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Riparian Forest Basal (Tree Diameter) Growth Response to River Flow Along an Impounded River in Central Texas

(Biology / Arts and Sciences)

Riparian zones are those plant communities that line stream banks. The riparian environment is both dependent on water availability as well as crucial to the well-being of the stream channel with which it co-exists. Riparian forests provide numerous benefits to the stream ecosystem including filtering sediments from the water, preventing soil erosion, moderating stream temperatures and increasing biological diversity by providing unique habitat for other organisms. Because riparian trees are adapted to the long-term flooding regime of a stream, understanding of flood characteristics on tree growth (productivity) is crucial to maintaining healthy riparian zones. Occasional flooding increases soil nutrients and moisture, thereby enhancing productivity; however, trees that are too often inundated may become stressed and less productive. Accordingly, there should be an optimal flood frequency and/or duration where trees maximize flooding benefits before being excessively affected by water stress. When river conditions are altered, trees may respond favorably or be negatively impacted by the change in water availability. This study proposes to examine tree growth in response to the long-term flooding regime, and subsequent water level changes, along the North Bosque River in Central Texas. A recent increase in the Lake Waco Dam height downstream and construction of an adjacent wetlands have resulted in increased water inundation into the surviving riparian forest. Tree-ring analysis will be used to determine annual tree growth for the previous ~ forty years, which will then be evaluated relative to the frequency and duration of flooding along the river. Comparisons will then be made to post-alteration tree responses to determine whether trees are benefiting or being stressed by the inundated water. This study will provide riparian managers useful information to maintain healthy, diverse riparian zones. Where reaches are altered because of dam construction, managers may implement riparian conservation/restoration aimed at optimally maximizing the relationship between tree productivity and river conditions.