

**CHENNAI – PONDICHERRY**

**Assessing the effectiveness of riparian restoration projects using Landsat and precipitation data from the cloud-computing application ClimateEngine.org**

**Abstract**

Riparian vegetation along streams provides a suite of ecosystem services in rangelands and thus is the target of restoration when degraded by over-grazing, erosion, incision, or other disturbances. Assessments of restoration effectiveness depend on defensible monitoring data, which can be both expensive and difficult to collect. We present a method and case study to evaluate the effectiveness of restoration of riparian vegetation using a web-based cloud-computing and visualization tool ([ClimateEngine.org](http://climateengine.org/)) to access and process remote sensing and climate data. Restoration efforts on an Eastern Oregon ranch were assessed by analyzing the riparian areas of four creeks that had in-stream restoration structures constructed between 2008 and 2011. Within each study area, we retrieved spatially and temporally aggregated values of summer (June, July, August) normalized difference vegetation index (NDVI) and total precipitation for each water year (October-September) from 1984 to 2017. We established a pre-restoration (1984–2007) linear regression between total water year precipitation and summer NDVI for each study area, and then compared the post-restoration (2012–2017) data to this pre-restoration relationship. In each study area, the post-restoration NDVI-precipitation relationship was statistically distinct from the pre-restoration relationship, suggesting a change in the fundamental relationship between precipitation and NDVI resulting from stream restoration. We infer that the in-stream structures, which raised the water table in the adjacent riparian areas, provided additional water to the streamside vegetation that was not available before restoration and reduced the dependence of riparian vegetation on precipitation. This approach provides a cost-effective, quantitative method for assessing the effects of stream restoration projects on riparian vegetation.