Remote Sensing Applications for Environmental Analysis in Transportation Planning: Application to the Washington State I-405 Corridor

Center for Transportation Analysis (CTA) Research Areas

Aviation Safety
Air Traffic Management Analysis
Data, Statistical Analysis
Geo-Spatial Information Tools
Defense Transportation
Energy Policy Analysis
Environmental Policy Analysis
Highway Safety
Intelligent Transportation Systems
Logistics Management
Supply Chain Management
Modeling and Simulation
Transportation Operations
Planning and Systems Analysis
Transportation Security

Patricia S. Hu, Director
Center for Transportation Analysis
Oak Ridge National Laboratory
2360 Cherahala Boulevard
Knoxville, TN 37932
865.946.1349
(Fax) 865.946.1314

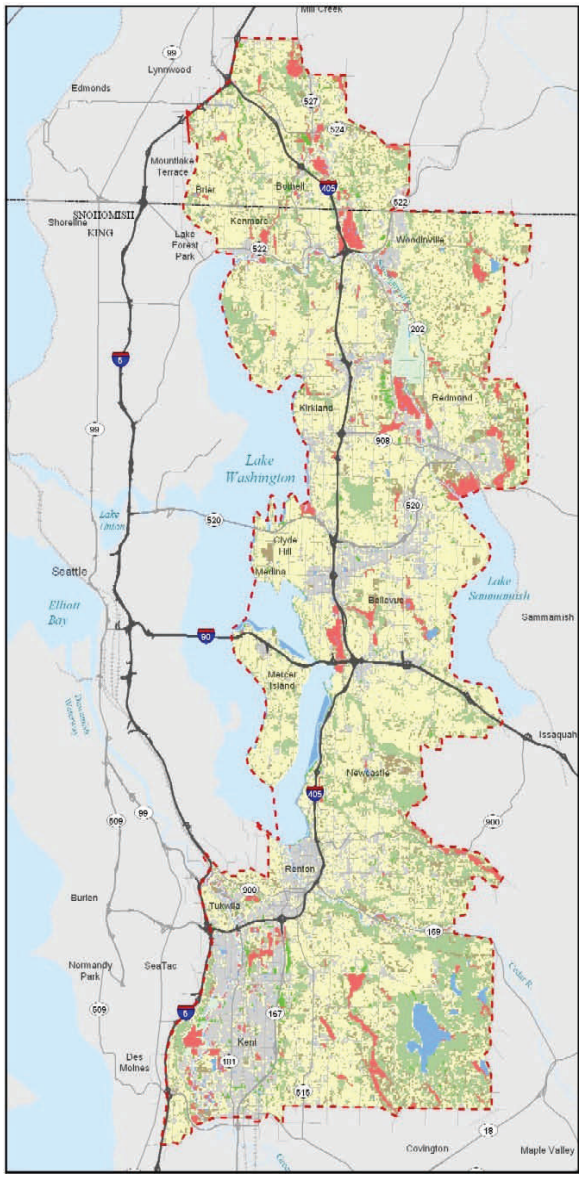
Website: cta.ornl.gov

Oak Ridge National Laboratory is managed by UT-Battelle, LLC, for the U.S. Department of Energy under Contract number DE-AC05-00OR22725

UT-BATTELLE

Washington State Department of Transportation (WSDOT), Oak Ridge National Laboratory, ERDAS, Inc., Space Imaging, the U.S. Environmental Protection Agency, Wisconsin DOT, and the Puget Sound Regional Council partnered to demonstrate and assess the applicability of commercial remote sensing products and spatial information technologies to environmental analysis in transportation planning.[1] The I-405 corridor in Washington State was used as a test case.

The project used Landsat 7 Enhanced Thematic Mapper Plus (ETM+) imagery as the primary data source for spectral analysis, complemented with broadly available data such as TIGER files, U.S. Geological Survey's Land Use / Land Cover maps, and orthophotos and digital elevation models (DEM). Supervised image processing methods were used, together with ancillary GIS data and manual interpretation, to provide a preliminary land use / land cover classification that had an overall accuracy of 80%. This preliminary classification was enhanced and integrated with existing GIS layers to prepare a set of environmental discipline maps.



[1] This study was part of the National Consortia on Remote Sensing in Transportation – Environmental Assessment (NCRST-E) program funded by the U.S. Department of Transportation's (U.S. DOT) Research and Special Programs Administration (RSPA) and the National Aeronautical and Space Administration.

These maps and basic land-cover acreage calculations were evaluated in a survey of stakeholders in the I-405 project and staff from other state DOTs. They compared these remote sensing / geographic information system (RS/GIS) products to the actual maps used in I-405 environmental-discipline reports, considering the RS/GIS products as either a replacement of, or an addition to the conventional mapping.

The comparisons were in terms of their: (a) attributes – nature of the information; (b) costs – data compilation and map production expenditures; (c) value – relative worth to the purpose; and (d) usefulness – comparable, supplementary, or complementary to the conventional mapping. Assessment of attribute comparisons showed that, for most disciplines, the RS/GIS maps included more information. The costs of the RS/GIS products were estimated to be comparable to the costs of developing the conventional mapping, once the initial R&D on how to generate the RS/GIS products is done (which was the major purpose of this project).

The survey responses varied for the different environmental-discipline maps evaluated and by the role of the respondent in the actual I-405 work. The most agreement was that the RS/GIS approach was better for land use and transportation network applications. Most of the responses indicated that the RS/GIS products would not have led to a different assessment of environmental impacts, though several respondents indicated that the RS/GIS products might have helped to better communicate those impacts. In general, most responses were generally positive about the value and usefulness of the RS/GIS products. For more information, refer to the project web site: http://www.wsdot.wa.gov/environment/envinfo/envinfo_I405.htm.

For more information contact Demin Xiong, Center for Transportation Analysis, Oak Ridge National Laboratory, phone (865) 946-1221 or e-mail xiongd@ornl.gov.