



Detecting areas disturbed by mining activities through Landsat images, San Luis Potosi City, Mexico

M.A Torres-Vera

Instituto Potosino de Investigacion Cientifica Y Tecnologica, Departamento de Geología Económica

Camino a la Presa San José 2055, Col. Lomas 4a. sección C.P. 78216, San Luis Potosí, San Luis Potosí, México. mtorres@ipicyt.edu.mx phone: +52 (444) 8342000 Ext. 2060 **Fax:** +52 (444) 834 20 10

The State of San Luis Potosi is largely situated within the northern reaches of Mexico's elevated Central Plateau. Here silver mining and livestock raising are both of economic importance. The capital of San Luis Potosi sits at the approximate midpoint of a triangle formed by Monterrey, Guadalajara and Mexico City. San Luis Potosí city (1990 pop. 489,238), capital of San Luis Potosí state, central Mexico. Situated on a plain almost entirely surrounded by low mountains, the city is a mining and agricultural distribution center and a rail junction. Industries include foundries, smelters, and factories which produce clothing, leather goods, and beverages. Mining for natural resources is invariably associated with land use change. Intensive monitoring of disturbed lands is necessary for effective management of surface mine recovery. Image classification can be used to determine landcover types, including vegetation classes, disturbed areas and impervious surfaces, among many others. When images are gathered over multiple time periods, conspicuous differences between vegetation classes can be determined or land cover change can be monitored. Of course, this depends on the length of time between the image dates. We were able to avoid many of the common problems associated with multi-temporal or change detection studies by seeking drastic changes in the Normalized Difference Vegetation Index (NDVI), corresponding to loss of greenness or vegetation. The results indicate this is a viable method for rapid determination of mining activity. Carefully classified images are a useful tool

for resource development and management and regulatory compliance. Three LandSat images (1973, 1983, and 1996) were evaluated for detection of areas disturbed by mining activities in the region of San Luis Potosi City, Mexico. Subtle tonal contrast between eroded areas and vegetation in San Luis Potosi constitutes a serious constraint on the identification of disturbed areas, using MSS LandSat images. However, normalized difference index (NDVI) images allowed identification of cover changes related to mining activities. NDVI images indicated increase in areas disturbed from 1973 to 1983 and from 1983 to 1996. The 1973–1996 NDVI images show significant changes. Results showed that processed LandSat images may be used to detect land cover changes even in non-forested terrain with low spectral contrast among scene components.