OPTIMIZING STREAM STRUCTURE TO REDUCE NUTRIENT EXPORT

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Rivers and streams today suffer from varying degrees of impaired function, the result of poor land use over the last 150 years and land use changes to accommodate population increases. Significant stream impairment began with the logging industry followed soon after by agriculture and urbanization. Today, sand and silt erosion into the stream channel, the loss of woody debris and natural stream sinuosity have resulted in the loss of stream function.

Past efforts to measure water quality have placed a heavy emphasis on nutrient content. Contemporary stream theory places a much heavier emphasis on stream function, the ability of a lotic system to process and remove plant nutrients through natural biological cycles. Such cycles are very efficient in natural streams but function at a fraction of their potential in systems that suffer from varying degrees of impairment.

The physical and biological components of rivers and streams work in concert to utilize and thereby reduce nutrient export. In addition, a continuum of macro and micro fauna exist between the headwaters and confluence that, when interrupted, impairs nutrient reducing capabilities. Excessive drainage and sedimentation have reduced or eliminated the substrates necessary for efficient biological nutrient processing.

While significant efforts are being made to restrict or reduce nutrient inputs to our streams, additional efforts to *optimize the use of in-stream structure* can have a significant impact on total nutrient export. Hard substrate materials and nutrient retention structures can be added or enhanced to increase nutrient retention times. Increasing retention times will increase the opportunity for physical and biological nutrient reduction. These materials include rock and cobble as well as woody debris and woody debris jams. The above materials may be used to create channel restrictions that increase current velocity. Increases in current velocity will flush sand and sediment particles from the stream channel, exposing hard substrate materials.

In addition, strong attempts must be made to reduce violent surges that result from rain and storm events. Such radical changes sharply reduce nutrient retention times and increase nutrient export rates significantly.