A Change Detection Analysis: Using Remotely Sensed Data to Assess Land-cover Change in the Gee Creek Watershed

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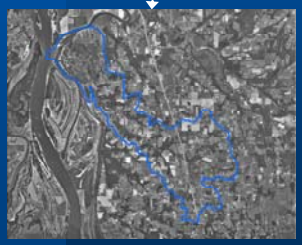
Gee Creek Watershed

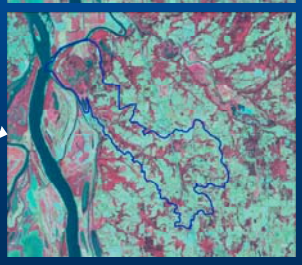
Objectives

1) Determine the type, amount, and location of land-cover change (i.e. Post-Classification Change Detection)
2) Determine how suitable Landsat imagery is for classifying land-cover
3) Compare Post-Classification Change Detection with tasseled cap transformation

Imagery Data

- Sept 7, 1990 Landsat TM
- Sept 22, 1999 Landsat ETM
- Aug 5, 2000 USGS orthophoto

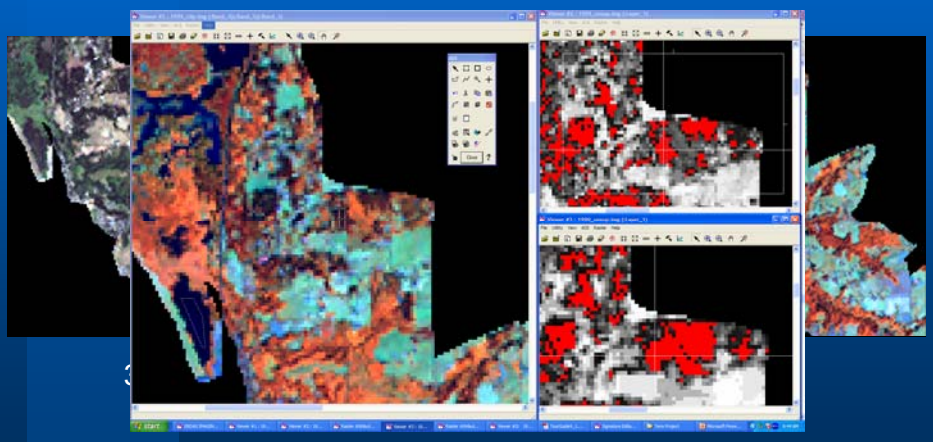




Methods

- Layer Stacked Images
  - discarded thermal & panchromatic bands (6 & 8)
- Clipped each image to watershed boundary
- Classification scheme = 10 land-cover classes
- Perform unsupervised classification for guidance (60 classes)
- Perform supervised classification on both images; maximum likelihood (checked threshold histograms)
- Perform accuracy assessment (goal: >= 75%)
- Calculate change on land-cover classes

Classification

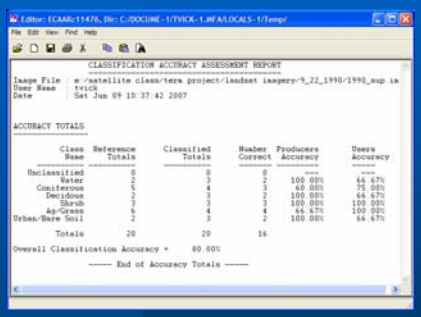


Classification Scheme

Accuracy Assessment

- Stratified Random
  - 20 points generated
  - >= 3 per class
  - Visual interpretation using various band combinations
    - 1999: used 2000 USGS image

Accuracy Assessment Results



CLASSIFICATION ACCURACY ASSESSMENT REPORT

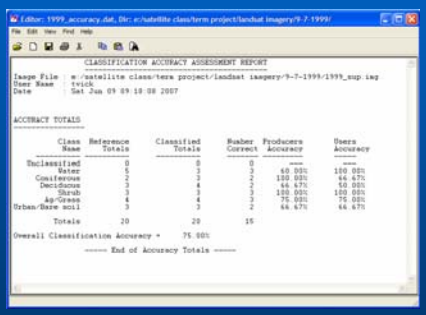
Image File : e:\satellite class\term project\landsat imagery\9_22_1990\1990_sup.is
User Name : tvick
Date : Sat Jun 09 10:37:42 2007

ACCURACY TOTALS

Class Name	Reference Totals	Classified Totals	Number Correct	Producers Accuracy	Users Accuracy
Unclassified	0	0	0	---	---
Water	5	3	3	60.00%	100.00%
Coniferous	5	4	3	60.00%	75.00%
Deciduous	3	3	2	100.00%	66.67%
Shrub	3	3	3	100.00%	100.00%
Ag/Grass	5	4	4	66.67%	100.00%
Urban/Bare Soil	3	3	2	100.00%	66.67%
Totals	20	20	16		

Overall Classification Accuracy = 80.00%

----- End of Accuracy Totals -----



CLASSIFICATION ACCURACY ASSESSMENT REPORT

Image File : e:\satellite class\term project\landsat imagery\9-7-1999\1999_sup.img
User Name : tvick
Date : Sat Jun 09 09:18:08 2007

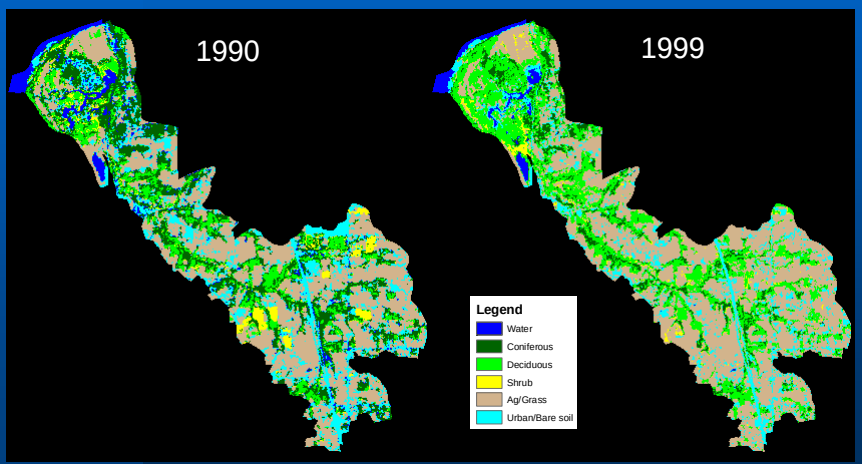
ACCURACY TOTALS

Class Name	Reference Totals	Classified Totals	Number Correct	Producers Accuracy	Users Accuracy
Unclassified	0	0	0	---	---
Water	5	3	3	60.00%	100.00%
Coniferous	3	3	2	100.00%	66.67%
Deciduous	3	4	2	66.67%	50.00%
Shrub	3	3	3	100.00%	100.00%
Ag/Grass	4	4	3	75.00%	75.00%
Urban/Bare soil	3	3	2	66.67%	66.67%
Totals	20	20	15		

Overall Classification Accuracy = 75.00%

----- End of Accuracy Totals -----

Classification Results

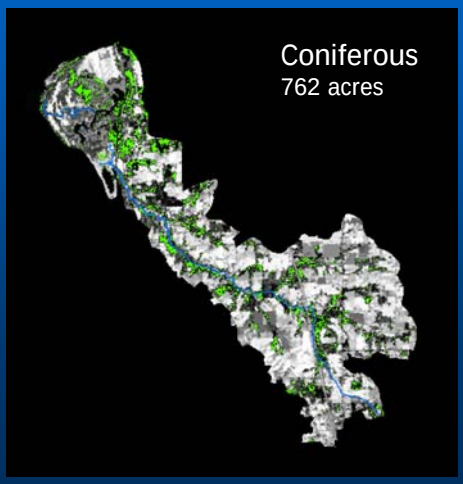


Land-Cover Change Results

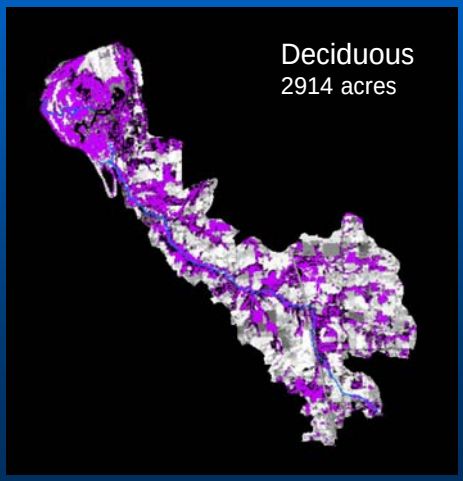
			Change	
Land-Cover Classes	**1990**	**1999**	**Loss**	**Gain**
Water	570	245	325	
Coniferous	2270	762	1509	
Deciduous	1327	2914		1588
Shrub	456	257	198	
Ag/Grass	4192	5266		1074
Urban/Bare Soil	1850	1220	630	
Total acres	10666	10666		

*** values = acres**

Land-Cover Change Results



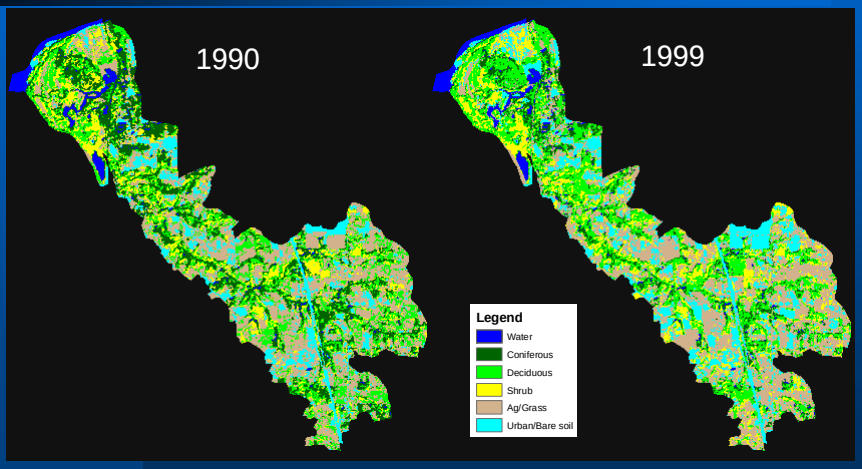
Land-Cover Change Results



Tasseled Cap Transformation

- Measuring Brightness and Greenness between 1990 and 1999 (band 1 & 2)
- Stacked 4 layers; bands 1 & 2
- Applied tasseled cap transformation
- Performed unsupervised classification: 15 classes
- Visually interpreted change / no change areas
- Calculated change on land-cover classes
- No accuracy assessment performed

Results



Land-Cover Change Results

					Change			
Land-Cover Classes	**1990**	**1990**	**1999**	**1999**	**Loss**	**Loss**	**Gain**	**Gain**
Water	570	377	245	377	325	0		0
Coniferous	2270	2081	762	911	1509	1170		
Deciduous	1327	2347	2914	2625			1588	278
Shrub	456	1405	257	1650	198			245
Ag/Grass	4192	3320	5266	3421			1074	101
Urban/Bare Soil	1850	1136	1220	1682	630			546

*** values = acres**

Post-Classification Change Detection
Tasseled Cap Transformation

Conclusions

- 1990-1999: A reduction in predominantly coniferous forest and in increase in predominantly deciduous forest
- Landsat imagery only suitable for classifying general land-cover types in the Gee Creek Watershed
- Landsat Imagery Not suitable for high resolution/highly variable land-cover classification
  - Acquire higher resolution imagery (e.g. Quickbird)

  or
  - Conduct alternative analysis (e.g. segmentation)