Mapping Land Cover in Urban Residential Landscapes using Fine Resolution Imagery and Object-oriented Classification

A knowledge of different types of land cover in urban residential landscapes is important for building social and economic city-wide policies including landscape ordinances and water conservation programs. Urban landscapes are typically heterogeneous, so classification of land cover in these areas requires fine resolution imagery in order to capture the level of detail required for effective decision-making. The main objective of our research was to characterize land cover proportions by zip code in Albuquerque, New Mexico. To achieve this objective, we classified a random selection of residential land parcels using object-oriented classification and fine spatial resolution photographic imagery. Vector data representing land parcels within the city limits of Albuquerque, zip codes, and land-use were used to create an integrated Geographic Information System (GIS) database. The database was stratified based on 16 zip codes, then 30 parcels were randomly selected from each zip code. Orthorectified, true color aerial photographs acquired in 2008 with 0.15 m (0.5 ft) resolution were used to identify irrigated areas (trees, shrubs and grass), swimming pools and non-irrigated areas using the object-oriented classification module embedded in ENVI EX 4.7.1software. Imagery was first segmented to produce meaningful image objects. These objects were then classified using a nearest neighbor algorithm. The variables used in this classification were: spatial, textural and spectral attributes. Then, we assessed classification accuracy and calculated landscape feature areas. Accuracy assessment was calculated using confusion matrices. Results showed that user's and producer's accuracy for different classes in the six zip codes ranged from 73% to 100%. Overall classification accuracy ranged from 80% to 90%. Most zip codes had a common landscape with 75% trees and 25% shrubs and turf. One zip code had 50% trees, 40% grass and 10% shrubs. About half of the parcels in three zip codes (87104, 87106, and 87110) had 40% of the parcel irrigated, while 80% of parcels in the other zip codes had irrigated areas of about 20%. Knowledge of these land cover proportions will provide useful guidance for water conservation and residential landscapes policies.