Bosque on Fire!
Remote Sensing Estimation of Vegetation Recovery from Fire

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Millions of dollars have been spent in New Mexico to remove nonnative vegetation such as tamarisk from arid riparian lands along the Rio Grande. One of the tamarisk removal techniques is through the use of controlled burning. Tamarisk is early successional after fire, but little is known about succession rates to full maturity. Knowledge of succession rates will provide ecological managers with a timetable for the implementation of combined control techniques, such as burning followed by herbicide treatment, that have been proven to maximize tamarisk clearing of up to 90% (McDaniel and Taylor 2003). Elevated evapotranspiration (ET) rates of tamarisk are a main factor in motivating the invasive species' control. Tamarisk ET rates are among the highest of any phreatophyte evaluated in southwestern North America. At the Bosque Del Apache National Wildlife Refuge (BDA), ET rates from a dense stand of Tamarisk were reportedly 1.35 m/yr (McDaniel and Taylor 1996). Following the tamarisk removal, a healthy native plant community can be reestablished with comparatively lower ET rates. Satellite derived estimates of spatial ET computed using a Surface Energy Balance Algorithm for Land (SEBAL) provide an accurate means for monitoring vegetation change and water consumption before and after fire. In this project SEBAL will be used to estimate and compare ET at the burned and unburned areas of three recent fires: 1. Mitchell Fire of April 10-16, 2005, which burned 1,100 acres of private land, 2. San Marcial Fire of May 3-6, 2006, which burned 4,819 acres of private land and 755 acres of the southern end of Bosque del Apache NWR, and 3. Bosquecito Fire of June 6-11, 2006, which burned 640 acres of private land. By comparing the SEBAL model results to field point measurements, the method will be evaluated in its effectiveness of estimating spatial and temporal ET and vegetation recovery after fires. This project will ultimately advise hydrological and ecological managers, such as at the Bosque Del Apache and Sevilleta NWR, on regeneration rates and changes in ET post fire. In addition, the project aims to provide a time table for the implementation of combined burn-herbicide control techniques, as an alternative to costly tamarisk removal methods such as mechanical removal or cut-stump herbicide application.

Biographical Sketch

Nicole grew up in coastal, suburban, affordable housing era of Orange County, California. She first became interested in hydrology at age 7, when the Orange County Water District gave a presentation to her class on the newsworthy drought water crisis and the hydrologic cycle. In the year 2000 she started at the University of California at Santa Cruz (UCSC) as a biology major, with an emphasis on wetland and rainforest ecology. After two years in the company of ruthless pre-med biology majors, she decided to change her major to earth science in order to pursue a lifelong interest in soil science and hydrogeology, as a career. During her last two years at UCSC, she participated in 2 research assistantships, with one of the assistantships contributing

research towards her undergraduate senior thesis on sediment properties above a seamount hydrothermal seepage zone, offshore Nicoya Peninsula, Costa Rica. After graduating and touring Europe solo, she was hired on to SECOR International Incorporated as a Staff Geologist, where she worked on "bread and butter hydrology"—writing Quarterly Reports and remediating soil and groundwater at contaminated gas stations and airports in Los Angeles County. She traveled to Socorro in August 2005 and has worked on tamarisk-fire research, as well as landmine detection research as part of the Hendrickx Research Group, and will be in residence until approximately December of 2007. After graduating from NMT she hopes to tour China, find a nice Jewish husband, and return to the environmental consulting field where she will work her way up the corporate ladder.