Recovery of Dewatered Upland Habitat Following Dam Removal

Martin Lafrenz
Department of Geography
Portland State University
1721 SW Broadway
Portland, OR 97201
lafrenz@pdx.edu

Removal of the 15-meter tall Marmot Dam from the Sandy River, OR provides an opportunity to evaluate the effects of reservoirs on upland soils and to assess how these soils and the abandoned reservoir sediments are responding to dewatering. A ripening index (n-value), a measure of soil development that is derived from soil moisture, organic matter percentage, and texture, is used to assess the dynamic changes in these soils. Following the construction of the dam in 1908, the reservoir filled rapidly with sand followed by accumulations of silt and clay near the upstream study site while aggradation continued in an upstream direction. The mantel of sand and silt buried a young soil that had formed on a stream terrace composed of lahar material from the 1790s Old Maid eruptive period on Mt. Hood. Three years following dam removal, the dewatered soil ripened to the depth of the buried soil (the n-value was less than 0.7). Compared with the downstream control soils these sediments have higher organic matter content and a finer texture. The buried soils below the sediment mantle have not ripened as the organic matter content is quite low and saturated from continued subsurface drainage following the removal of the dam. In fact, this continued drainage is mobilizing the oxidizing organic matter that was buried in the surface mantle leading to the ubiquitous eutrophic springs that are seeping from this former terrace. At this time it is unclear when this system will reach an equilibrium condition between carbon and nitrogen levels in the dewatered upland soils and how these soil dynamics will influence the successional pathways of vegetation in this newly created, nutrient rich, sub-aerial environment.