# STREAM GEOMORPHOLOGY

This is a term used more and more frequently be persons interested in rivers and streams. The words mean the study of water and earth forces that form stream channels, drainage patterns, floodplains, terraces, and explain erosion, sediment transportation and deposition. That's what BRASS is now studying through literature, and through the use of field survey equipment and computational analyses thanks to a Lake Champlain Basin Program grant.

Why are we anxious to read/talk this language, and to spend weeks slipping on streambed cobbles with survey equipment only to wrestle with mathematical formulas afterwards? It is not masochism; it is a desire to make sure the effort and precious dollars BRASS spends on stabilization go into projects that are successful and work with the river and its ecological habitats.

Previously, BRASS worked on eroding streambanks or repaired old DEC in-stream structures by applying design principles from professional conservation literature. We planted recommended vegetation species and shaped streambanks in certain ways, used recommended erosion control fabrics, figured the size of rip rap required to meet certain-sized storms, and copied old DEC Fisheries designs for stream habitat structures. Some projects seemed to work, but others were failures and we weren't sure why.

We want to tell you a few things we have learned in the process since it helps answer questions often asked us.

***"Shouldn't my eroding streambank be fixed?"***

In the last couple of years, increasing studies, literature, and demonstrations by professional hydrologists have changed how everyone approaches restoration efforts. Scientists like Luna Leopold and David Rosgen have determined relationships within stream systems that allow assessment of whether a stream is stable (even though it may not look like it is to others), or unstable through aggradation (building up more sediment than the water can move) or degradation (cutting into the streambed to lower its elevation). If it is stable–and stable streams may have 50% of its streambanks eroding–then there should be no efforts of stabilization except when there is a real threat to lives or valuable property.

If it is unstable, a careful study may reveal the river can repair what is causing instability if given the chance. If, however, instability requires human interference, then a study of another stream reach having similar characteristics and land use can help determine the elements of a good restoration design. H5> *"Shouldn't the river be back where it used to be?"*

A river is constantly adjusting to the varying amounts of water and sediment it must carry throughout the year. A stable river is not stationary. Indeed, water never flows in a straight line, even in a pipe. With friction and pressure, water meaders. This is true even when ice is melting (where there is no sediment load) and true in ocean currents.

In a river channel that must carry both water and sediment, the bed moves either up and down or laterally in meander arcs. As long as the cross sectional area of the channel remains the same, no matter how much the river has wiggled across a floodplain, the river can be said to be stable.

***"You're just worried about the fish, aren't you?"***

Nope. There is an incredible amount of wildlife along and in a river. Wildlife depends more on river channels and their adjacent lands than any other type of habitat. Then there is a "domesticated" form of wildlife called humans. Flooding is a major preoccupation of people who live near rivers. Yet flooding is a natural occurrence regulated by precipitation, climate, and geology. If we try to make the river stay in its channel we only corral or concentrate its energy to do even more damage.

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