

Forest Formation and Land Cover Map Series: Caribbean Islands

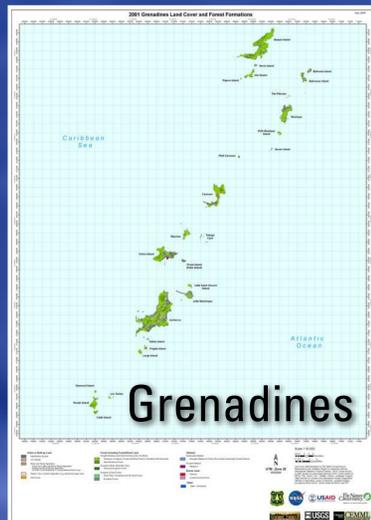
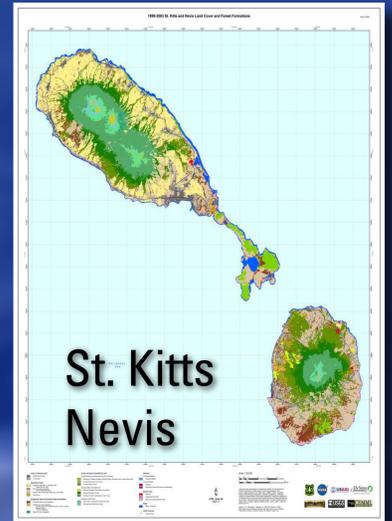
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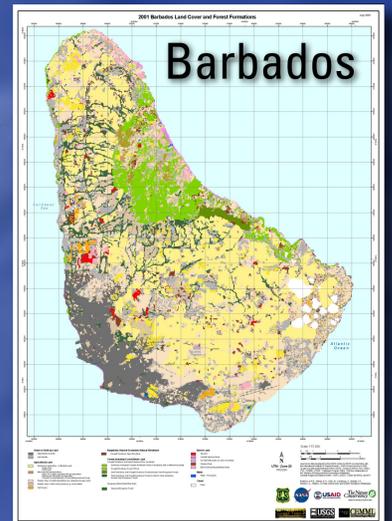
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St. Kitts
Nevis



Dominica



St. Lucia

St. Vincent

Grenadines

Barbados

Grenada

ABSTRACT

Forest formation and land cover maps for several Caribbean islands were developed from Landsat Enhanced Thematic Mapper Plus (ETM+) and SPOT imagery as part of a multi-organizational project. We used decision tree classification methods to classify the Landsat imagery for Puerto Rico (including Vieques and Culebra islands) (Kennaway, submitted), St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, and Grenada. SPOT imagery was included for the analysis of Dominica. Land cover and forest formations obscured by clouds in the Landsat imagery were manually delineated using IKONOS imagery for large parts of St. Lucia, St. Vincent and the Grenadines, and the entire island of Barbados. The woody vegetation classification scheme relates closely to that described in "A guide to Caribbean vegetation types: classification systems and descriptions" by Areces-Malea (1999). This scheme classifies Caribbean vegetation according to standards of the U.S. Federal Geographic Data Committee, with modifications similar to those in "Mapping forest types and land cover of Puerto Rico, a component of the Caribbean biodiversity hotspot" by Helmer (2002). For each mapping area, the decision trees were used to classify a stack of raster layers that included the Landsat image bands and various ancillary raster data layers. For Puerto Rico, ancillary data included climate parameters (Daly, 2003). For some islands, ancillary data included Shuttle Radar Topography Mission data (SRTM) (Farr, 2000) or other orthophotography and topographic derivatives such as aspect, slope, and slope position. We applied regression tree normalization (Helmer, 2005) to develop image mosaics that were mostly cloud-free, including mosaics for wet and dry seasons for several of the islands.

The map of the Dominican Republic (DR) (Hernández, 2005) was developed by the DR Department of Environment and Natural Resources. Land cover classes were manually interpreted; rule-based methods were not used. Woody vegetation classes in the original map for the DR corresponded to those of Tolentino and Peña (1998), and included two conifer cover classes, four climatic zone classes of broadleaved forests, and two shrubland classes. These classifications were cross-walked to match the classes used on maps of other islands based on surficial geology and applying techniques described in Helmer and others (2002).

The approach of using decision tree classifiers along with ancillary geospatial data accurately distinguished spectrally similar forest formations without the aid of ecological zone maps. Decision tree classifiers accommodated spectrally heterogeneous classes, and the regression tree modeling techniques used to fill cloud gaps produced mosaics of cloud-free images that were easier to visually interpret. These gap-filled products aided the collection of training data. For several of the islands, the use of multi-season imagery enhanced land cover classification accuracy by distinguishing between similar classes, such as semi-deciduous forest (including semi-evergreen forest) and dry deciduous forest/woodland.

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COOPERATING INSTITUTIONS

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DATA AVAILABILITY

These land cover data and cartographic products will be available June 2007 for download at the following Web sites: USGS Center for Earth Resources Observation and Science - International Programs (<http://edcintl.cr.usgs.gov>) and U.S. Department of Agriculture Forest Service International Institute of Tropical Forestry (<http://tropicalforestry.net/>).