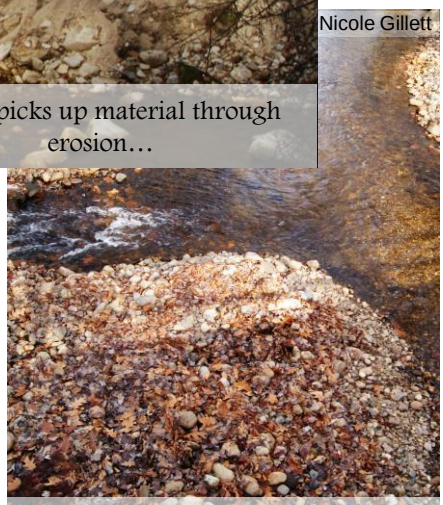
Flowing Earth

Water can pick up, carry, and deposit materials. There is a balance between the flow of water and of sediment and materials through a river system. Constant adjustment to this balance create a state called "**dynamic equilibrium**" in which a river may migrate across a valley bottom while keeping its overall dimensions relatively constant.



Nicole Gillett

Water picks up material through erosion…



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…and deposits it downstream

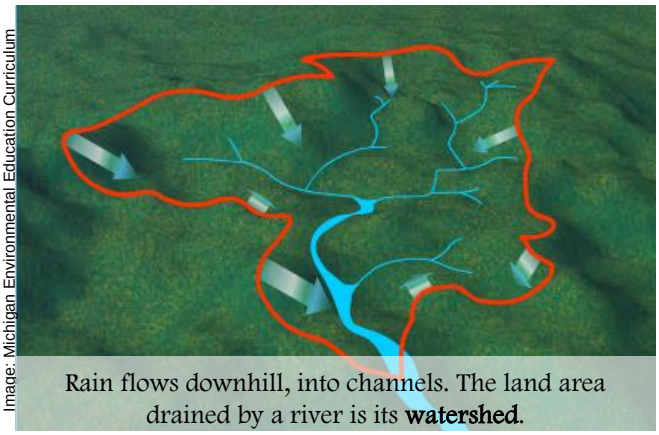

Image: Michigan Environmental Education Curriculum

Rain flows downhill, into channels. The land area drained by a river is its **watershed**.

Beyond the Channel

River **features** are the physical forms, objects, and processes that make up a river system. They are the basic vocabulary used to describe a river.

River **metrics** relate features to one another, giving them meaning in the context of river science. Metrics allow us to measure and quantify a river.

On the reverse of this page, some examples of river features and metrics are given.

What makes a River?

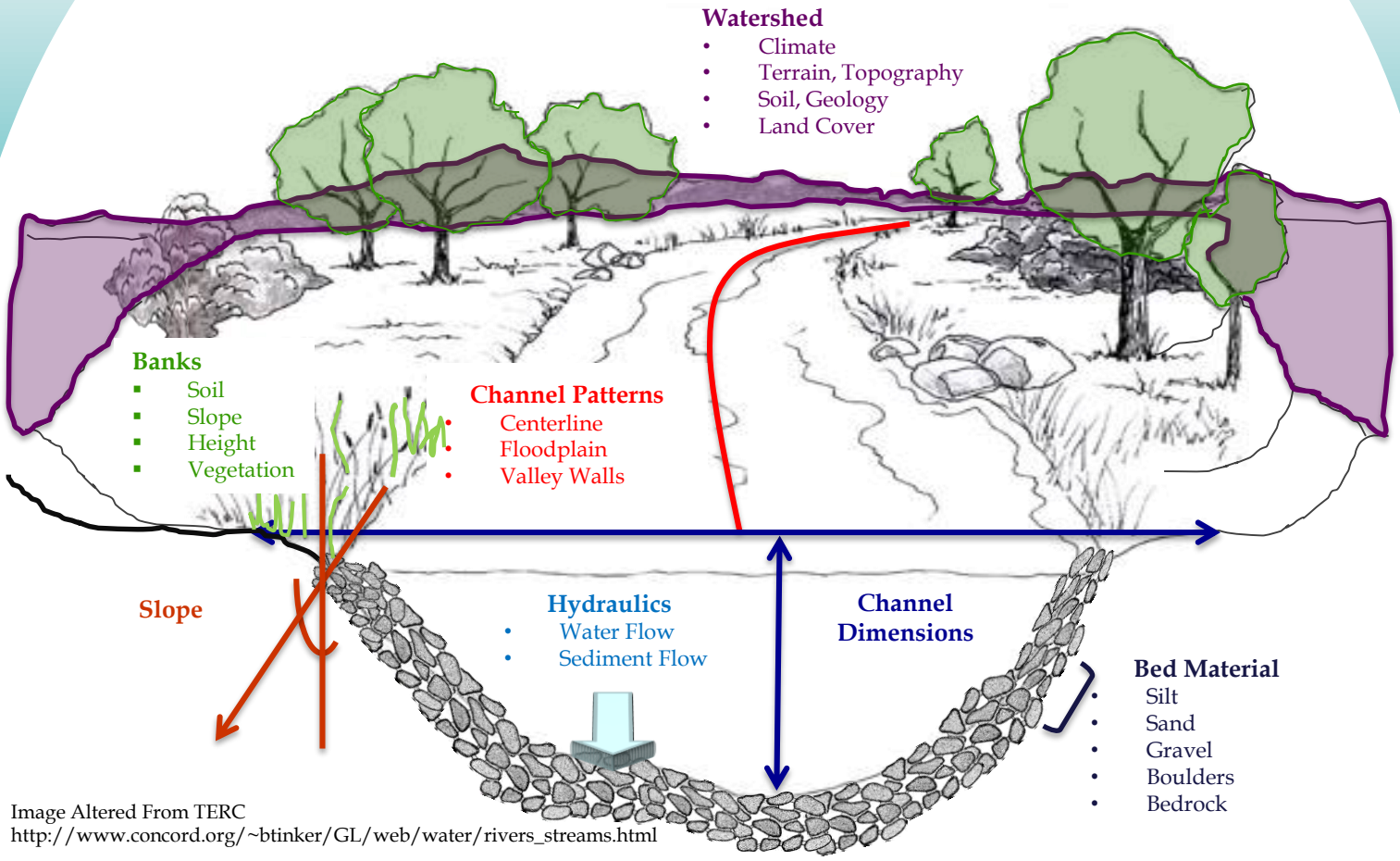

Image Altered From TERC
http://www.concord.org/~btinker/GL/web/water/rivers_streams.html

Common River Features	
Watershed	Climate, topography, geology, & cover of the land area drained by a river determine patterns of water & sediment flow.
Channel Banks	Bank stability - susceptibility to erosion and collapse – is based on soil, slope, height, and vegetation. Bank erosion is a major source of sediment and nutrients to the stream, and is an often-overlooked hazard.
Channel Patterns	The shape of a river as seen from above is its pattern. Random variation in flow speed cause rivers to naturally curve. Channel pattern is related to other features such as slope, watershed size, and bed and bank materials.
Channel Bed	Bed materials are rocks of many sizes and shapes, from silt and sand to boulders and bedrock. Large material builds up over time and helps keep a channel in place. Stones also provide habitat, spawning ground, and shelter to organisms.
Channel Dimensions	The volume of water that can move through a river is directly tied to the width, depth, and slope of the channel. Changes to flow patterns can alter these dimensions, and changes in these dimensions can alter discharge patterns.
Hydraulics	Important aspects of a river's flow patterns include flow speed, volume of water, and the timing of flood events.
Slope	Generally, steep channel contain powerful streams that erode large materials. Low-gradient channels have low-powered streams that deposit fine materials.