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Desertification and other ecological impacts produced by the historic Rodeo-Chediski Wildfire of 2000, Arizona, USA

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The Rodeo-Chediski Wildfire - the largest in Arizona's history - damaged or destroyed ecosystem resources and disrupted ecosystem functioning in a largely mosaic pattern throughout the ponderosa pine (Pinus ponderosa) forests exposed to the burn. Impacts of this wildfire on tree overstories were studied on two watersheds in the area burned; one watershed burned by a high severity (stand-replacing) fire, while the other watershed burned by a low severity (stand-modifying) fire. The Rodeo-Chediski wildfire damaged or destroyed ecosystem resources and disrupted the ecological functioning on much of the 189,015 ha impacted by the burning. Intermingling chaparral shrub communities and pinyon-juniper woodlands at lower elevations and ponderosa pine forests at high elevations were located within the burned area. The wildfire was caused by two human ignitions that merged into one inferno. The Rodeo Fire was started by an arsonist on June 18, 2002, while the Chediski Fire was ignited as a signal fire by a stranded motorist on June 20th. The two fires merged on June 26, 2002, to become the Rodeo-Chediski Wildfire. The combined wildfires were contained on July 7th at a suppression (firefighting) cost of about €37.9 million (USA $50 million). However, the estimated costs associated with property losses; losses of ecosystem, anthropological, and cultural resources; and post-fire rehabilitation efforts increased the costs of the wildfire to over €114 million (USA $150 million). About one-half of the total area that was burned by the Rodeo-Chediski Wildfire experienced a high-severity fire, other areas burned at a low- to medium-severity fire, and still other areas were largely unburned according to a Burned Area Emergency Rehabilitation (BAER) report and fire severity map prepared shortly after containment of the wildfire. A mosaic of areas burned at varying fire severities within intermingling unburned areas resulted. Post-fire rehabilitation efforts, including establishment of water bars, wattles, k-rails, and aerial seeding and mulching of herbaceous plants to mitigate that anticipated accelerated post-fire soil erosion, began immediately after the fire was extinguished and it was declared safe for people to enter the burned area and initiate rehabilitation. An assessment of the impacts of the Rodeo-Chediski wildfire on soil erosion was carried out on two watersheds situated at the headwaters of the Little Colorado River. One of the watersheds experienced a high severity burn and the other a low-to-medium severity burn. Estimates of soil erosion on a watershed-basis and relative to physiographic characteristics on the two watersheds following the (a) high-intensity summer monsoonal rains and (2) low-intensity winter precipitation and spring snowmelt-runoff events are presented and compared with estimates of soil erosion following other wildfires in the region. Monitoring of soil erosion and other hydrologic and ecological parameters is continuing to obtain a longer, more comprehensive picture of the impacts of this catastrophic wildfire event. The Rodeo-Chediski Wildfire altered the species composition and impacted the production of herbaceous plants on the burned watersheds studied. Effects of the post-fire vegetation changes reduced the capabilities of watersheds to support livestock and some of the other larger herbivores in the region. When these watersheds will return to pre-fire conditions is largely unknown. Not only must the forage resources be restored but the magnitude of post-fire soil erosion and accompanying nutrient losses must be mitigated. Post-fire rehabilitation efforts including the seeding of herbaceous species and installation of controls to reduce soil erosion and sedimentation processes have helped to accelerate this recovery to some extent. A much longer time will obviously be required for severely burned areas to recover than those areas burned by at a low severity. Portions of the latter have already returned to pre-fire conditions.