Detailed Stream Riparian Buffer Zone Characterization Using High Resolution Remotely Sensed Data

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Accurately mapping and characterizing narrow forested riparian buffers using remotely sensed data requires data of higher resolution than the 20 to 30 meter resolution that has previously been readily available. In addition, accurately mapping the locations of small streams and characterizing adjacent land use is critical to assessing the hydrologic and ecologic impacts of forested riparian zones. With the availability of 4-meter resolution Ikonos multispectraldata and sub-meter accuracy elevation data provided by LIDAR, these narrow riparian buffer zones can now be more accurately mapped and characterized. This paper reports on an evaluation of these high-resolution data to determine their effectiveness in mapping and characterizing such narrow stream buffers. The objectives of the project include: (1) detailed characterization of LU/LC in stream riparian zones and mapping of the adjacent land use and land cover; (2) assessing the effectiveness of new high-resolution remote sensing data sources in determining effective riparian buffer widths and cover types, and (3) assessing the effectiveness of using LIDAR data in horizontally mapping stream centerlines and consequently, more accurately mapping stream buffers. The evaluations of LU/LC are based on using IKONOS, DOQQ, SPOT4, and Landsat TM-7 data. Publicly available LIDAR data from the North Carolina Flood Mapping Program will be used to evaluate the horizontal mapping of stream centerlines. The study area is approximately 4km by 13km and covers the Contentnea Creek Watershed including a growing urban area (City of Wilson) located in Wilson County, NC. The approach used in this research involves the creation of LU/LC classifications using various satellite data and the comparison of the resulting classifications between the various satellite data types. Accuracy assessment of the various LU/LC classifications and maps is based on GPS controlled field data. Accuracy assessment of the LIDAR topographic mapping and stream centerline locations is also based on sub-meter accuracy GPS controlled field data. A customized land-use/land-cover classification and mapping scheme is currently under development for comparison with an EPA-produced classification scheme. This project will produce an integrated approach for use of very high-resolution satellite data for riparian buffer zone characterization, mapping, and monitoring and for assessing hydrologically important spatial relationships to land uses adjacent to the stream.