Analysis of Desert Shrubs along First Order Channels on the Desert Peidmonts: Possible Indicators of Ecosystem Health and Historic Variation

Conservation
CS-1153

Background:

Within the United States, approximately 70 percent of Department of Defense lands are located in arid and semi-arid environments. The overall majority of this land that is suitable for wheeled or track vehicles is desert piedmont plains (bajadas) that are largely comprised of alluvial fans covered with desert (rock) pavement and active washes. The greatest concentration of biomass and biodiversity in these areas is associated with vegetation along rills and tributary channels that drain alluvial fans as well as along main alluvial washes. This distribution of vegetation is primarily the result of a considerable increase in available water that is derived from the ephemeral runoff of precipitation generated from surrounding soils and desert pavements. In some cases, this runoff-supplied water may be two or three times the amount of water received from precipitation alone. Any change in the runoff water, whether the result of military activities (i.e., disruption of soil and pavements) or natural environmental (i.e., climatic variation) change, will directly impact the ecosystem.

Objective:

This project addresses the following three objectives: (1) to determine historic range in variation (HRV) of key desert vegetation common to alluvial fan surfaces and first-order rills, including HRV resulting from both military activities and natural environmental change; (2) to evaluate if changes in soil and surface hydrology, resulting from either military activities or natural environmental variation, can be shown to predominantly account for changes in ecosystem health; and (3) to provide recommendations that can be utilized to further develop and test methods or procedures that can be used to monitor ecosystem status and identify impacts related to natural disturbance relative to military activities.

Summary of Process/Technology:

The project will be focused on the extensive areas of desert piedmont at the U.S. Army Yuma Proving Ground in Arizona, but the overall concepts and technical approach will be applicable to many Federal installations in the desert Southwest. Two first-order drainage basins will be selected for this study. Drainages will cover approximately 500 to 1000 square meters and will consist of drainage areas that have a nearly continuous cover of desert pavement (prior to any disturbance). One basin will drain an area with minimal disruption from military activities (natural basin); the other basin will drain an area that has been extensively disrupted by military activities (impacted basin), especially through degradation of the soil and pavement by tracked vehicles.

An aerial view of an alluvial fan surface.

Benefit:

Recognition of physical and biological signals that indicate change in the flux and availability of water because of either military or environmental causes will greatly benefit conservation management of sensitive desert lands. Results will directly advance knowledge of fundamental soil-hydrology-vegetation processes that are common to desert piedmonts. Evaluation of critical linkages between soils, soil water balance, and desert plant ecology will provide key information about the impact of climate and military activities on desert shrubs, soils, and archeological sites.

Accomplishments:

This is an FY00 New Start project.

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