



Landscape Dynamics Monitoring

Network Parks Where Landscape Dynamics is Monitored

△ All Pacific Island Network national park units

Importance: Controlling Factor for Other Resources

The conversion of native habitat to developed land or to another vegetation type fundamentally affects habitat conditions and ecosystem processes. Fires, human-made development, ecosystem restoration, soil erosion, nutrient transport, and climate change are all examples of events or processes that can dynamically change a landscape. These changes impact native ecosystems in a variety of ways that alter species compositions and water quality as well as quantity. Land use and human or naturally caused land cover change must be considered a central component in developing strategies for managing natural resources and monitoring environmental change.

Long-Term Monitoring

The Landscape Dynamics Protocol uses GIS and remote sensing technologies to map land use and land cover changes over time. A pilot study, testing the North Coast Cascades Network monitoring protocols using Landsat imagery for Hawai'i Volcanoes National Park, indicates that image differencing*, rather than change vector analysis**, provides results that are more accurate and easy to interpret and therefore better-suited for PACN resources management. A new pilot study will test the use of higher resolution imagery (Quickbird™) to detect land cover changes in more detail within Kaloko-Honokōhau National Historical Park. Moreover, GIS analysis of thematic layers of land cover, roads, and human population densities for the watershed of Kaloko-Honokōhau National Historical Park show an increasingly fragmented landscape due to urban development between 1980 and 2000.

Monitoring Objectives

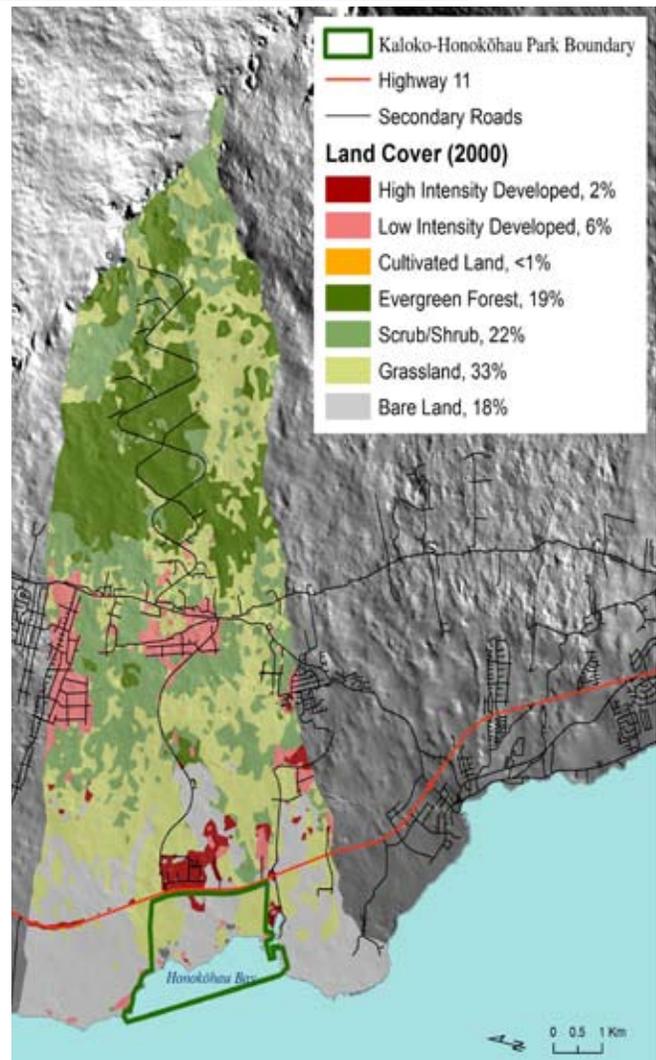
- △ Identify land cover changes (and trends) occurring within PACN parks
- △ Identify land use changes within the watersheds of PACN parks

Management Applications

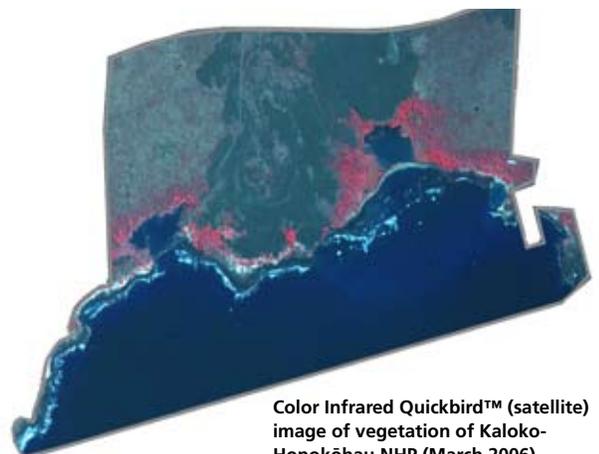
- △ Information from GIS land use analysis will provide park managers with comprehensive information (GIS files, databases, and reports) for evaluating the dynamic interaction between urban development, forest fragmentation, soil erosion, eutrophication, and the spread of invasive species
- △ Focus vegetation mapping efforts in areas that have changed, reducing time and effort required to maintain accurate up-to-date vegetation maps

* For more information on image differencing (image subtraction) go to: http://www.cast.uark.edu/local/brandon_thesis/Chapter_IV_change.htm

** Change vector analysis indicates the direction and magnitude of change. For more information see: <http://www.isprs.org/commission1/proceedings02/paper/00014.pdf>



The above GIS map depicts the vegetation classes of the watershed of Kaloko-Honokōhau NHP.



Color Infrared Quickbird™ (satellite) image of vegetation of Kaloko-Honokōhau NHP (March 2006).

Network: <http://science.nature.nps.gov/im/units/pacn/> Resource: http://science.nature.nps.gov/im/units/pacn/monitoring/vs_landscape.cfm