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2nd Choice:	Disturbance Ecology

HANSEN*, D. J. and W. K. OSTLER, Bechtel Nevada. An evaluation of new high-resolution image collection and processing techniques for estimating shrub cover and detecting landscape changes associated with military training in arid lands.

Research funded by the U.S. Department of Defense, U.S. Department of Energy, and the U.S. Environmental Protection Agency as part of Project CS-1131 of the Strategic Environmental Research and Development Program evaluated novel techniques for collecting high-resolution images in the Mojave Desert using helicopters, helium-filled blimps, kites, and hand-held telescoping poles at heights from 1 to 150 meters. Several camera types, lens, films, and digital techniques were evaluated on the basis of their ability to correctly estimate canopy cover of shrubs. A high degree of accuracy was obtained with photo scales of 1:4,000 or larger and flatbed scanning rates from films or prints of 300 lines per inch or larger. Smaller scale images were of value in detecting retrospective changes in cover of large shrubs, but failed to detect smaller shrubs. Excellent results were obtained using inexpensive 35-millimeter cameras and new super-fine grain film such as Kodak's Royal Gold^{TM} (ASA 100) film or megapixel digital cameras. New image-processing software, such as SigmaScan Pro^{TM}, makes it possible to accurately measure areas up to 1 hectare in size for total cover and density in 10 minutes compared to several hours or days of field work. In photographs with scales of 1:1,000 and 1:2,000, it was possible to detect cover and density of up to four dominant shrub species. Canopy cover and other parameters such as width, length, feret diameter, and shape factors can be nearly instantaneously measured for each individual shrub yielding size distribution histograms and other statistical data on plant community structure. Use of the technique is being evaluated in a four-year study of military training impacts at Fort Irwin, California, and results compared with image processing using conventional aerial photography and satellite imagery, including the new 1-meter pixel IKONOS images. The technique is a valuable new emerging tool to accurately assess vegetation structure and landscape changes due to military or other land-use disturbances.