River Bank Rehabilitation in Sand-bed Channels

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The use of anchored tree revetments incorporating live vegetation provides an effective, "habitat-friendly" approach for stabilizing eroding stream banks in sand-dominated rivers. Many bank stabilization techniques involve the use of large stone. Their application in sand-dominated rivers can be problematic for several reasons. Due to the erodible nature of sand, these mitigation measures are commonly outflanked or undermined, and can sink due to hydraulic sorting. Alternative treatments that rely more on large woody debris have been found to be superior in these dynamic systems. Mitigation measures for these systems should take into account the erodibility of the sand, and should include measures to increase roughness at the bank, thereby slowing flows. Additionally, treatments that trap sediment can also be effective in stabilizing these channels. NVCA and GEO Morphix Ltd. have applied knowledge of sand-bed channels to restoration projects in the Nottawasaga River watershed, where these sand-dominated systems are common. Prior to undertaking a restoration design, technical analyses are completed to determine an appropriate restoration technique. Bioengineering methods that include native vegetation are typically most appropriate. The use of woody bank revetments further enhances bank stability, while also providing aquatic habitat improvements particularly through high quality cover habitats for small and large fish. Plantings between the woody bank revetments provide cover and organic inputs, while also impeding flow velocities along the bank to further protect the bank. Additionally, the large surface area of the woody materials can provide optimal attachment habitats for aquatic invertebrates, including filter-feeding species, which can improve water quality. Once the appropriate technique is determined, additional analyses are completed to determine appropriate sizing of the treatments and their placement. This presentation discusses proper placement, installation, and anchoring, along with scour and force balance analyses to determine stability of these structures.