

Combining GIS and Remote Sensing for Forestry

11/14/2000

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Overview

- Affiliated Research Center (ARC) Program
- ARC at SUNY-ESF
- International Hardwood Consulting
- Project summary: combining remote sensing and GIS for forestry

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Affiliated Research Center

- An initiative of NASA's Commercial Remote Sensing Program
- Aimed at improving commercial use of remote sensing
- Provide companies with a low risk opportunity to investigate commercial ideas

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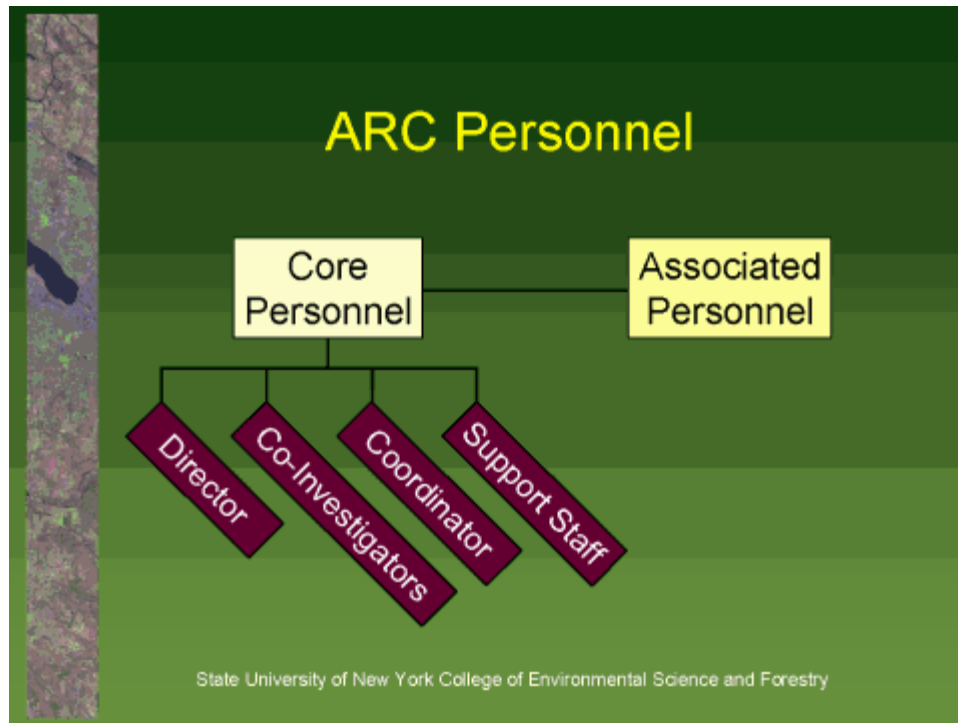
ARC at ESF

- ESF is one of nine ARCs in the U.S.
- ARC at ESF established in 1998
- Primary affiliation with Environmental Resources and Forest Engineering
- Draw resources from several other departments at ESF

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International Hardwood Consulting

- Based in Doylestown, Pennsylvania
- Seeks to find logistically smarter methods of manufacturing, packing and sourcing raw materials
- Interest in increasing low impact, selective harvesting and reducing unnecessary logging

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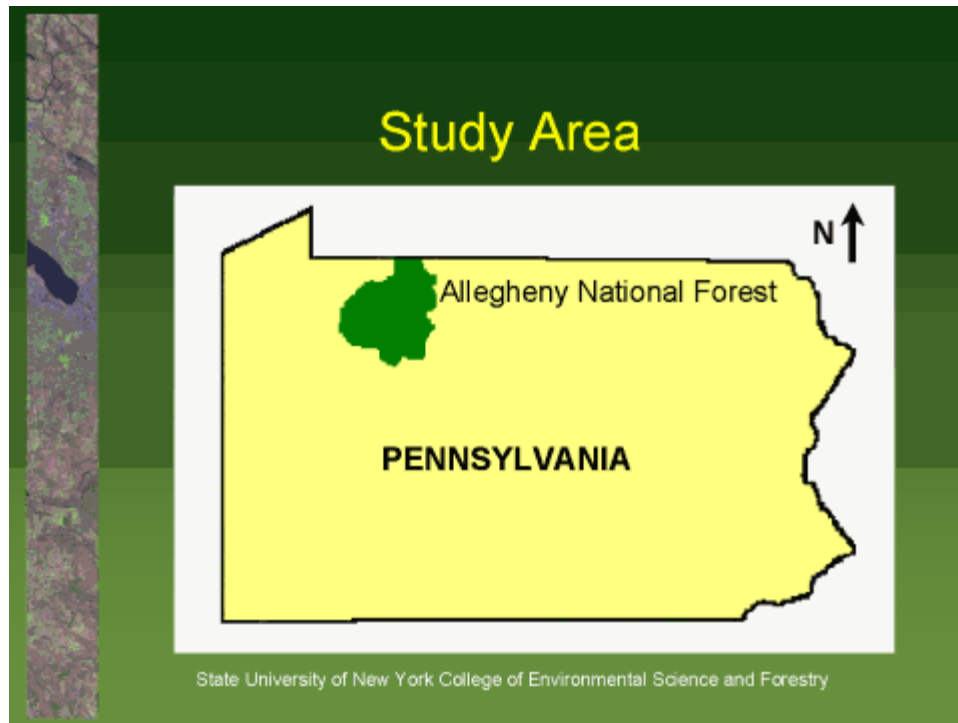


The Project


- Investigate using remote sensing techniques and GIS analysis to define specific forest regions
- Specifically:
 - Use remote sensing to define desirable forest types
 - Use GIS to define regions with limited access

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Software Used

- Remote sensing processing
 - ERDAS Imagine V 8.3.1
- GIS analysis
 - ESRI ARC/INFO V 7.2.1
 - ESRI ArcView V 3.1

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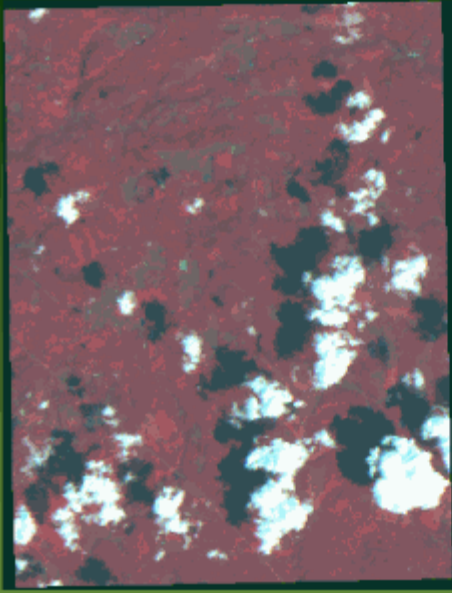
Imagery and Data Used

- Landsat Thematic Mapper Imagery
 - 6 spectral channels
 - 30 meter ground sample distance

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James City -
Landsat TM

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The slide features a central satellite image of James City, Virginia, showing a mix of urban, forested, and water areas. The image is presented in a false-color composite where vegetation is red, water is dark blue/black, and urban areas are light grey/white. To the left of the main image is a vertical strip showing a zoomed-in view of a specific area. The background of the slide is a dark green gradient. The title 'James City - Landsat TM' is displayed in yellow text on the right side. At the bottom of the slide area, the text 'State University of New York College of Environmental Science and Forestry' is written in white.



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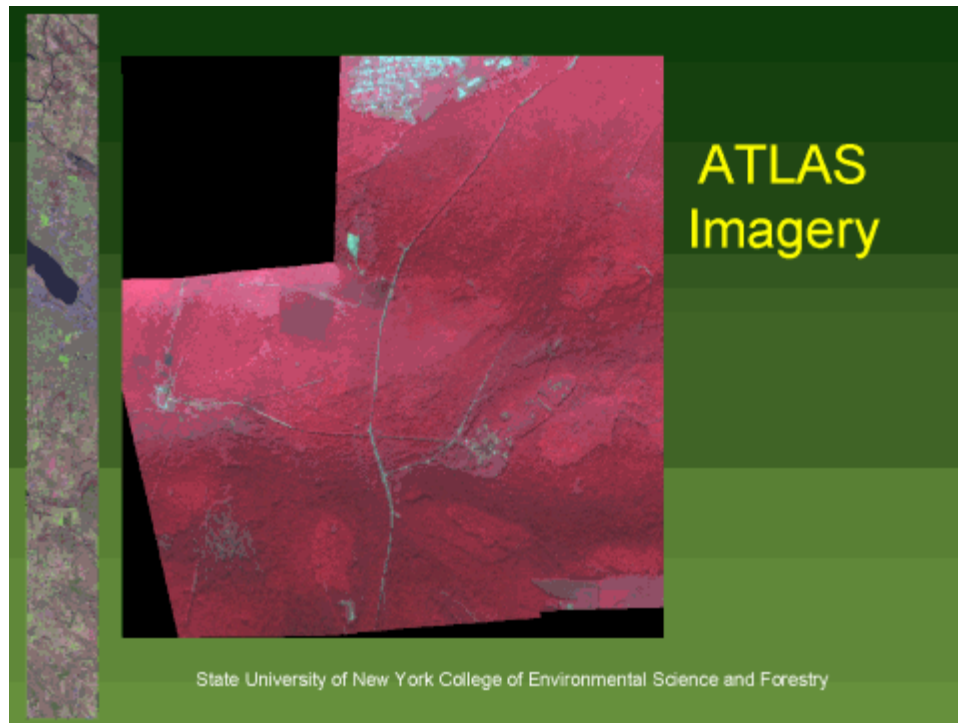
Imagery and Data Used

- Landsat Thematic Mapper Imagery
 - 6 spectral channels
 - 30 meter ground sample distance
- ATLAS Imagery
 - 15 spectral channels
 - 2.5 meter ground sample distance


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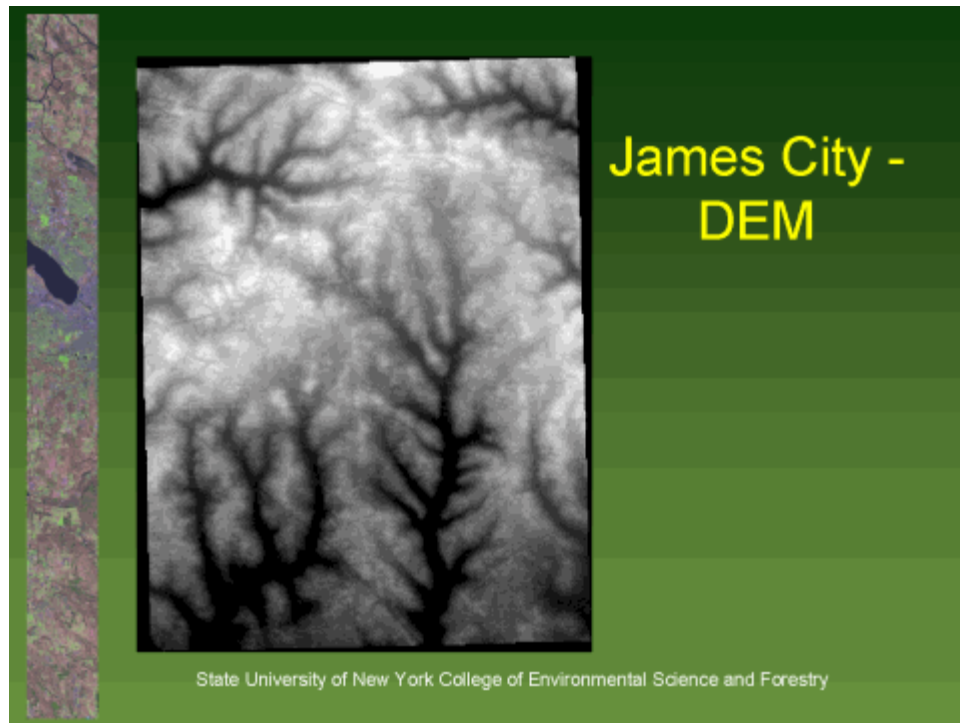
Imagery and Data Used

- Landsat Thematic Mapper Imagery
 - 6 spectral channels
 - 30 meter ground sample distance
- ATLAS Imagery
 - 15 spectral channels
 - 2.5 meter ground sample distance
- Digital Elevation Models

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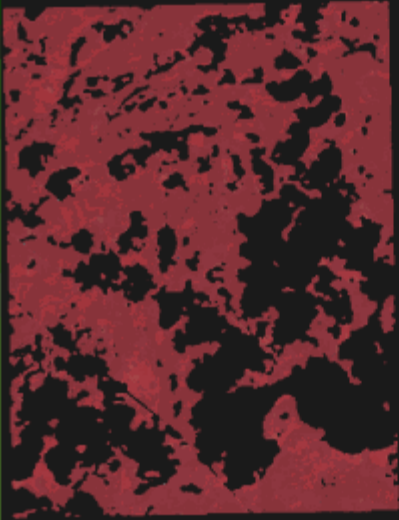

James City -
DEM

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Remote Sensing Analysis



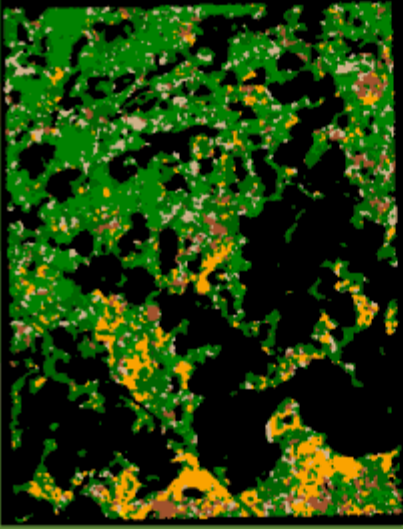
- Perform unsupervised classification
- Reclass to distinguish forest vs. non-forest

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Remote Sensing cont.



Supervised classification of forest

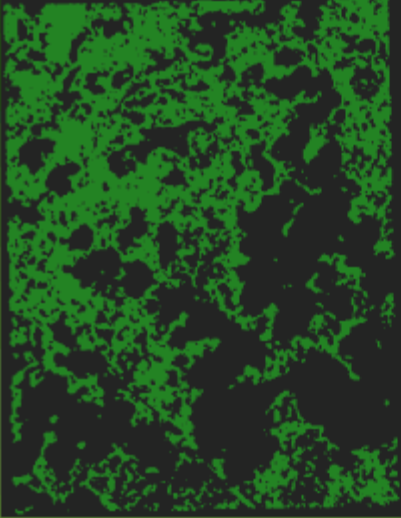

- Hemlock
- Low Shrub
- Red Maple (wet)
- Red Maple (dry)
- Maple-Beech-Birch
- Upland Hardwood
- Black Cherry Mix

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Remote Sensing cont.




Selection of regions with desirable forest type

- Black Cherry Mix
- Upland Hardwood

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GIS analysis


- Define factors that may have limited access by loggers
- This may include distance from roads and/or streams or be related to topography
- For the PA study area the limiting factor was determined to be slope

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GIS analysis cont.



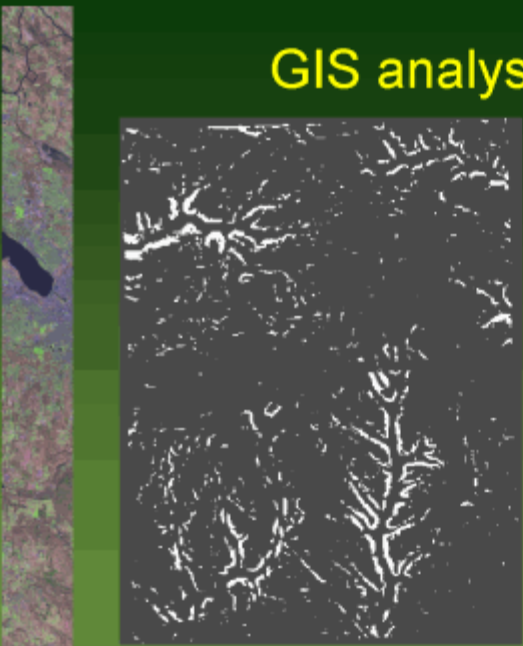
Use Digital Elevation Model (DEM) to calculate slope

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GIS analysis cont.




Select areas with high slope

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GIS analysis cont.



Clump/sieve to select regions with viable acreage

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Combining RS and GIS processing

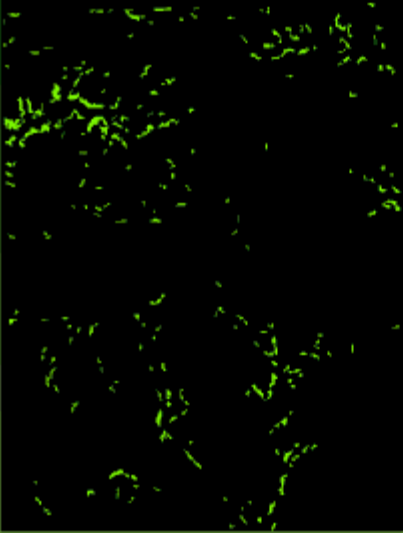
- Remote sensing shows regions with desirable forest types
- GIS analysis shows regions with limited access, therefore decreased probability of prior logging
- Combine regions to highlight areas for field visit

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Combined desirable areas



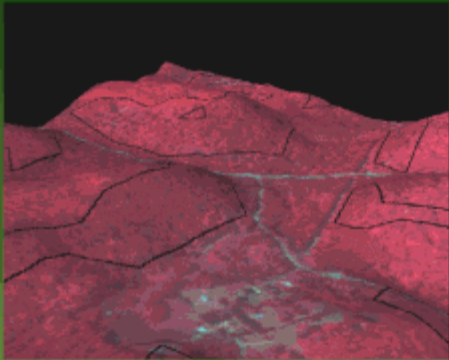
Combine desirable forest types with high slope areas to identify regions for focused field visit

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Additional processing




Use ATLAS imagery to further refine forest classes within desirable polygons

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Project Conclusions

- Preliminary analysis with test area showed positive result
- Combination of GIS and remote sensing allowed company to reduce field visitation
- Increase in sales potential with decrease in costs

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ARC Summary

- IHC project is one example of range of projects carried out under ARC
- ARC was established to explore commercially viable ideas in remote sensing
- What is your idea?

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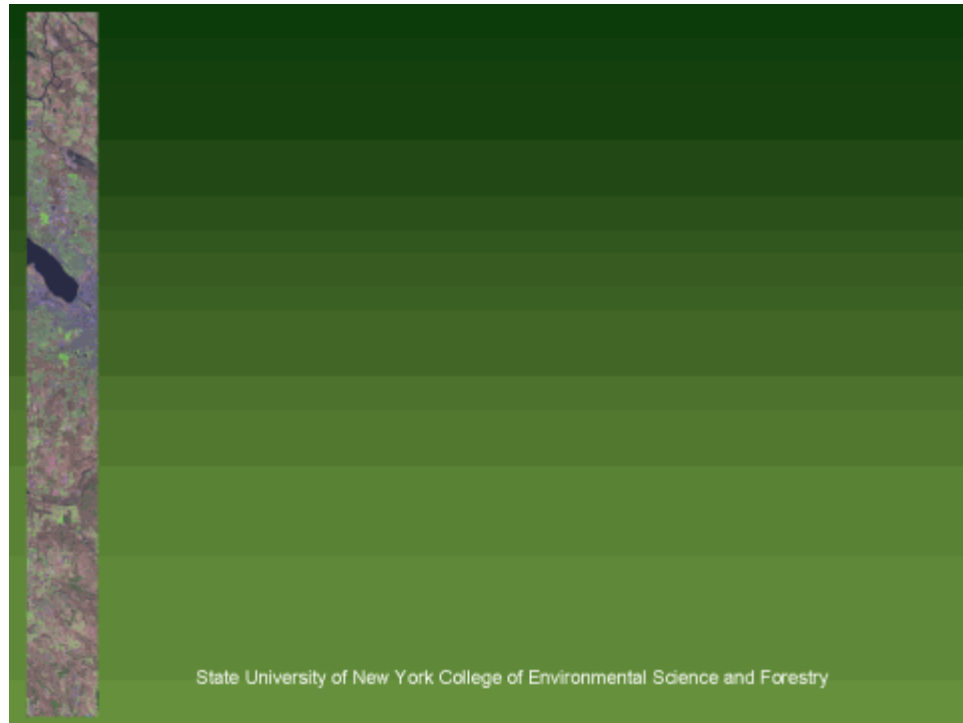
For Information

- Visit the ARC web page
– www.esf.edu/arc
- E-mail the ARC
– arc@esf.edu

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