Combining GIS and Remote Sensing for Forestry

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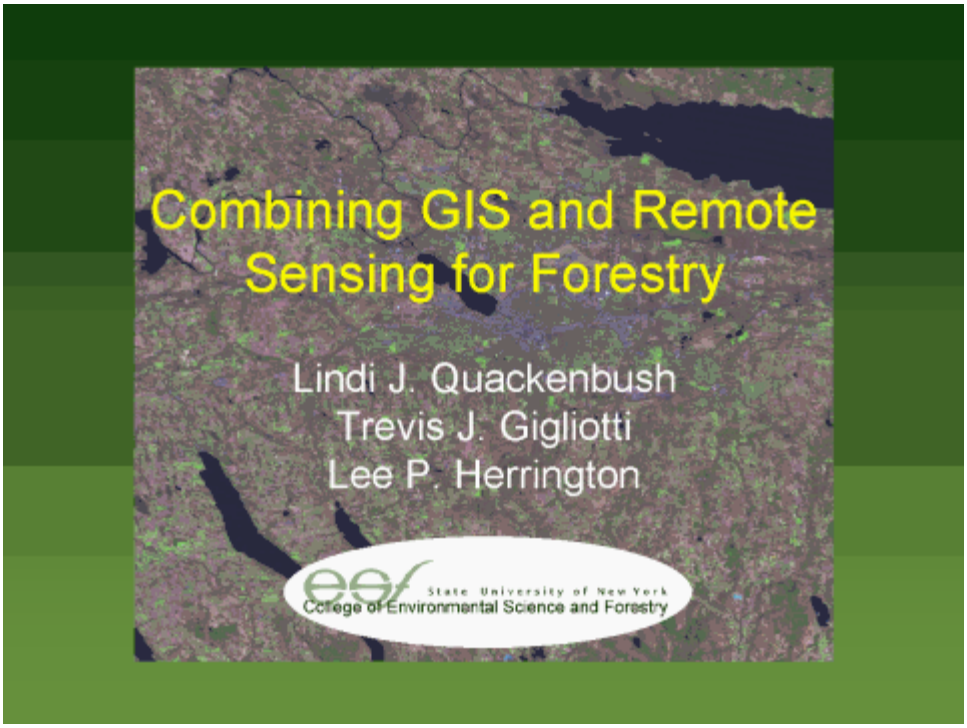
Author: Lindi Quackenbush

Table of Contents


Combining GIS and Remote Sensing for Forestry
Lindi J. Quackenbush
Trevis J. Gigliotti
Lee P. Herrington
State University of New York
College of Environmental Science and Forestry

Slide 1 of 29


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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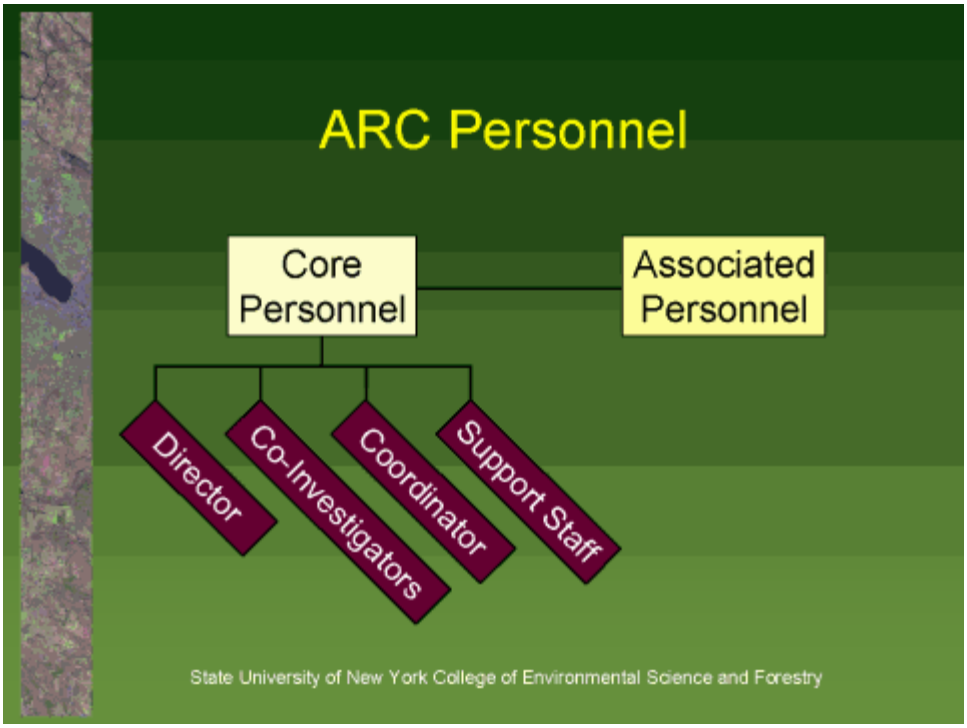
Slide 4 of 29


ARC Personnel
Core Personnel
Associated Personnel
Director
Co-Investigators
Coordinator
Support Staff
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Slide 5 of 29


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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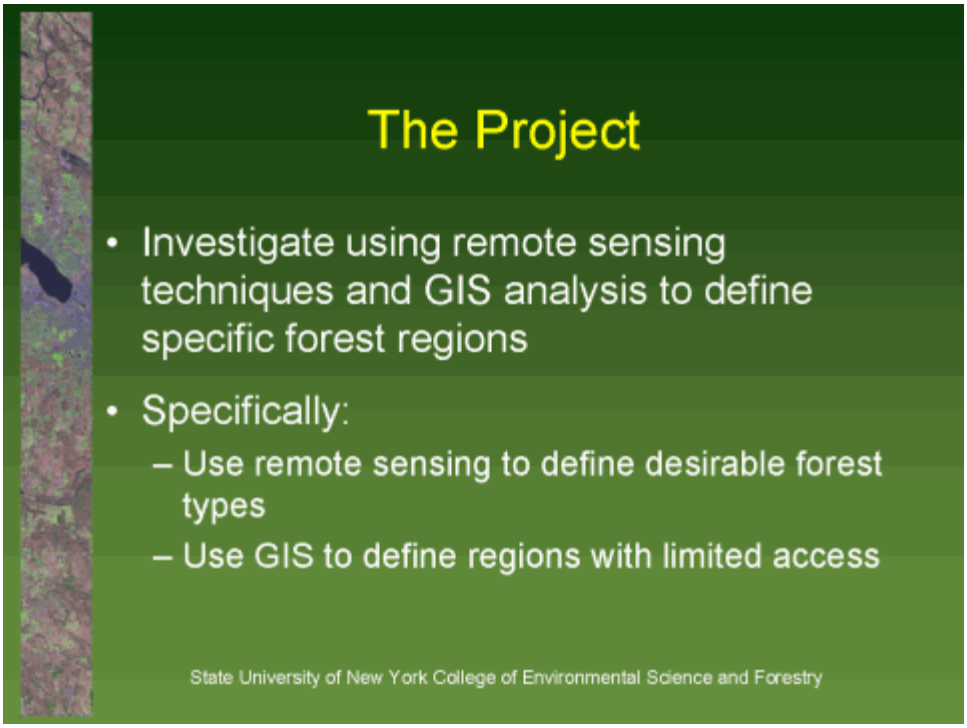
Slide 6 of 29


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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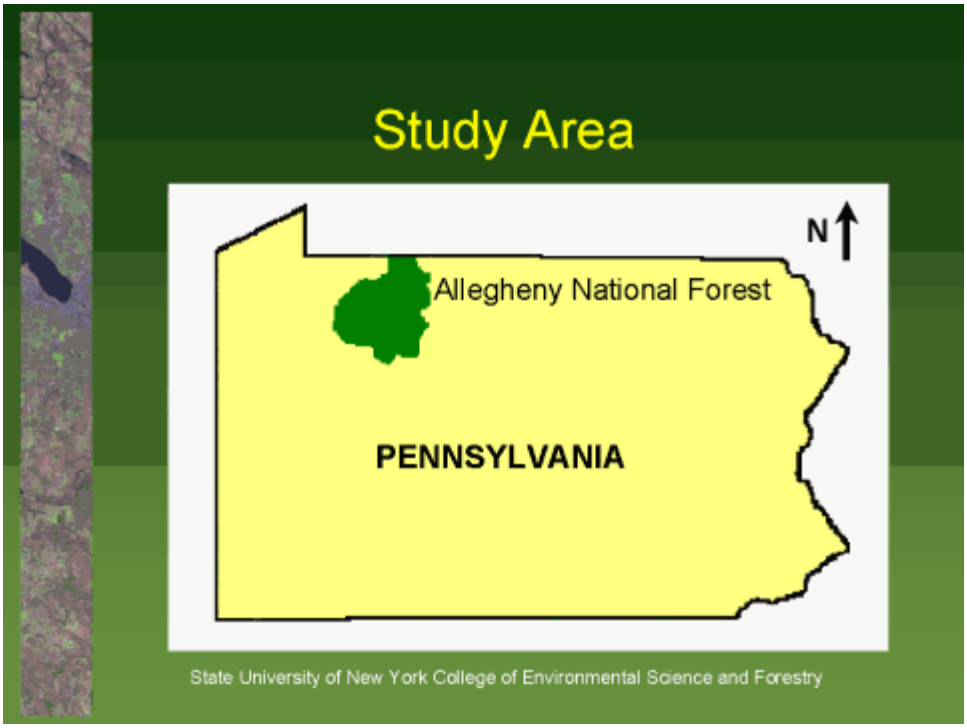
Slide 7 of 29


Study Area
N
Allegheny National Forest
PENNSYLVANIA
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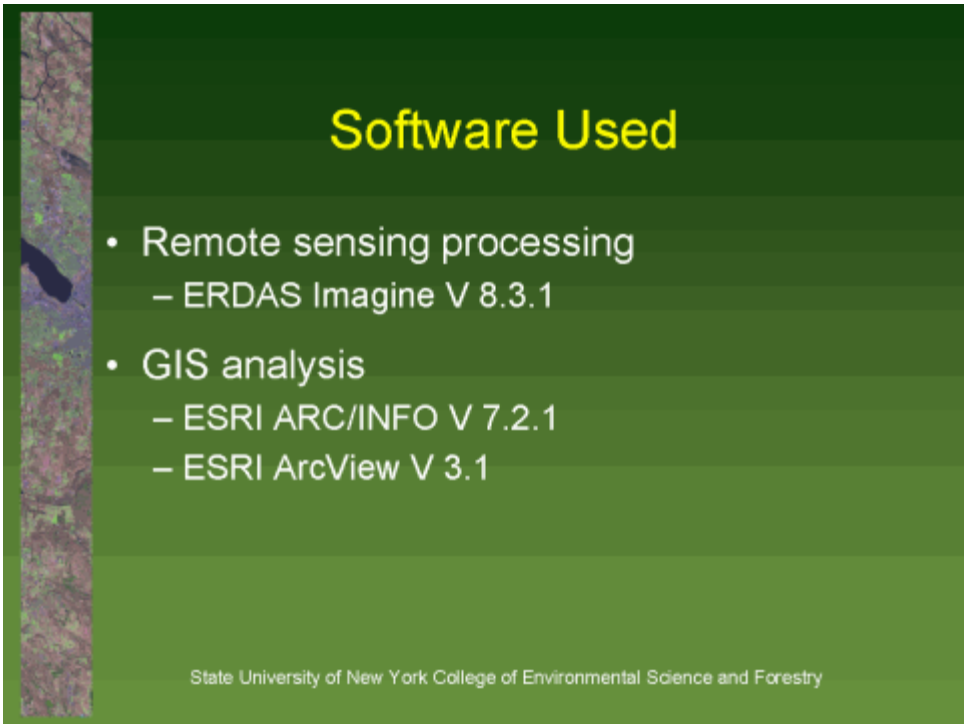
Slide 8 of 29


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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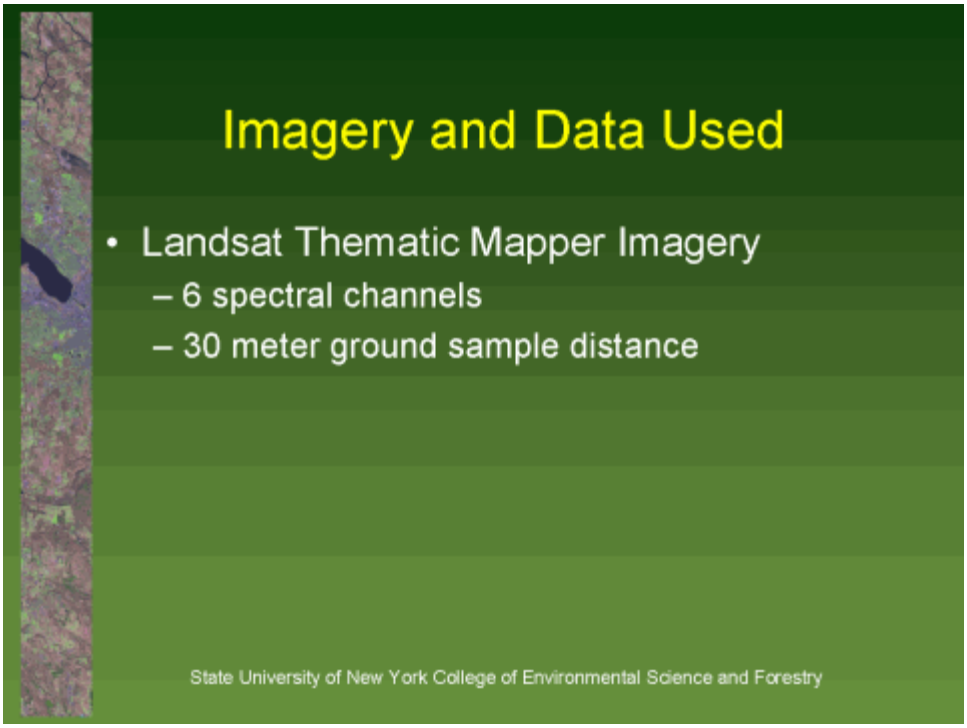
Slide 9 of 29


Imagery and Data Used
• Landsat Thematic Mapper Imagery
– 6 spectral channels
– 30 meter ground sample distance
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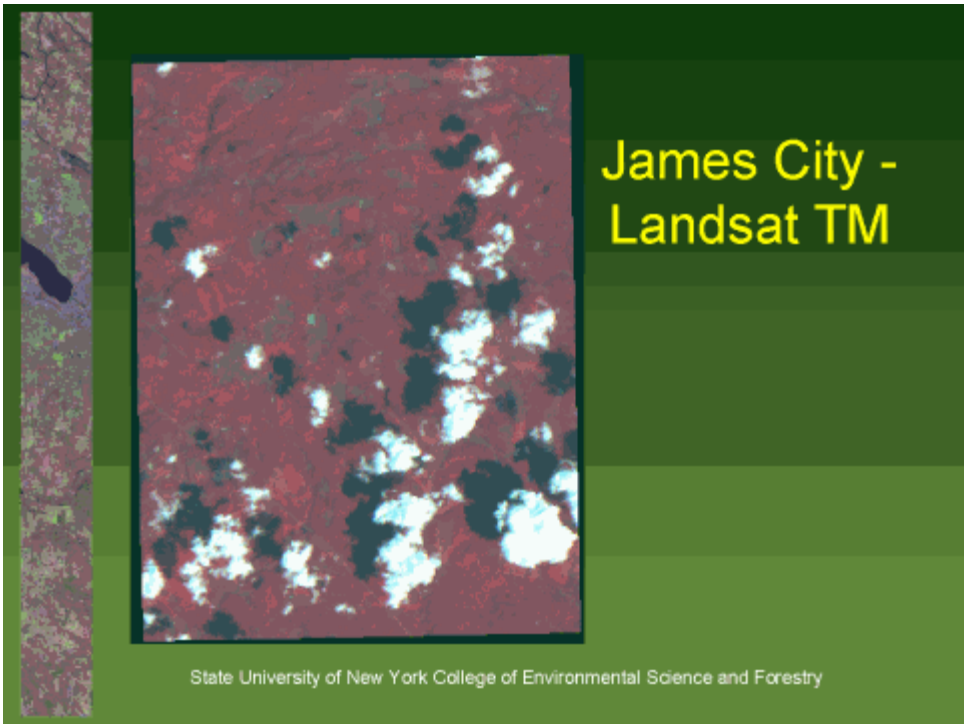
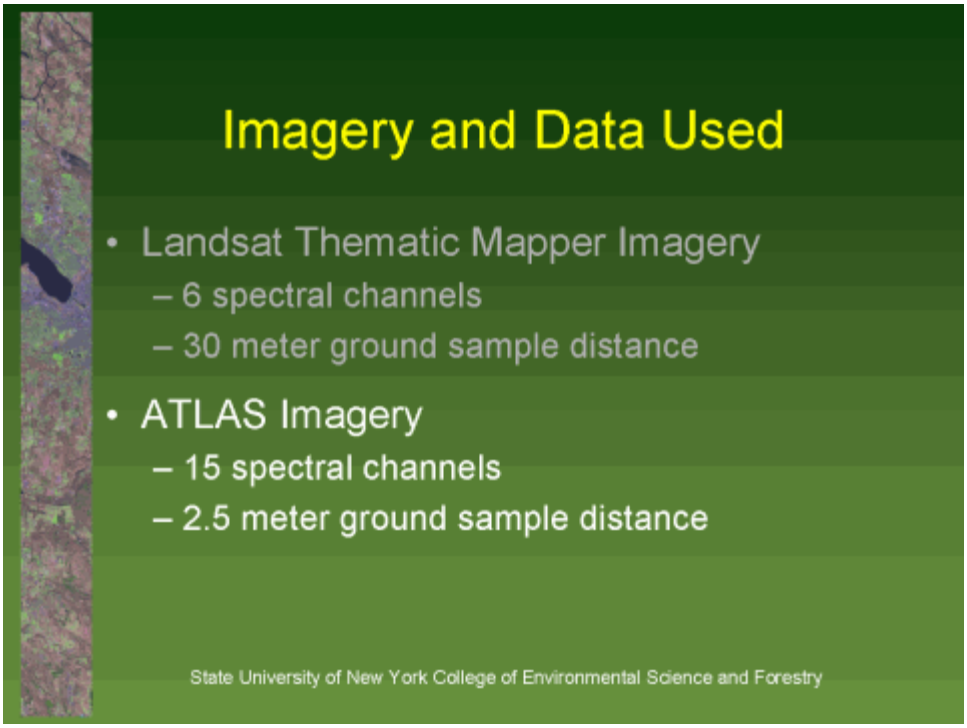


Slide 11 of 29


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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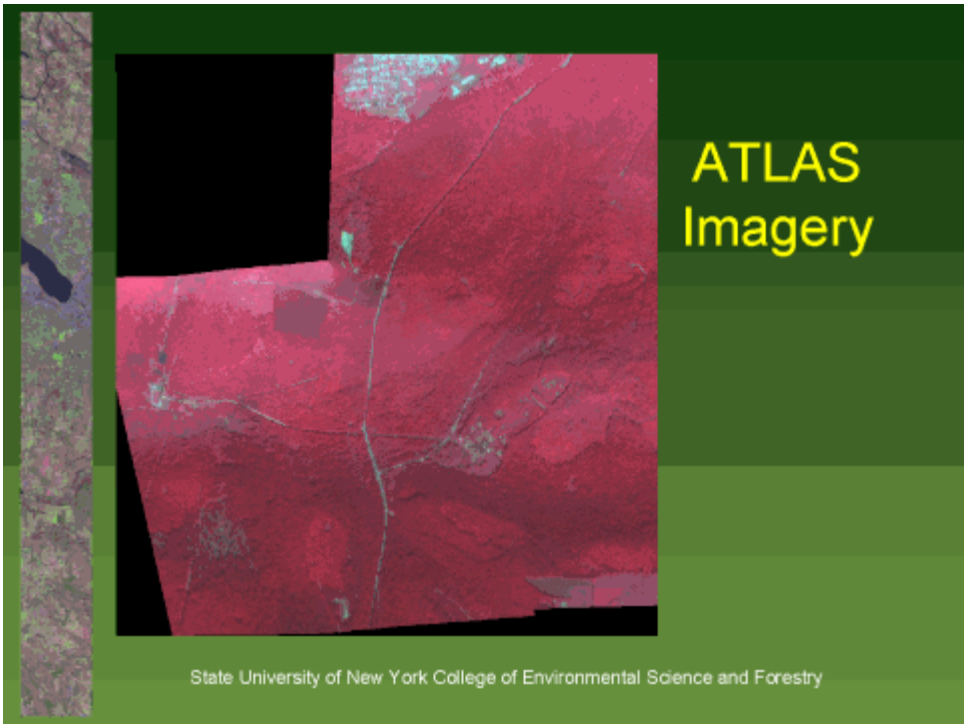
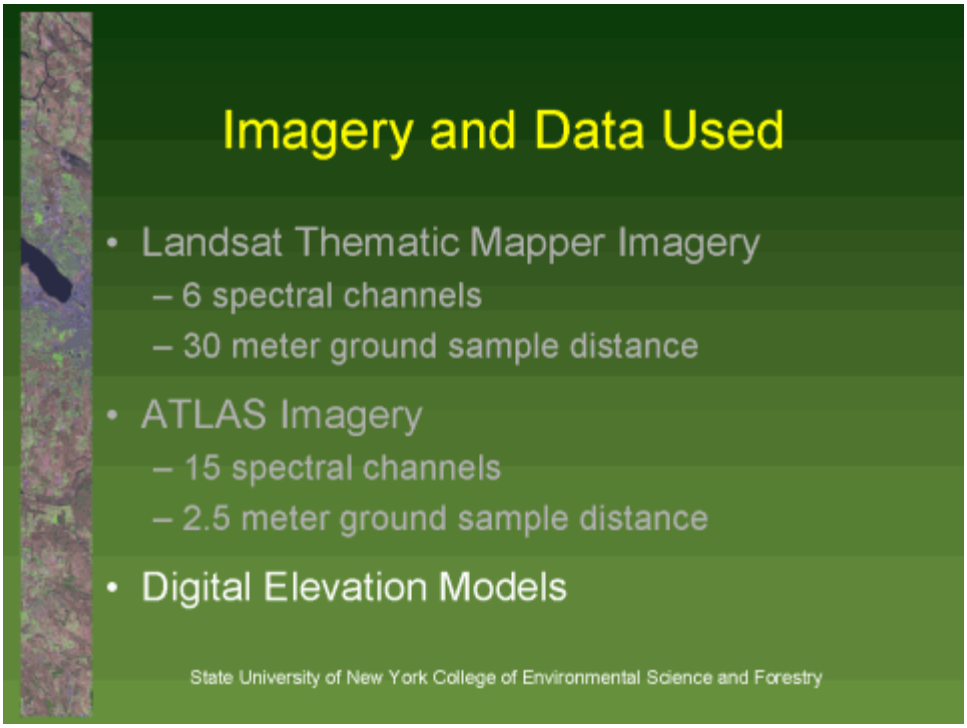


Slide 13 of 29


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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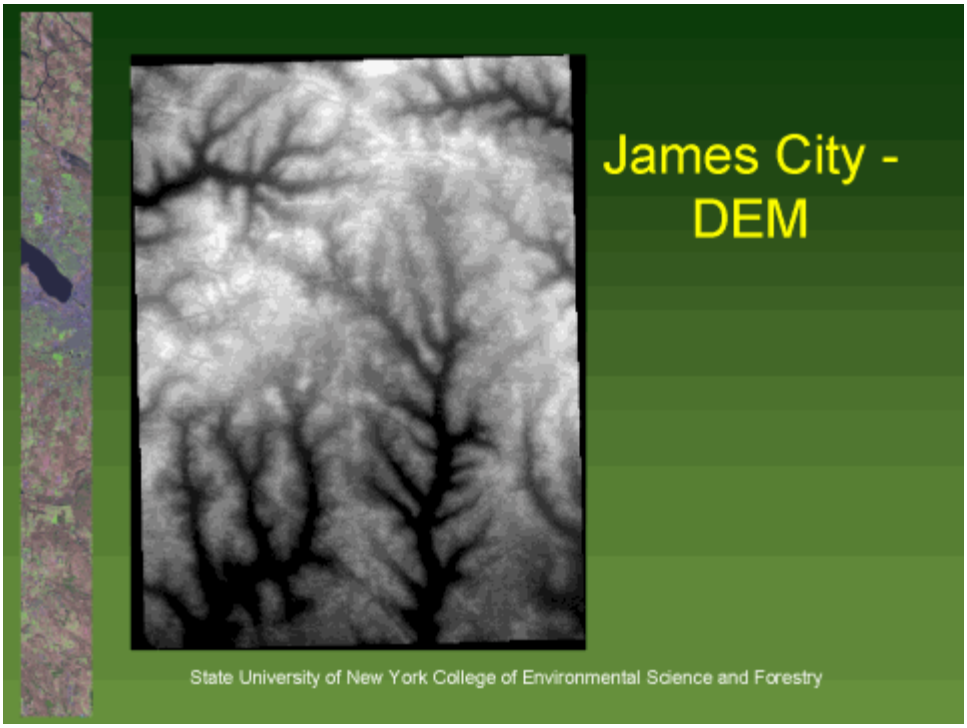
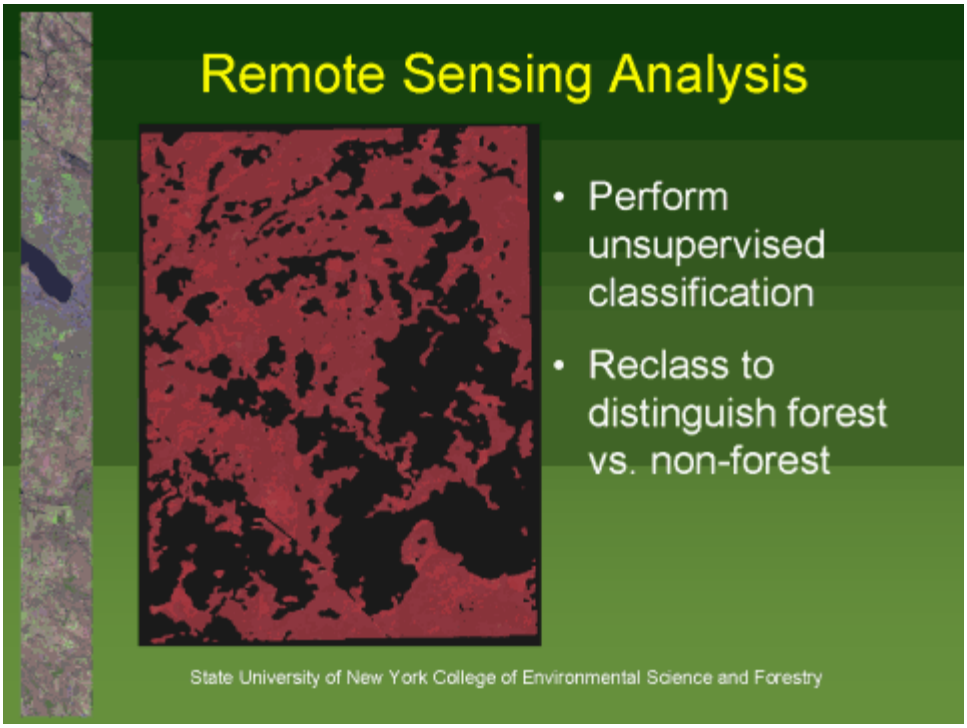
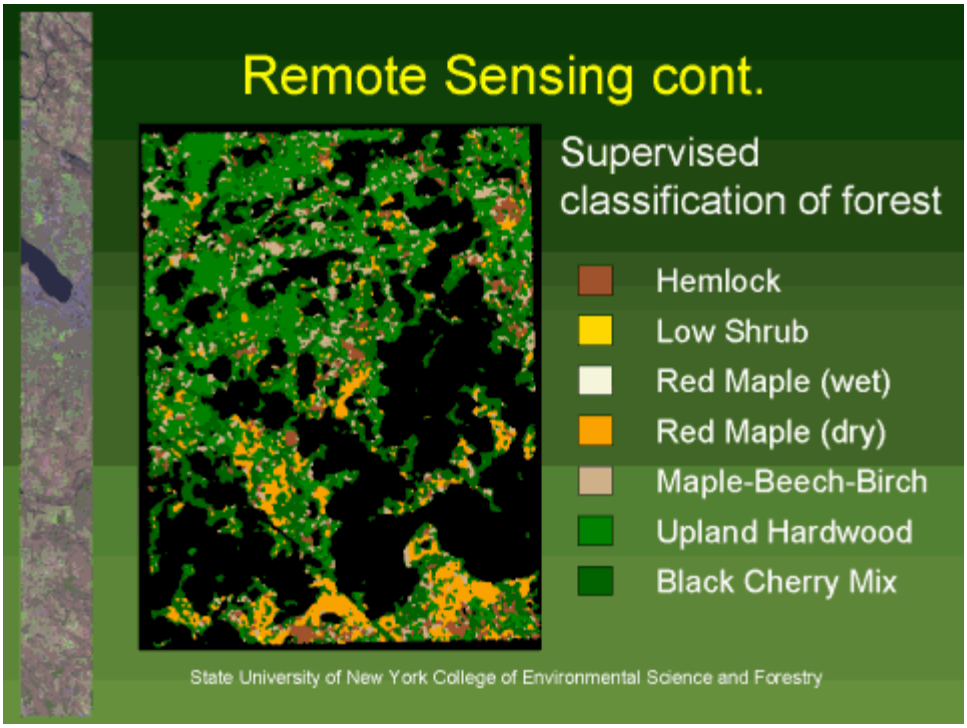


Slide 15 of 29



Slide 16 of 29


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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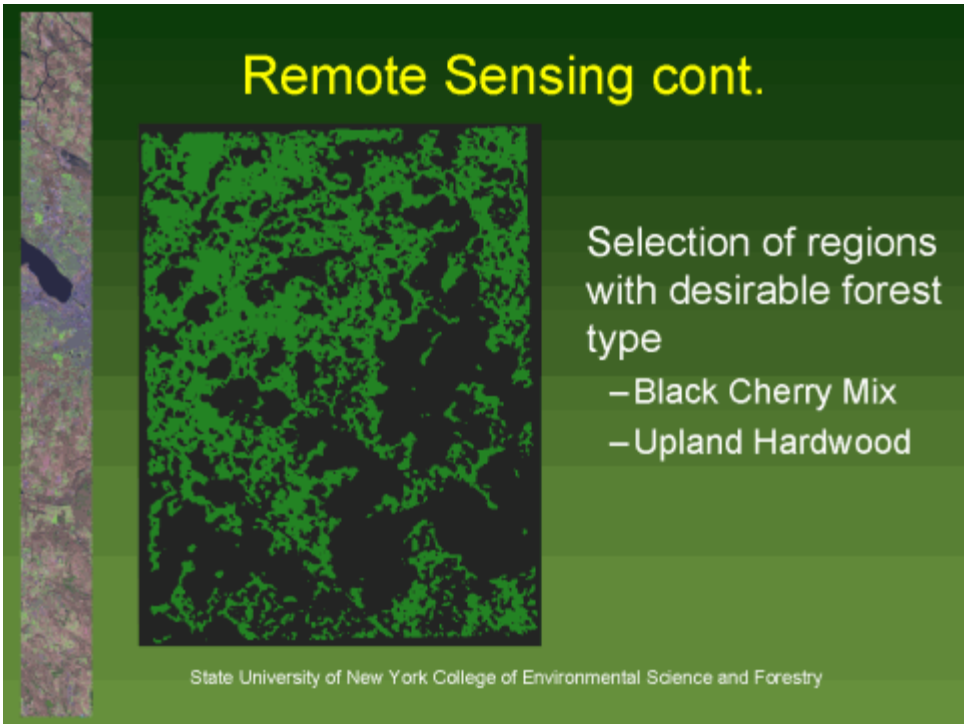
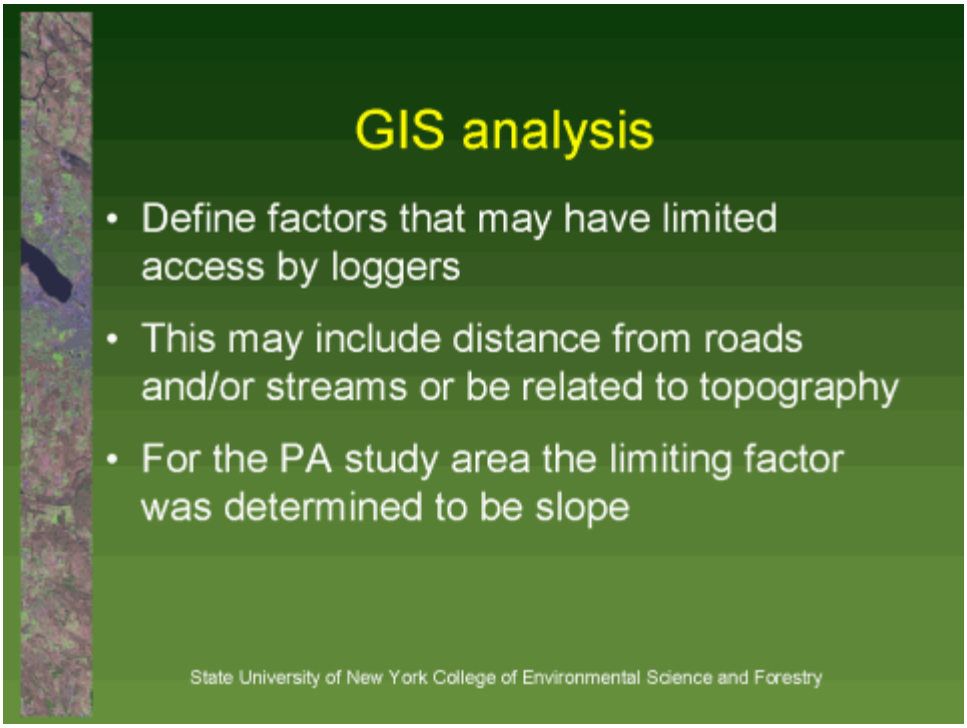


Slide 18 of 29


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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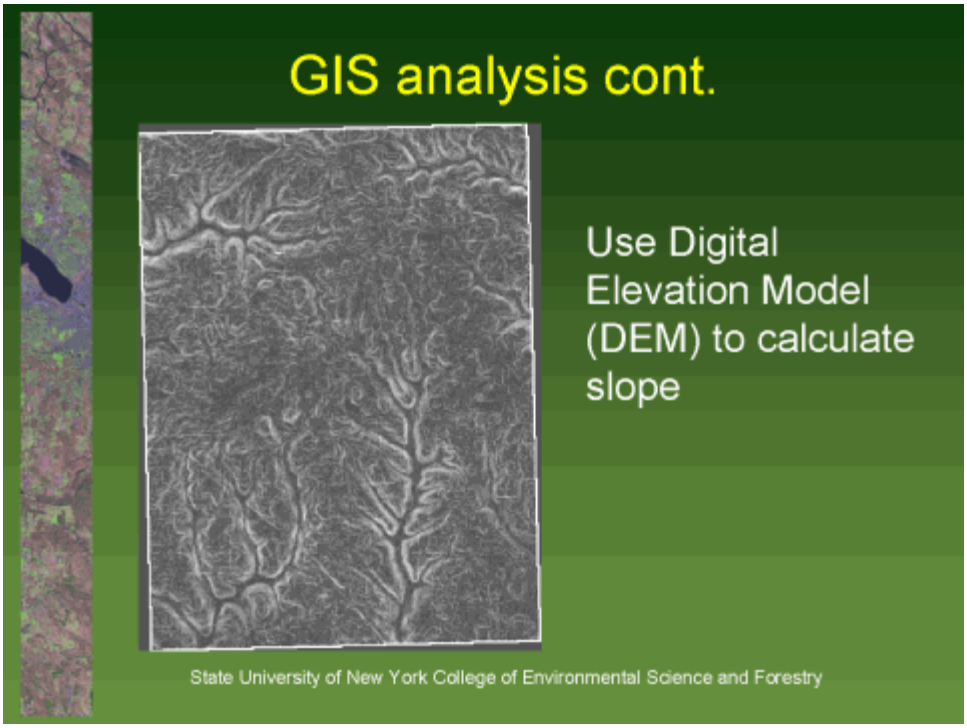
GIS analysis cont.
Use Digital Elevation Model (DEM) to calculate slope
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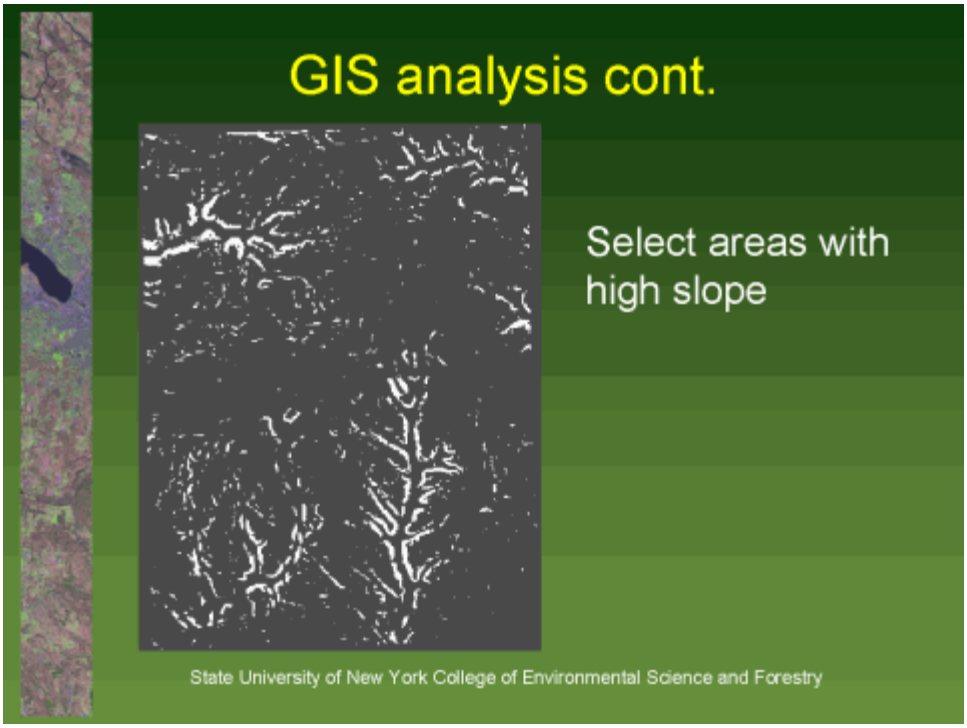
GIS analysis cont.
Select areas with high slope
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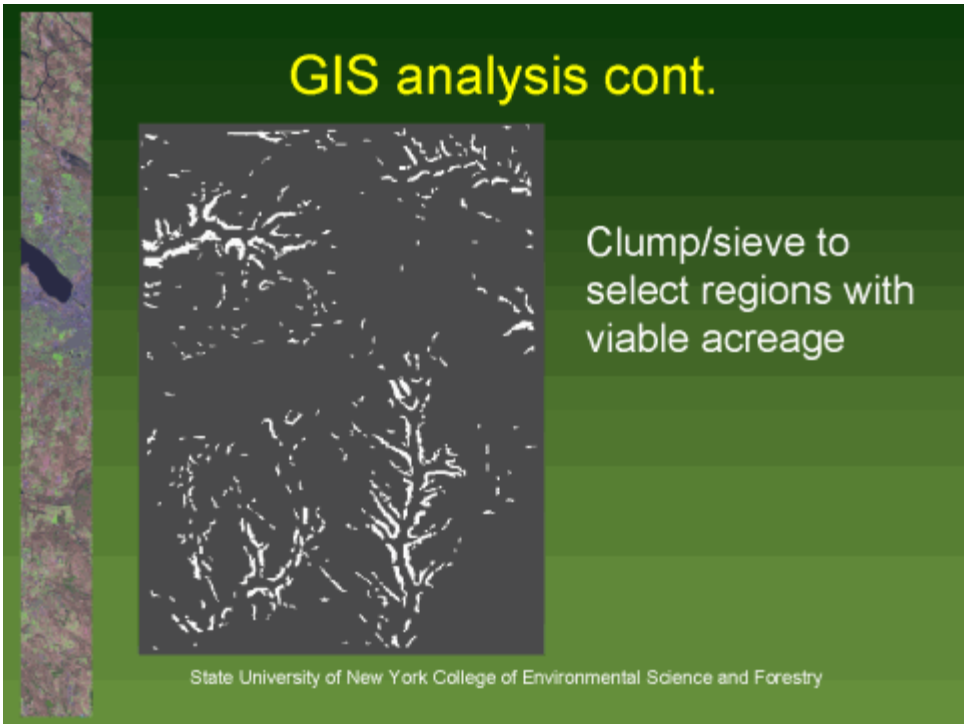
GIS analysis cont.
Clump/sieve to select regions with viable acreage
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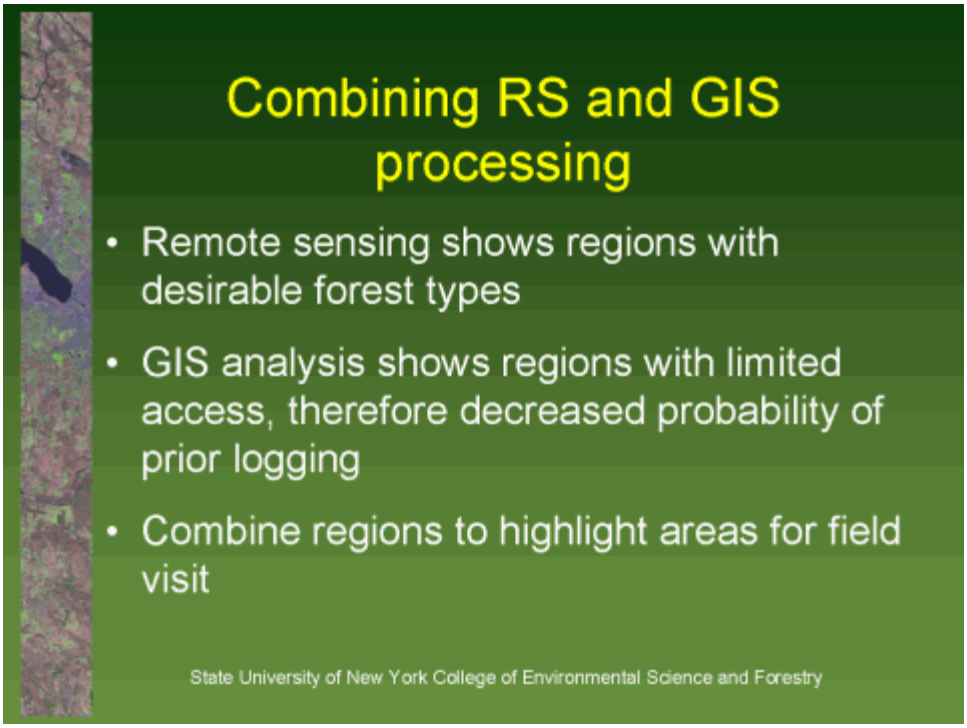
Combining RS and GIS processing
• Remote sensing shows regions with desirable forest types
• GIS analysis shows regions with limited access, therefore decreased probability of prior logging
• Combine regions to highlight areas for field visit
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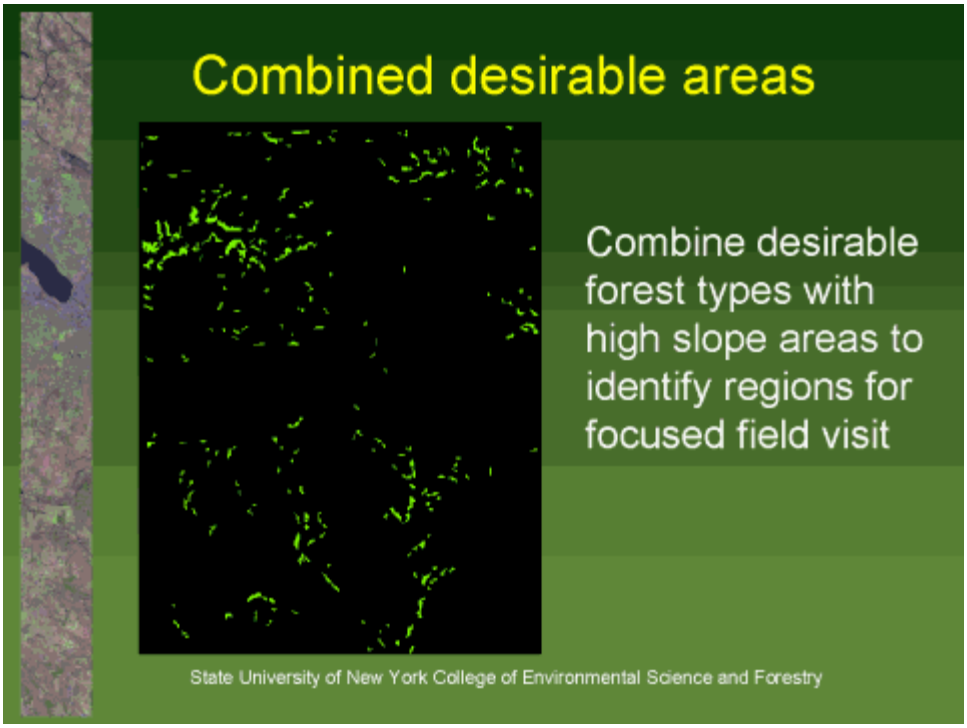
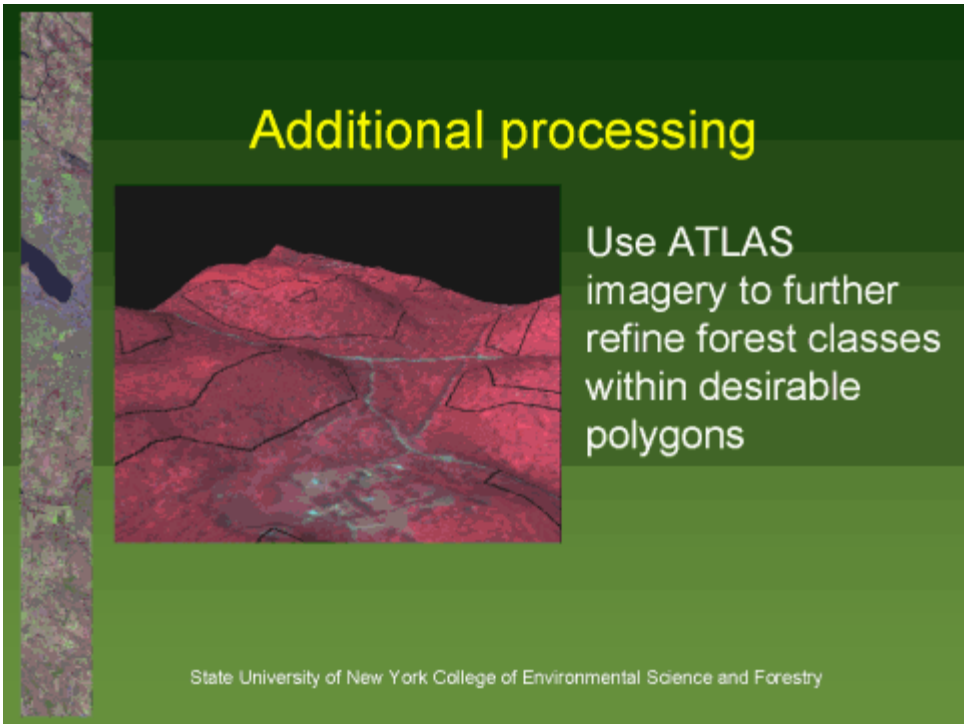
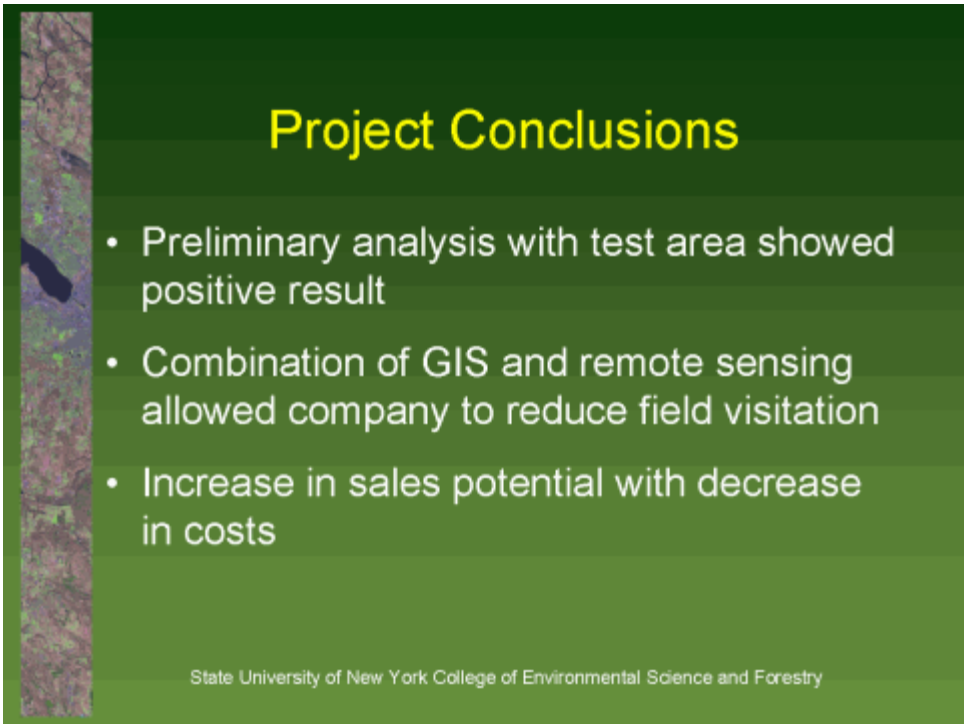


Slide 24 of 29



Slide 25 of 29


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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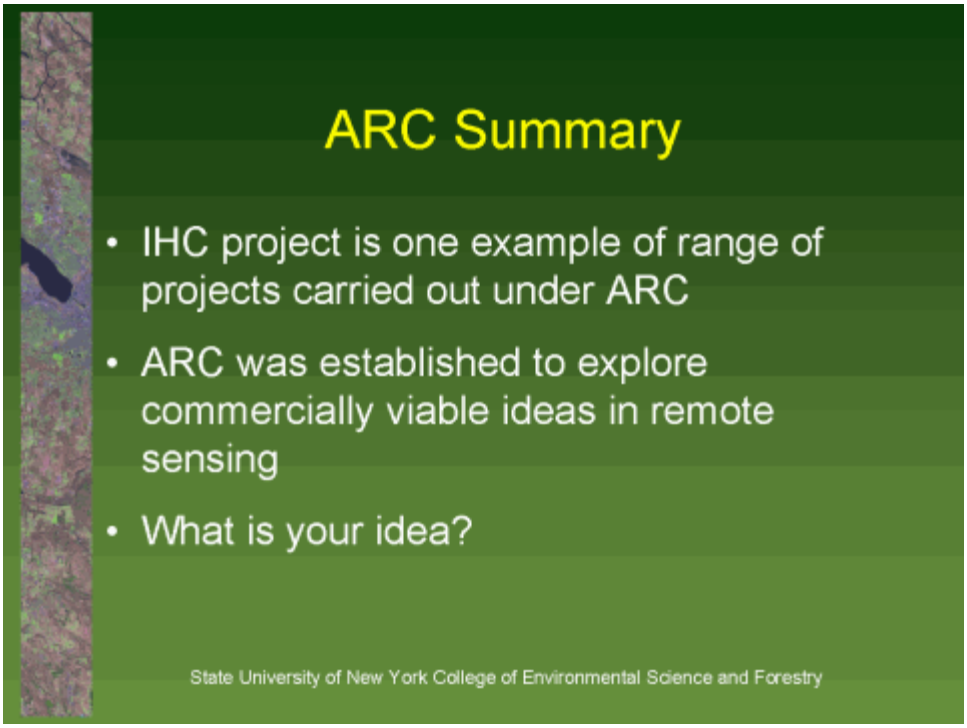
ARC Summary
• IHC project is one example of range of projects carried out under ARC
• ARC was established to explore commercially viable ideas in remote sensing
• What is your idea?
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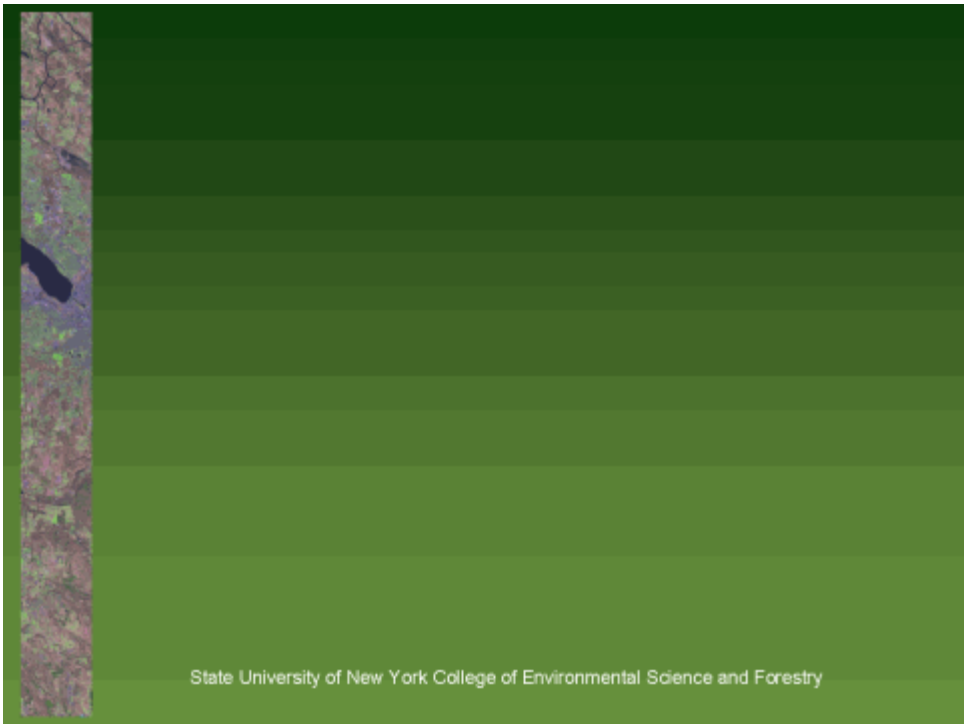
Slide 28 of 29



Slide 29 of 29