Regional Land Cover Change Detection (1992 – 2011)

Houston-Galveston Area Council

Houston Area GIS Day 2013

Introduction

Department of Community and Environmental Planning at H-GAC conducted a land cover change detection study to generate accurate information about the land cover classes and their changes in a 15-county region of South Central Texas. Such analysis is essential in regional planning, natural resource management, monitoring of environmental changes, impact analysis, etc.

Purposes of this study are:

- To identify the regional spatial patterns of each land cover conversion,
- To estimate the area amounts of each conversion, and
- To estimate the net gain and losses of each land cover class.

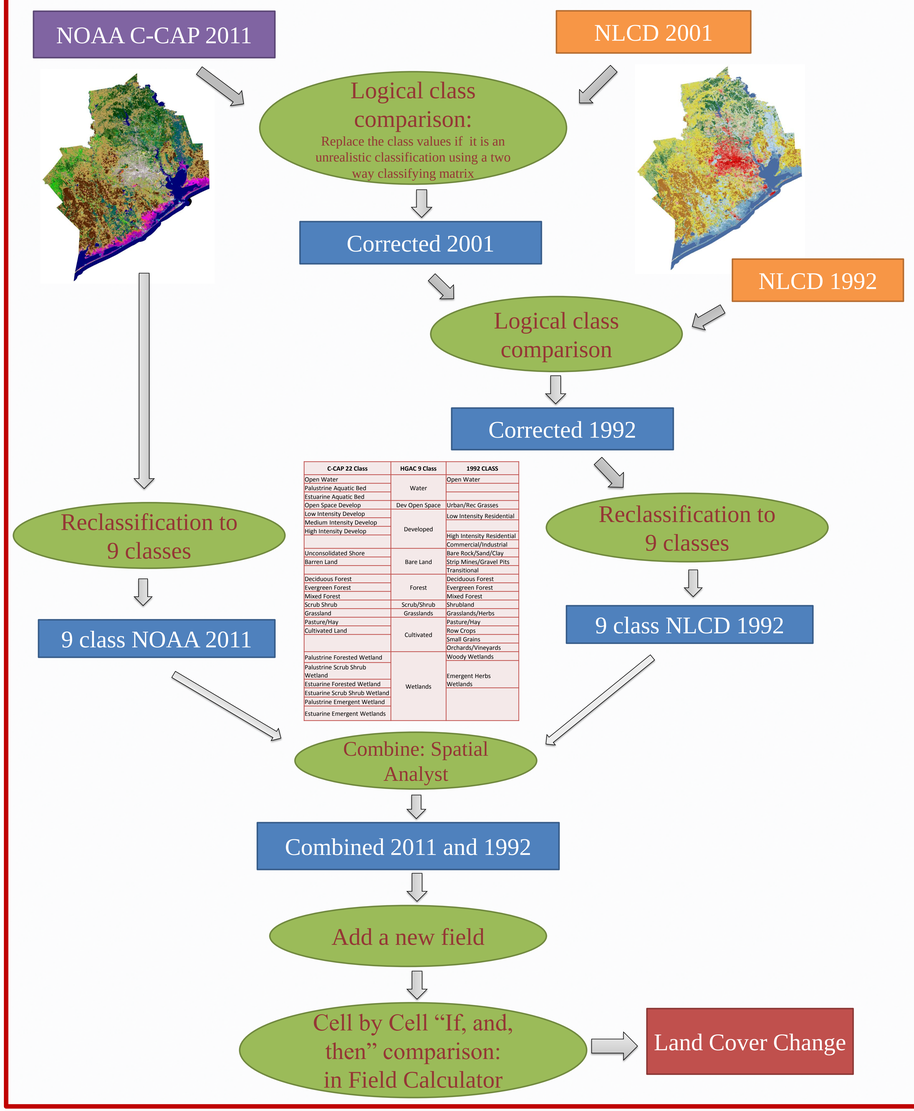
For these purposes, ArcGIS Spatial analysis functions and other data management tools were employed in python environment.

Change detection was estimated from 1992 to 2011 using datasets from NLCD (National Land Cover Database) 1992, NLCD 2001 and NOAA C-CAP (National Oceanic and Atmospheric Administration, Coastal Change Analysis Program) 2011.

Through field observations and comparing aerial imageries, the study identified NLCD 1992 and 2001 datasets were not accurately classified as the NOAA 2011 dataset. Therefore misclassified cells in the NLCD datasets were corrected in contrast to the 2011 C-CAP dataset. The NLCD 2001 dataset was first corrected using a logical evaluation with 2011 classes in each pixel. Then the NLCD 1992 dataset was corrected using the correct 2001 dataset.

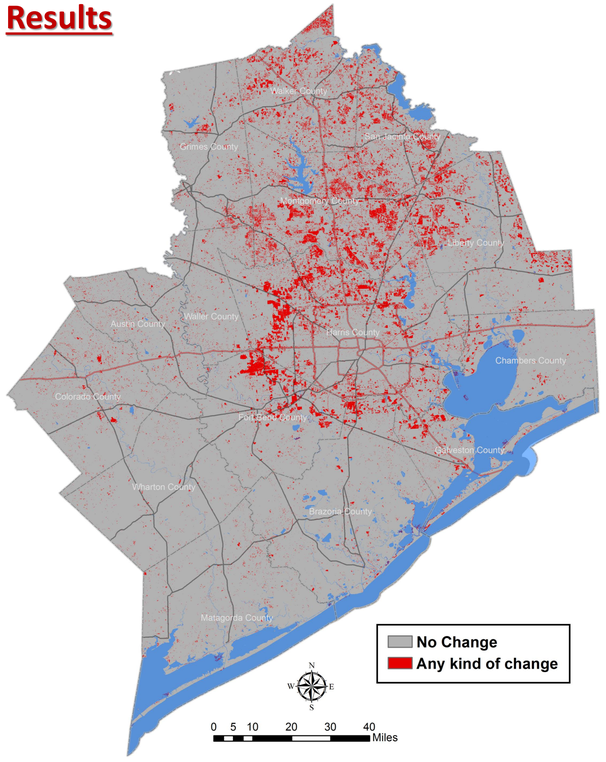
After correcting 1992 dataset, a cell by cell comparison was conducted with the NOAA 2011 dataset, and individual changes were recorded.

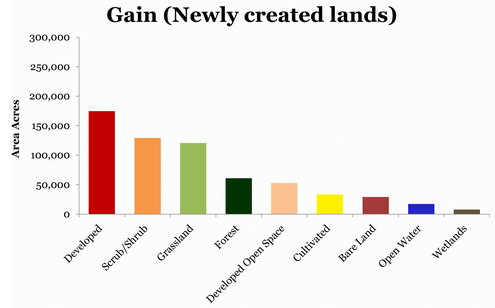
Methodology

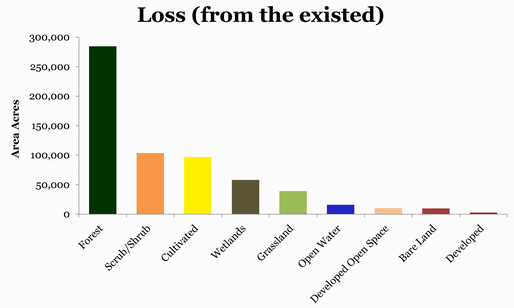


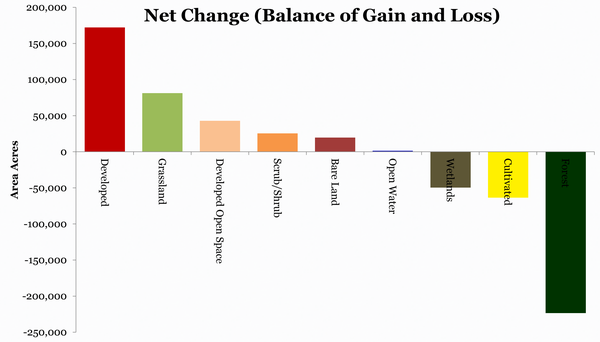
C-CAP 22 Class	HGAC 9 Class	1992 CLASS
Open Water	Water	Open Water
Palustrine Aquatic Bed		
Estuarine Aquatic Bed		
Open Space Develop	Dev Open Space	Urban/Rec Grasses
Low Intensity Develop	Developed	Low Intensity Residential
Medium Intensity Develop		
High Intensity Develop		High Intensity Residential
		Commercial/Industrial
Unconsolidated Shore	Bare Land	Bare Rock/Sand/Clay
Barren Land		Strip Mines/Gravel Pits
		Transitional
Deciduous Forest	Forest	Deciduous Forest
Evergreen Forest		Evergreen Forest
Mixed Forest		Mixed Forest
Scrub Shrub	Scrub/Shrub	Shrubland
Grassland	Grasslands	Grasslands/Herbs
Pasture/Hay	Cultivated	Pasture/Hay
Cultivated Land		Row Crops
		Small Grains
		Orchards/Vineyards
Palustrine Forested Wetland	Wetlands	Woody Wetlands
Palustrine Scrub Shrub Wetland		Emergent Herbs Wetlands
Estuarine Forested Wetland		
Estuarine Scrub Shrub Wetland		
Palustrine Emergent Wetland		
Estuarine Emergent Wetlands		

Results



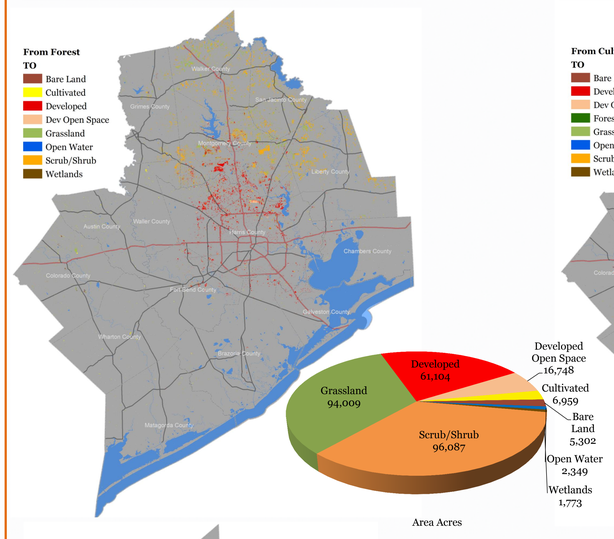




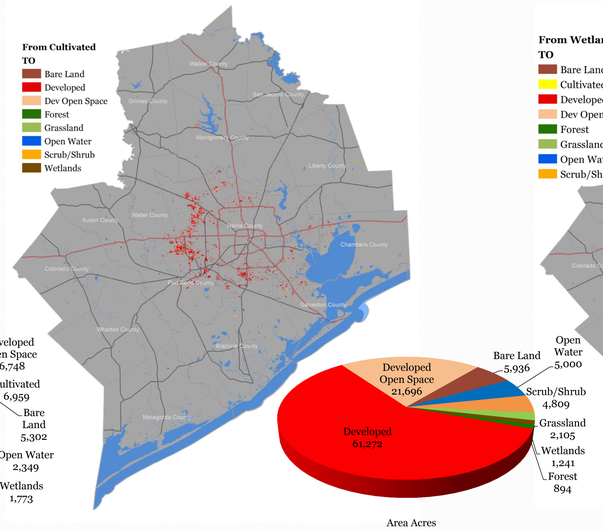


FROM	TO	Area Acres
Forest	Scrub/Shrub	96,087
Forest	Grassland	94,009
Cultivated	Developed	61,272
Forest	Developed	61,104
Scrub/Shrub	Forest	53,486
Cultivated	Developed Open Space	21,696
Wetlands	Developed	18,618
Scrub/Shrub	Cultivated	17,678
Forest	Developed Open Space	16,748
Grassland	Scrub/Shrub	16,614
Scrub/Shrub	Grassland	14,018
Scrub/Shrub	Developed	11,860
Open Water	Bare Land	10,967

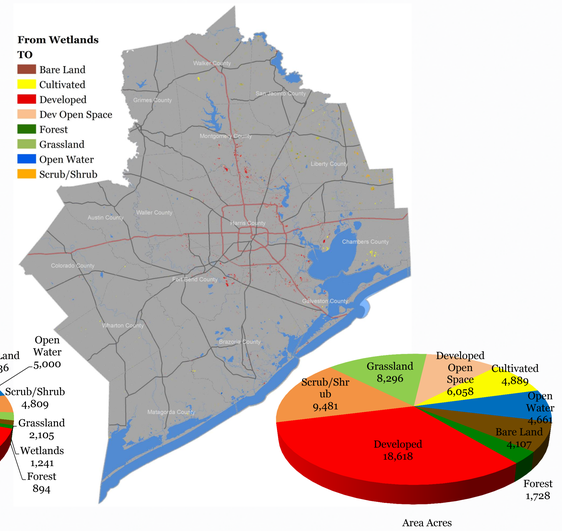
Conversion from Forest:



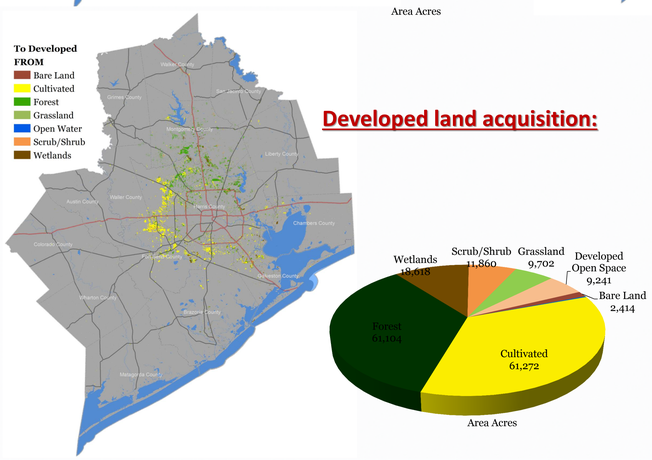
Conversion from Cultivated:



Conversion from Wetlands:



Developed land acquisition:



Conclusions

- ❑ Within 15 county region Forest is the land cover type that experienced most losses. Cultivated lands are second, and Wetlands are third
  - Forest has transferred mostly to Shrubs, Grasslands, and Develop lands
  - Cultivated lands are converted primarily into Develop land types
  - Wetlands have mostly converted into Develop land types, and to Shrubs, and Grasslands
- ❑ Developed lands experienced the highest net gain, followed by Grasslands and Developed Open spaces
- ❑ Spatial patterns of land acquisition for developments;
  - Forests in North/North-East regions
  - Cultivated in West and South regions to the city of Houston

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Thushara Ranatunga, Environmental Modeler; Dmitry Messen, Program Manager (Socioeconomic Modeling)