



## More For Your Money

*Researchers gauge the cost and effectiveness of remote sensing technologies to monitor development and its impact on water quality.*

### Challenge

More than half of the U.S. population lives along the coast, and these communities are expected to grow by an additional 27 million people by 2019. To protect water quality, coastal managers need tools to understand inland and near shore development patterns and predict the pollution such development entails. Traditional methods of monitoring development such as aerial photography are expensive and time consuming and prevent managers from regularly gauging the impact of rapid growth on coastal resources.

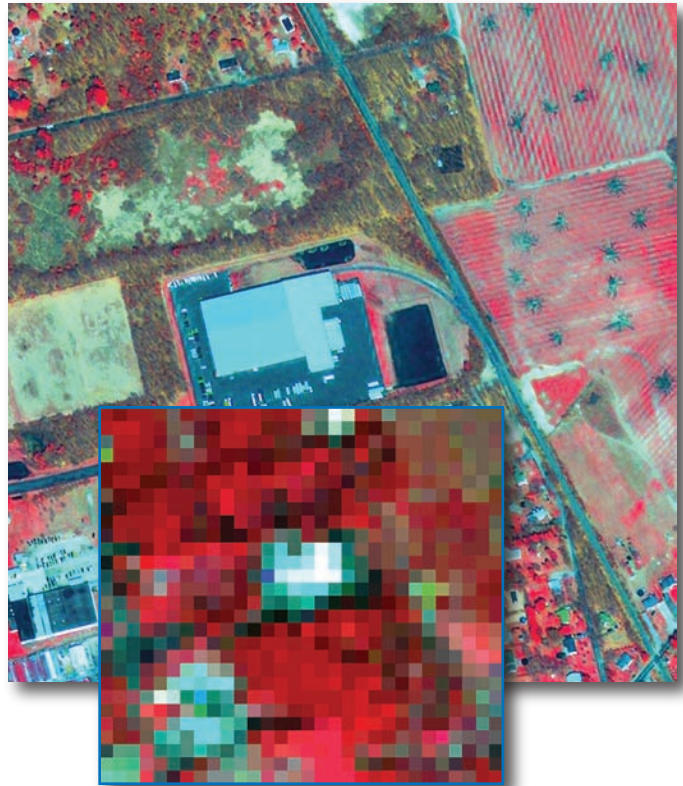
### Response

With a grant from CICEET, researchers from Rutgers University assessed the utility and cost-effectiveness of remote sensing technologies to monitor the intensity of land cover and water quality.

The project developed three reliable indices of human land coverage to track development over time: impervious surfaces, managed lawns; and tree cover. They then obtained imagery data using three acquisition systems: Landsat ETM, a medium-resolution, public domain data system; IKONOS, an expensive, high-resolution imagery system; and traditional, aerial photography. Using this data and the three indices, investigators explored several image analysis techniques that quantify development and compared them for quality and cost-effectiveness.

Results showed that the Self-Organizing Map Neural Network (SOM) analysis technique provided the best estimates of the three land cover components. The Landsat ETM System, the IKONOS System and aerial photography all provided closely comparable estimates of impervious surface and lawn cover.

These results demonstrated that medium-resolution imagery such as Landsat ETM can provide useful information for watershed managers at a fraction of the cost of IKONOS and aerial photography. While IKONOS can cost approximately \$270 per square km, Landsat ETM provides accurate results for just \$.02 per square km. Information can be obtained faster, more frequently, and at a minimum expense.



*This high-resolution, but costly, IKONOS image [background] provides estimates of impervious land cover comparable to less expensive, Landsat ETM medium-resolution imagery [inset]. Project results indicate that medium resolution imagery such as Landsat can provide useful information at a fraction of the cost of higher resolution data acquisition systems.*

### Impact

Researchers successfully applied the SOM technique to Landsat imagery covering the entire state of New Jersey. Future research will focus on improving estimates of the tree cover index.

#### [Learn more](#)

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