Raising Lawns: Understanding the social and ecological consequences of land use/cover change in southern Dade County

FCE LTER Human Dimensions Group

Hugh Gladwin, Jim Heffernan, Gail Hollander, Laura Ogden, Jeff Onsted, Rinku Roy Chowdhury, Val Smith
Central Question:

How does suburbanization alter quality of life and availability of critical ecosystem services in the region?
Raising Lawns: Why it Matters
2000 Land Use in East Homestead
2006 Land Use in East Homestead w/ 09 zoning

Legend

- Developed Land, PARK!
- Ocean
- Single-Family, Low-Density
- Single-Family, Med.-Density
- Single-Family, High Density
- Mobile Home Parks
- Townhouses
- Two-Family (Duplexes)
- Multi-Family, Low-Density
- Multi-Family, High Density
- Migrant Camps
- Non-Residential Development
- Vacant, Open Space, Park
- Agricultural Land
- Water
Suburbanization & Zoning

• Goals

  – Develop land use/cover classification mapping using GIS parcel-scale land use data, zoning, and high resolution imagery
  – Develop spatially explicit models of suburbanization and land management practices
Social Vulnerability

• Social vulnerability: ability to plan for, respond, and recover from hazards (capacities)

• High vulnerability corresponds with low levels of social & economic capital

• Indices of Social Vulnerability
  – Ethnic minorities (particularly African American in US)
  – Low income
  – Land degradation
  – Housing density
Percent Below Poverty, 1990 and 2000
Number of Households and Median Household income by Block Group
$y = -0.137x + 24.5$

$r^2 = 0.1347$

$p<0.05$

Change in Density (# km$^{-2}$)

1990 Population Density (# km$^{-2}$)

J. Heffernan & V. Smith
Andrew amplified existing patterns social stratification and vulnerability.

• Community A
  – Population remained same
  – Income remained same
  – Ethnic composition remained same

• Community B
  – Population grew
  – Income remained same, slight increase
  – Ethnic composition changed (from Anglo to Anglo and Hispanic)
Trends evident at the parcel level: assessed valuation of single family homes

Last assessment before Hurricane Andrew in 1992

H. Gladwin
Post-Andrew Home Values

First assessment after Hurricane Andrew

H. Gladwin
Amount of losses not covered by insurance following Hurricane Andrew

Top three insurance companies were better able to cover most losses than other companies

Blacks were more likely to not be insured by top 3 companies and have greater losses

W. Peacock & C. Girard, 1997
Insurance: Critical Capacity

- Blocks with over 75% Black Households: 64 census blocks
- Blocks with 26 to 75% Black Households: 54 census blocks
- Blocks with less than 25% Black Households: 645 census blocks

Only 37% insured by one of the top 3 insurance companies.

% of Households in Block Insured by Top 3

10% 20% 30% 40% 50% 60% 70%

W. Peacock & C. Girard, 1997
Disturbance responses

- In some contexts, low capacity can result in displacement (e.g. gentrification)

- In South Dade, low capacity resulted in an inability to relocate

- Consequences for patterns of land use change?
Land Use Change

1990 FC and Homestead Land Use

2000 FC and Homestead Land Use

Legend
- Single Family, Low Density
- Single Family, Med.-Density (2-5 DU/Acre)
- Single Family, High Density
- Mobile Home Parks and Permanent Mobile Home
- Townhouses
- Two Family (Duplexes)
- Multi Family, Low-Density
- Multi Family, High Density
- Migrant Camps
- Non-Residential Dev
- Parks, Open Space, Vacant
- Agricultural Land
- Water
- Dye in 94 but not 90
- 90obliigo

J. Onsted
Resilience to disturbance – State changes and regime shifts in Natural Ecosystems

[Graph showing the transitions and thresholds]

- Returns to prior state/condition
- Transition to new state/condition

Threshold for regime shift

J. Heffernan & V. Smith
Vulnerability to disturbance – Amplification of differential capacity in Socio-Ecological Systems

- Transient decrease in capacity to respond
- Persistent low capacity to respond

Threshold for full return of capacity

J. Heffernan & V. Smith
What is the effect of Hurricane Andrew (as a pulse event) within the context of ongoing press processes (suburbanization) in socioeconomic landscape?