GEORGIA NOW AND FOREVER:

Using Historical Land Cover Data
to Build a More Sustainable Georgia

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Contents of today's presentation:

Preface:

Who are we and why are we doing this?

1. Why study land cover?

Population pressures

Climate pressures

Economic pressures

2. Implications of the study

Low-Intensity Development

Regional Differences

3. What can practitioners do about it?

Land conservation best practices

Land use best practices

Land stewardship best practices

4. Overview of StoryMap / educational tool

First, who are *we*?

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We are a conservation non-profit that has advanced sustainable land conservation and planning strategies for over 50 years.

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We are a conservation non-profit that has advanced sustainable land conservation and planning strategies for over 50 years.

Vision:

a Georgia where **all** people and the environment thrive.

Mission:

to protect Georgia through ecological and economic solutions for **stewardship**, **conservation**, and sustainable **use** of the land and its resources.

Second, what is *Georgia Now and Forever*?

1. an analysis of Georgia's historical land cover over the past 50 years & projected growth over the next 50
2. a collaboration between Georgia Conservancy & Georgia Tech's CSPAV
3. a multi-layered framework for designing policy that advances sustainability and resilience in GA

1. Why land cover?

Why focus on land cover?

Why focus on land cover?   *Reason 1:*

~4 million

people added to GA since 1990
people coming to GA through 2050*

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Atlanta Region	North GA	Coastal Region
+1.72 million	**+750,000**	**+230,000**
North-Central	Central Belt	South GA
+540,000	**+80,000**	**+6,000**

Climate crisis ⟷ Land crisis

*Governor's Office of Planning & Budget
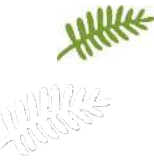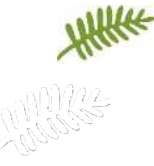
Why focus on land cover?   *Reason 2:*

Climate crisis ⟷ Land crisis

GA forest loss since 1974
-2.03 million acres

GA farmland loss since 1974
-2.63 million acres

GA development gain since 1974
+2.49 million acres

*Governor's Office of Planning & Budget

Why focus on land cover?   *Reason 3:*

Georgia is a rare place that has it all...

- A robust economy that takes advantage of our natural resources & geography
  - Agriculture sector: **$73.3 bn** economic impact (2017)
  - Forestry sector: **$35.9 bn** economic impact (2017)
  - 4th busiest port in the country

- Recreational opportunities in varied ecological settings
  - Outdoor economy: **$27.3 bn/year**
  - **6th** in biodiversity, but **5th** in extinctions

- High but varied quality of life

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A Georgia where people and the environment thrive.

ENVIRONMENT   ECONOMY

**We must strike a balance to keep what we love.**

Why focus on land cover?
In sum:

Intentional and thoughtful decisions about land put our communities in greatest control of their future resilience.

What we need our land to support:

Jobs & employment

Housing & people

Utilities & infrastructure

Ecological services & habitat

Outdoor recreation & natural resources

Climate change adaptation/mitigation strategies

Georgia Growth Rates by County (2020)

LOSS   GAIN

>4%   2-4%   0-2%   0-2%   2-4%   4-8%   >8%
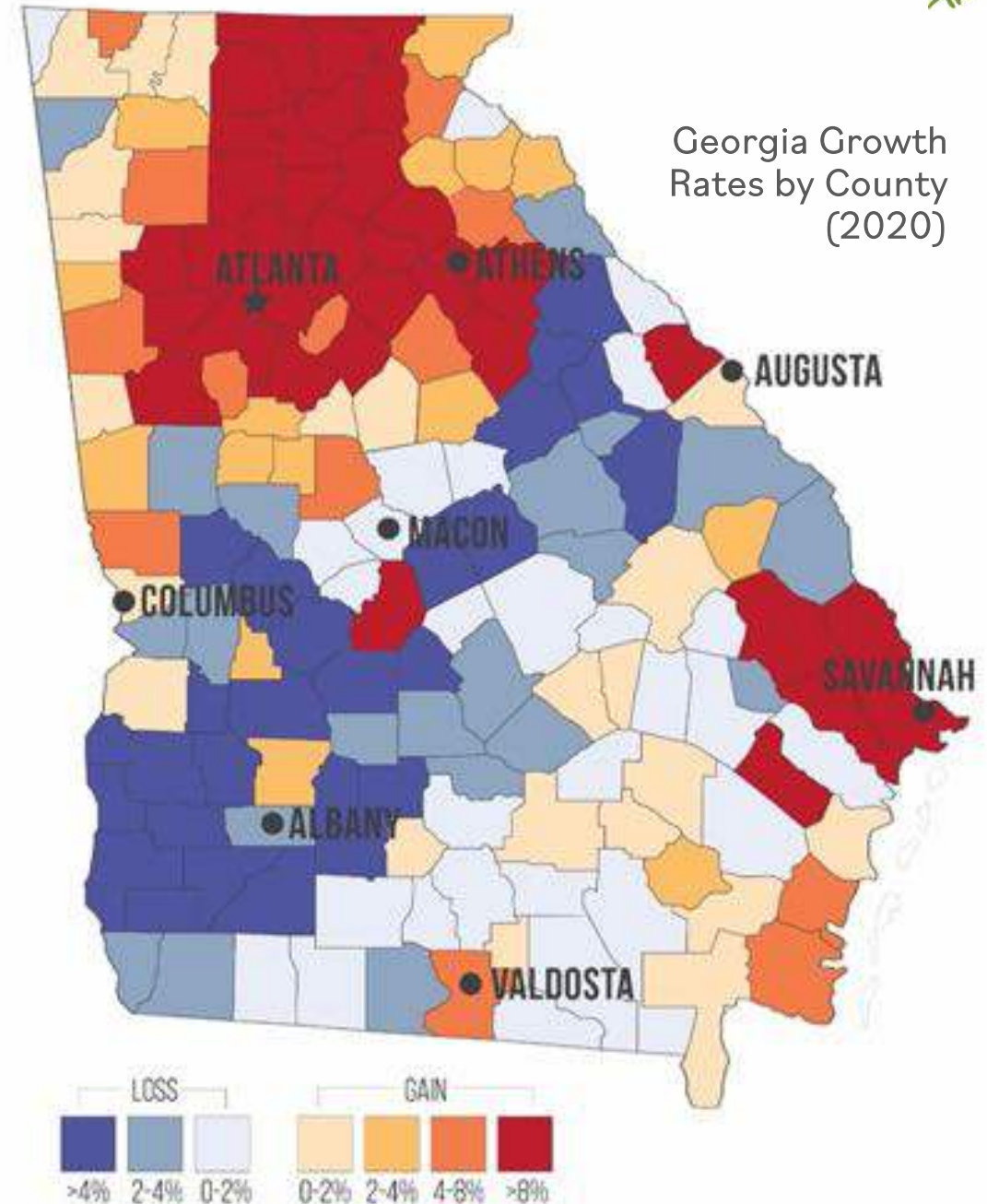
Our big questions:

How has our land cover changed in the past 50 years?

How has that impacted our communities?

How will land cover evolve over the next 50 years?
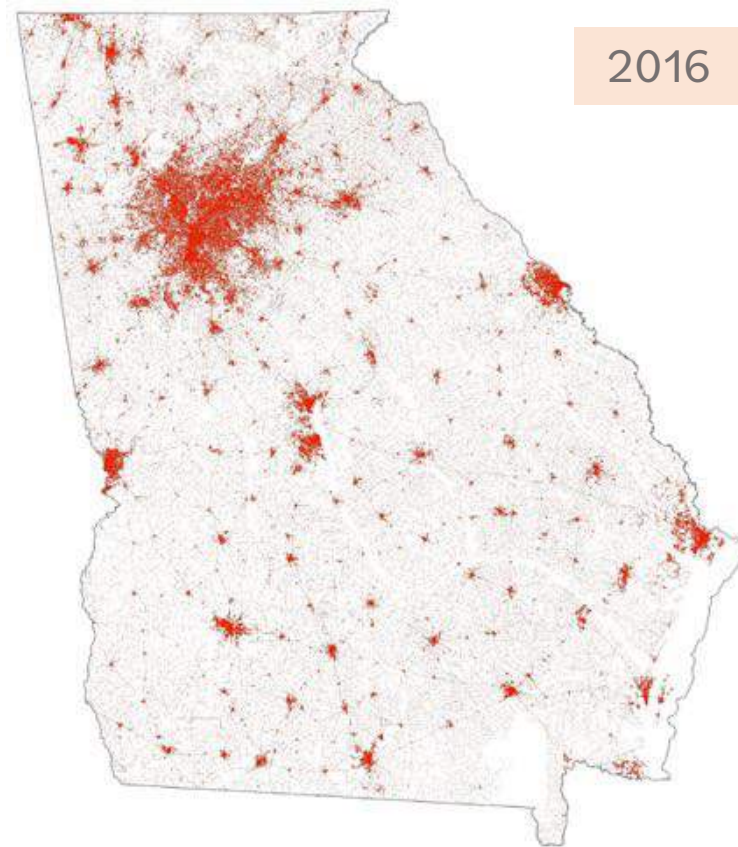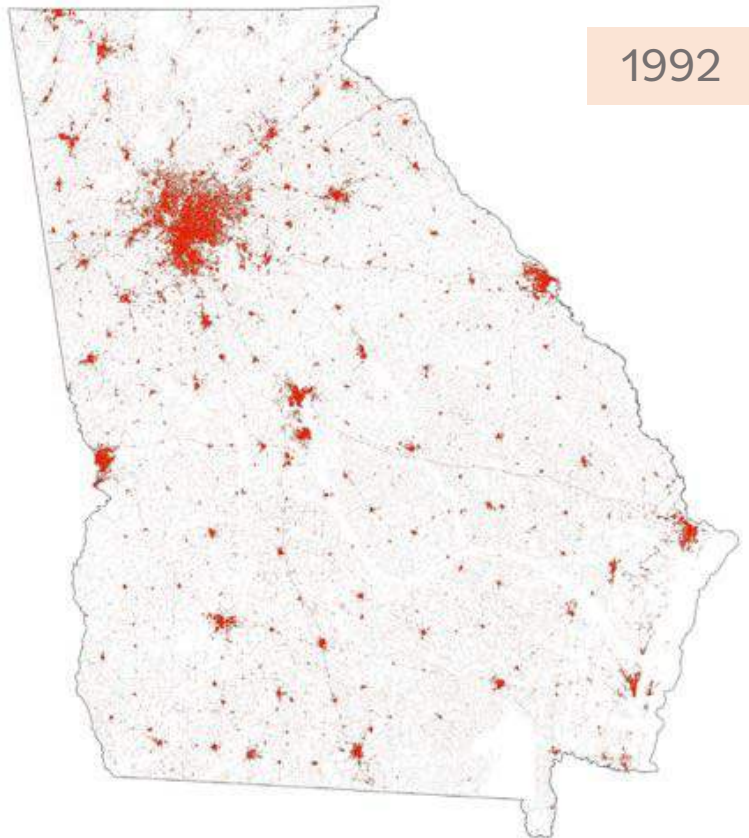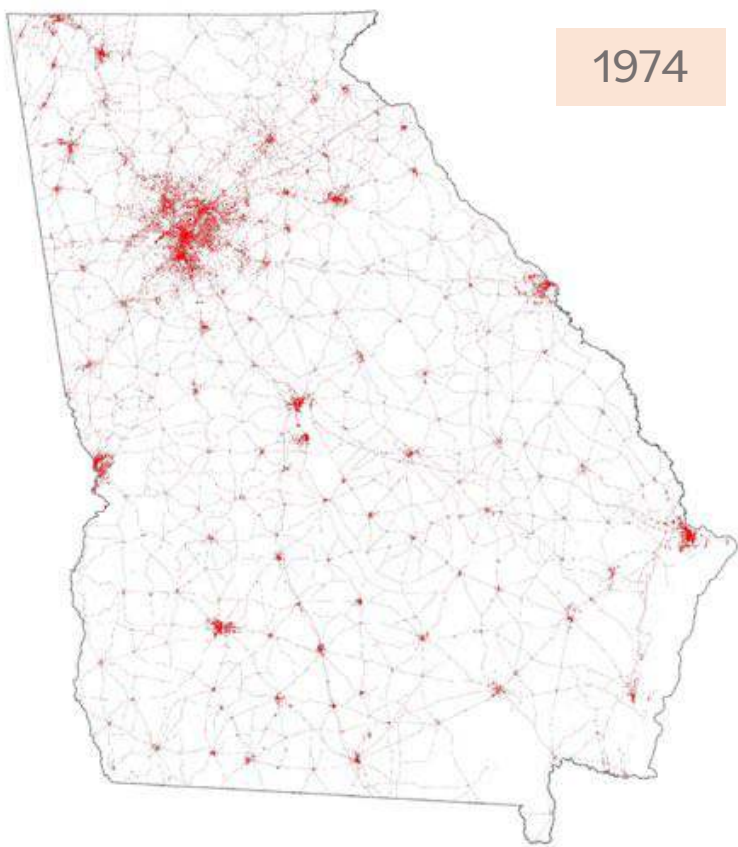
What policies must we advance to grow sustainably?

Implications of the Data

1) Low-Intensity Development Has Sprawled
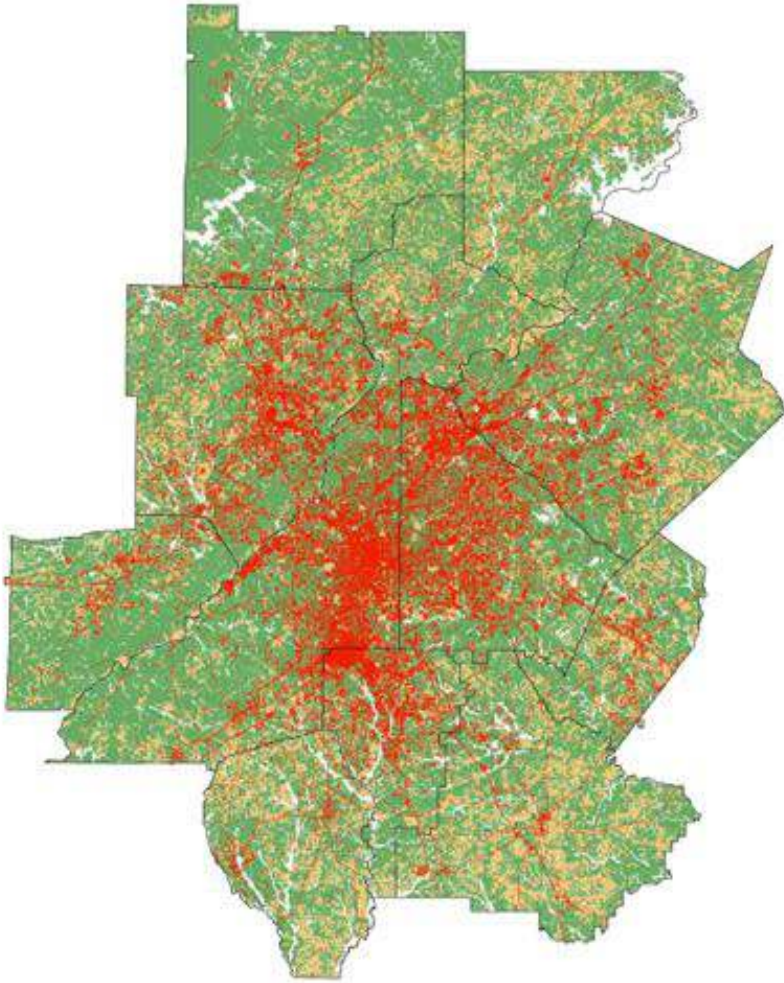
1974

1992

2016

- No jurisdiction has seen a decrease in development. Everywhere has seen an increase.
- Forest and working farmland have been lost at rates of 133 acres/day and 172 acres/day, respectively.
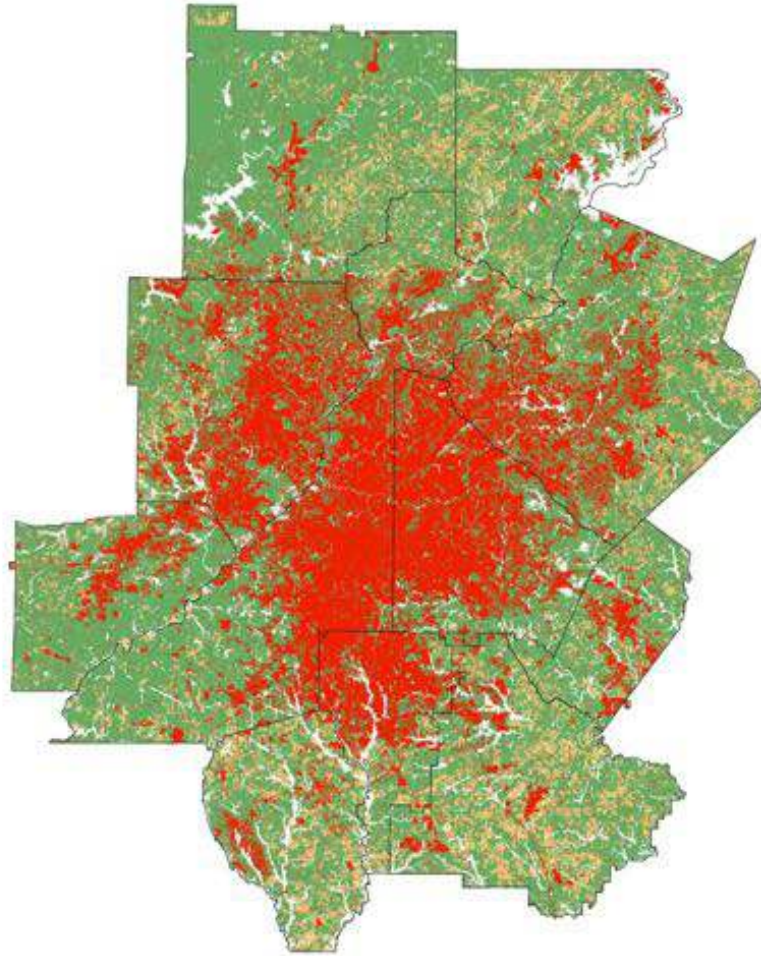- Typically, these land cover types are being converted to types that are less ecologically productive.
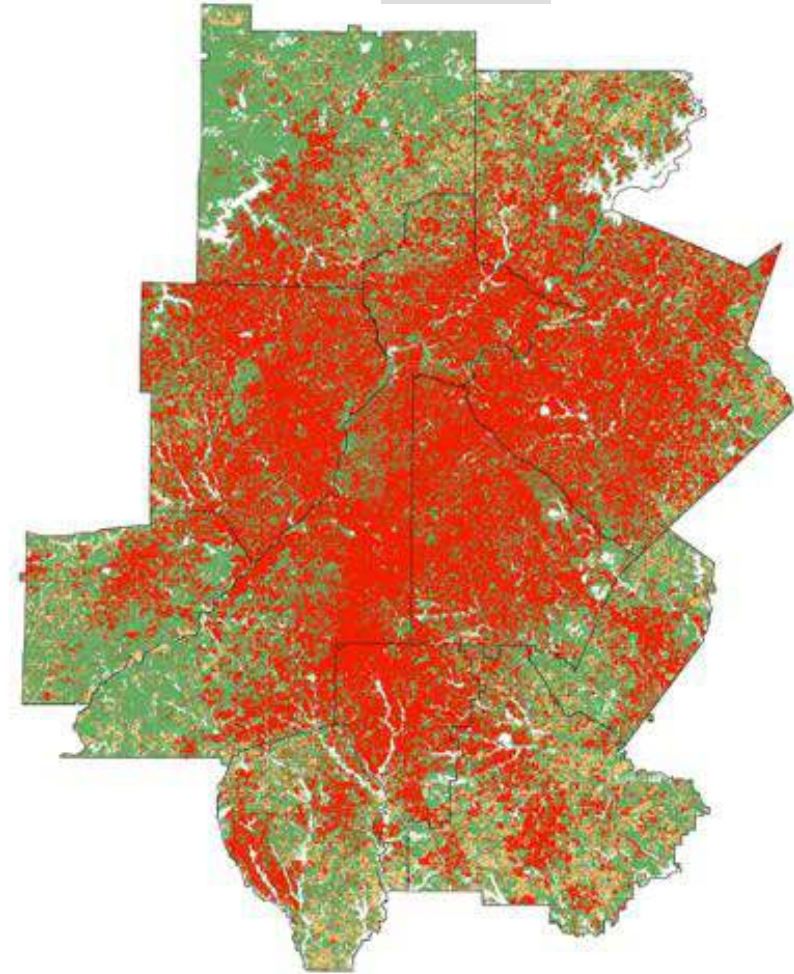
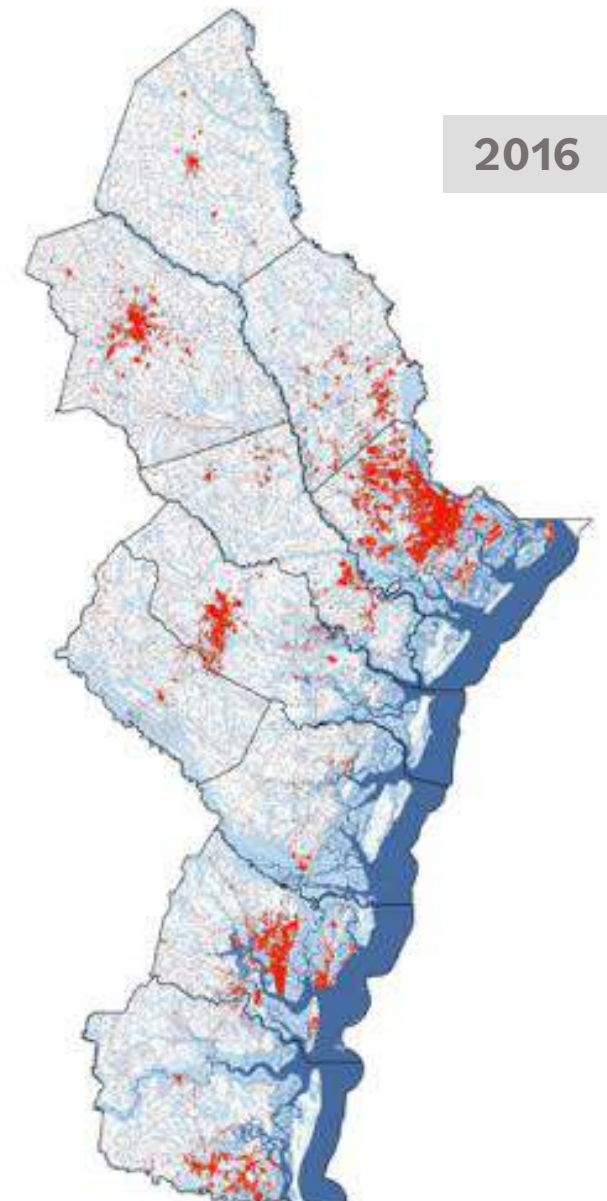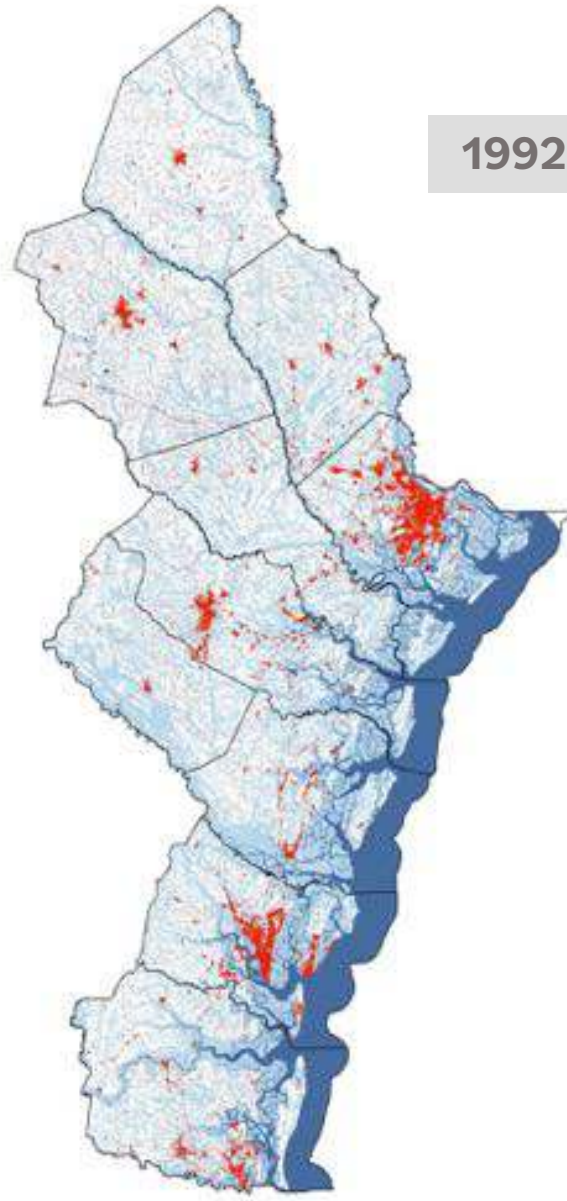# Change Over Time in Atlanta

1974

1992

2016

Change Over Time on the Coast

1974

1992

2016
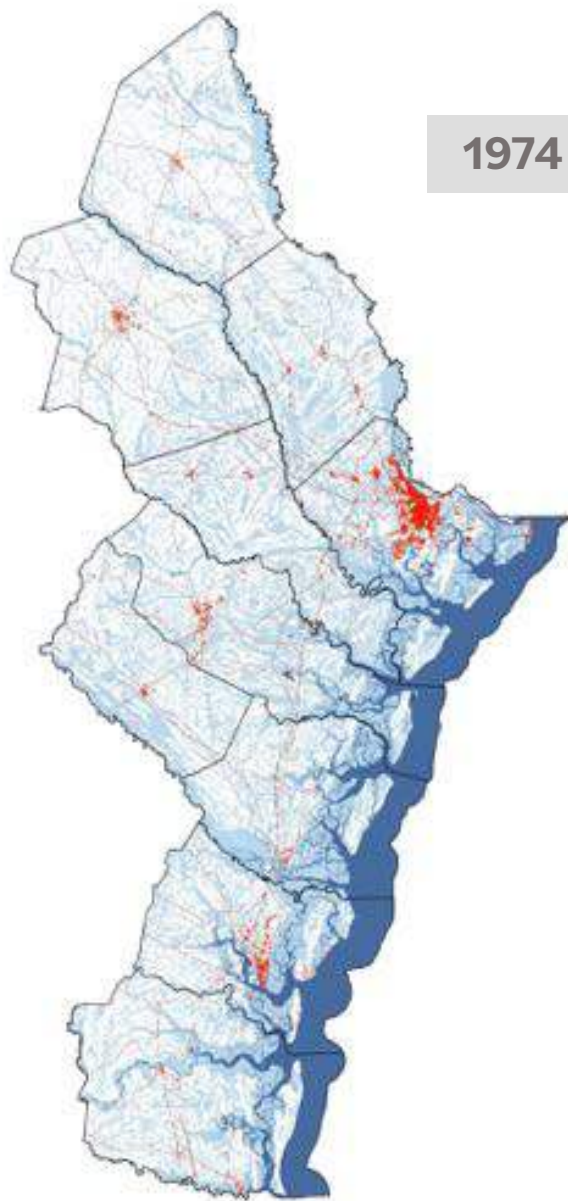
2) Change Patterns Differ Between Counties/Regions
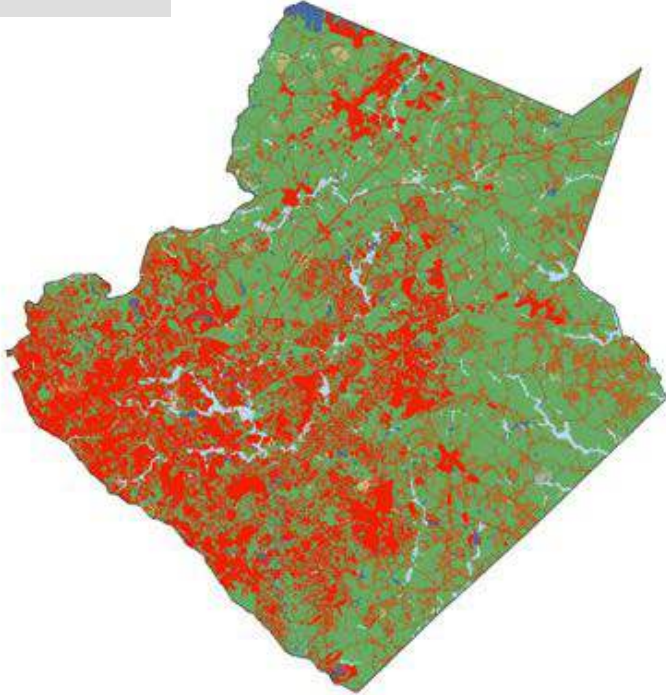
Gwinnett

Bibb
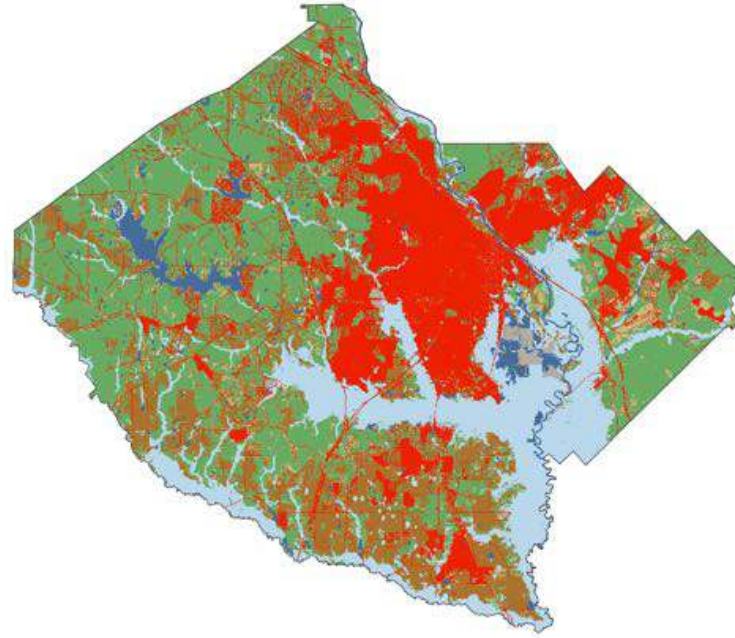
McIntosh
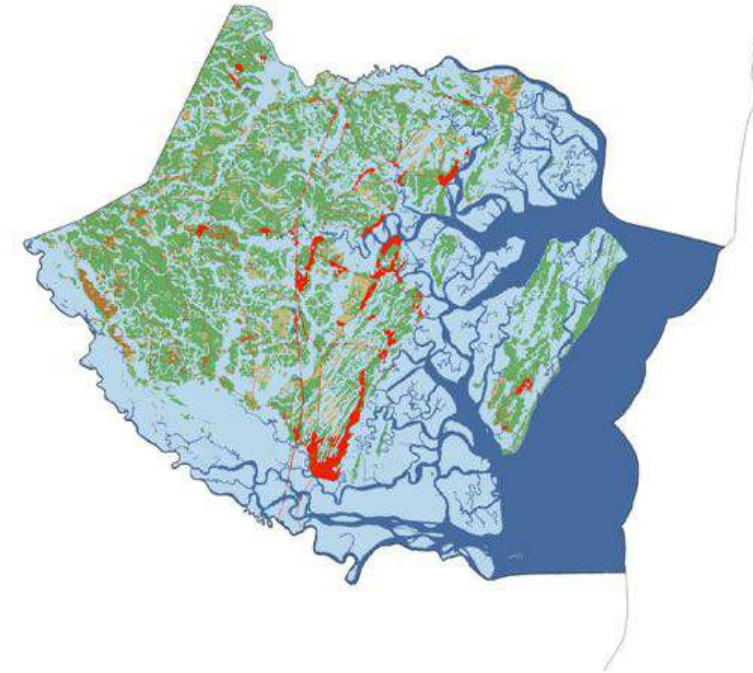
1992

Developed   Forest   Pasture, Hay, Crops   Grassland/Shrub   Wetlands   Open Water

2) Change Patterns Differ Between Counties/Regions

Gwinnett
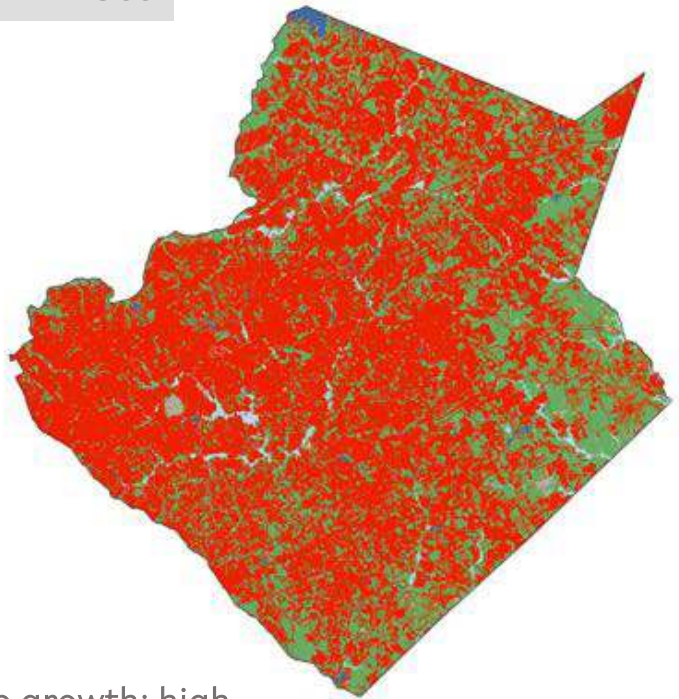
Pop growth: high
Dev growth: high

Bibb
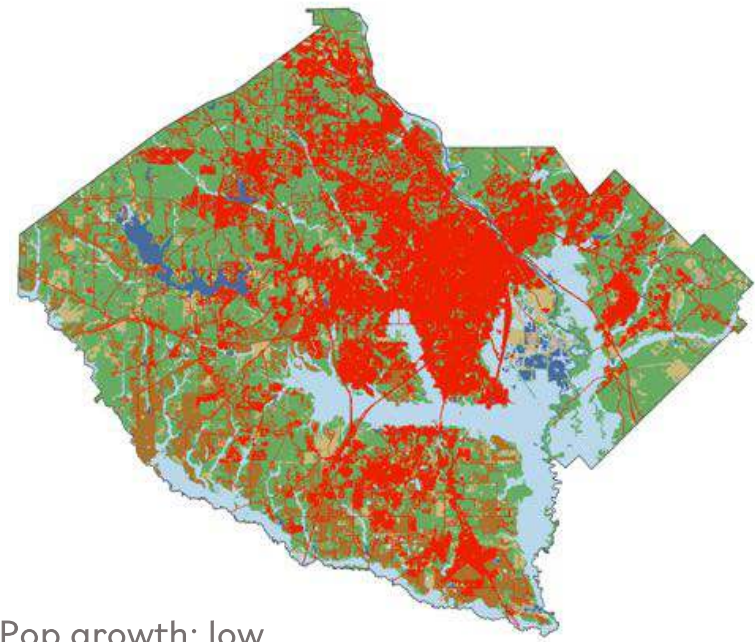
Pop growth: low
Dev growth: high

McIntosh
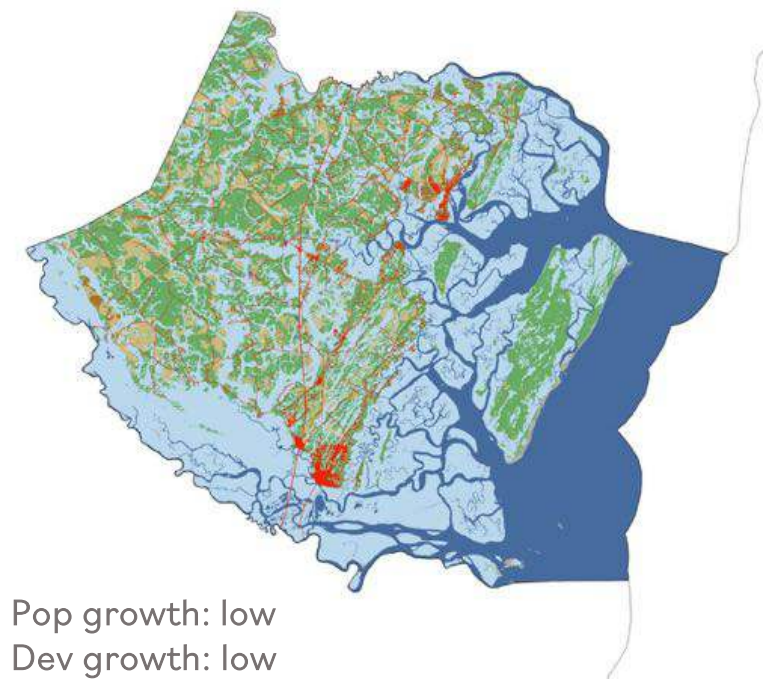
Pop growth: low
Dev growth: low

2 0 1 6

| Developed | Forest | Pasture, Hay, Crops | Grassland/Shrub | Wetlands | Open Water |

2) Growth Patterns Differ Between Counties/Regions
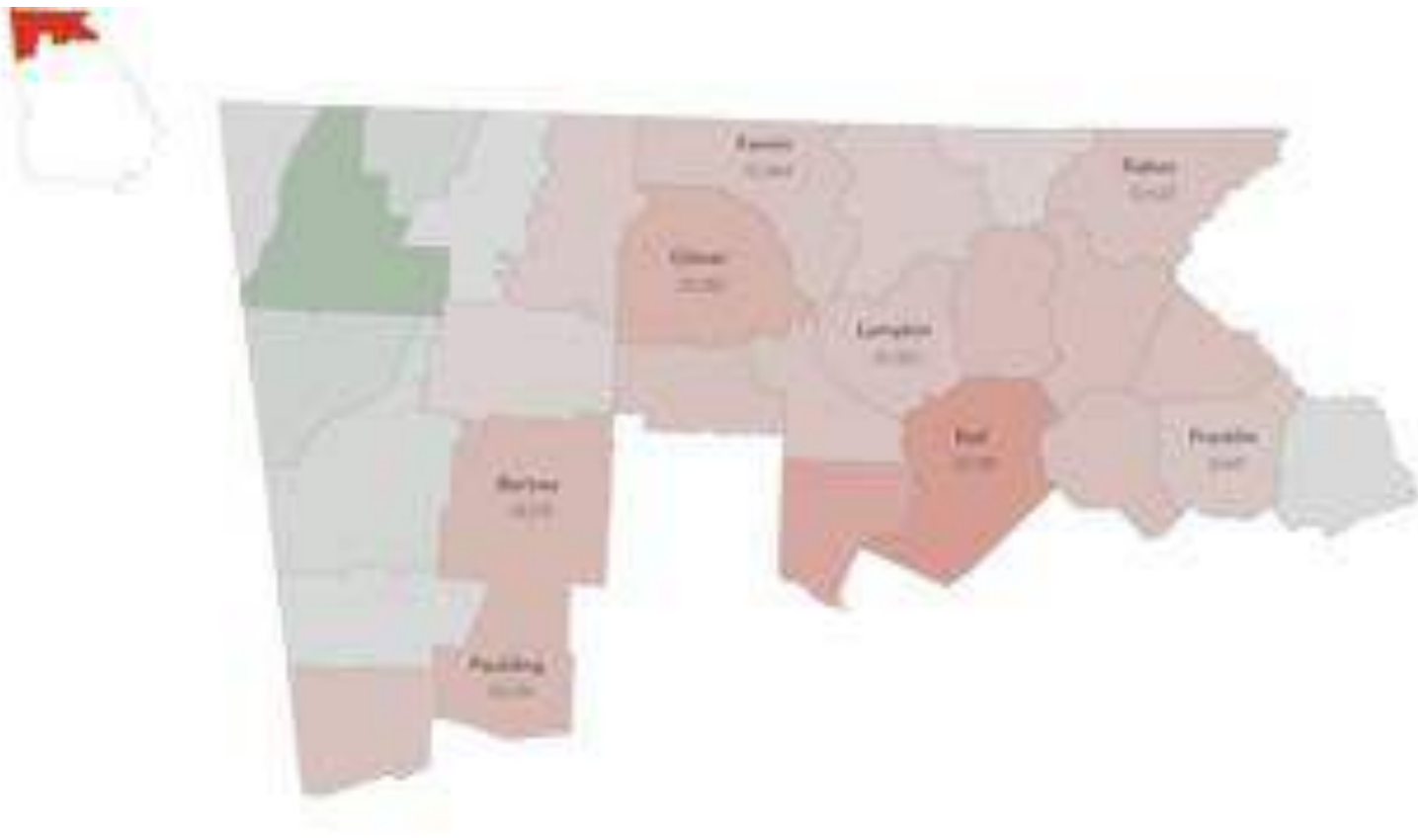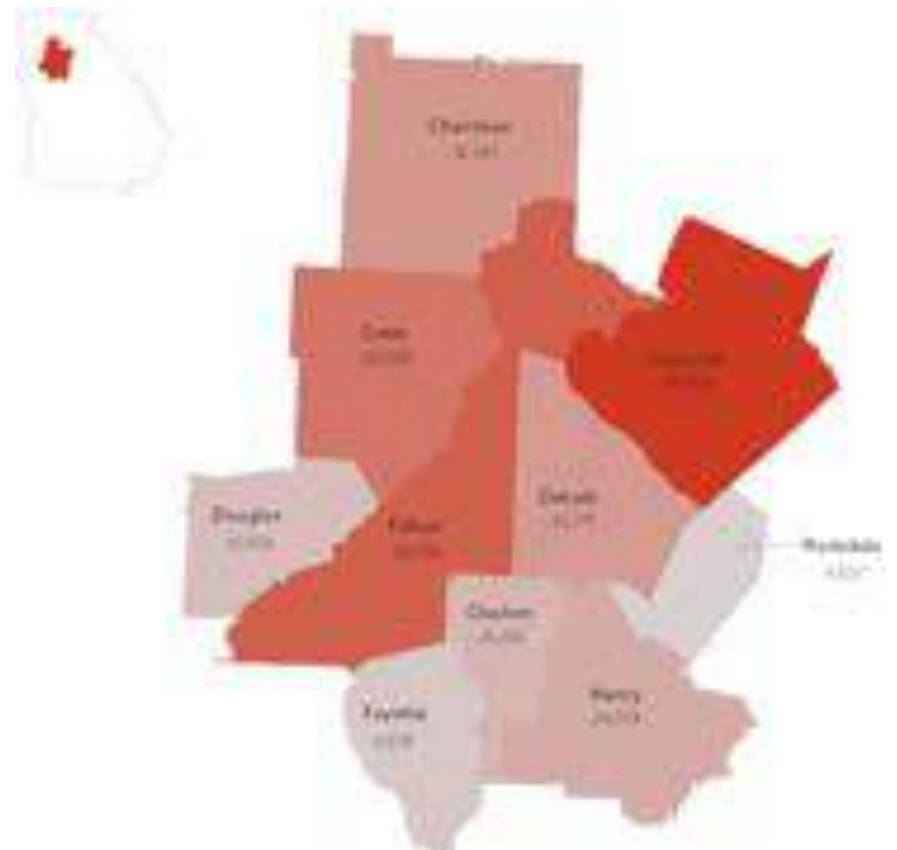
3) Demographic/Population Change Doesn't Always Affect Land Cover & Vice Versa
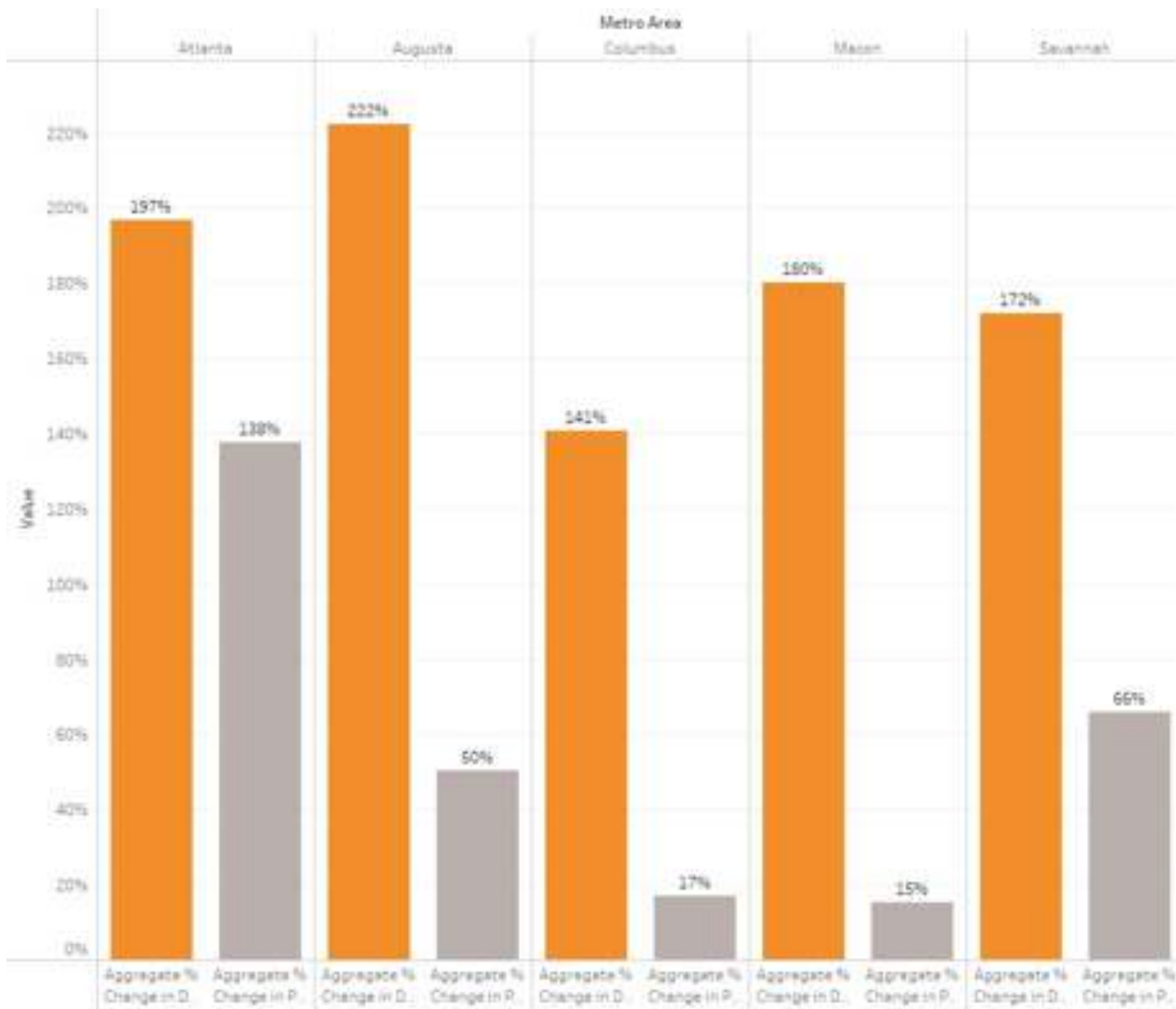
Change 1980-2016:

Macon-Bibb Metro

Population: **+30,665 people**

Developed land: **+61,714 acres**

+dev acres/person: **2.01**

Columbus Metro

Population: **+35,776 people**

Developed land: **+50,574 acres**

+dev acres/person: **1.41**

What Can Practitioners Do About it?

What can GNF tell us?

/ how can practitioners use it?

- Where lands of high ecological value are & what kind of value they bring

- Where lands of high ecological value are under pressure of conversion

- How conscientious stewardship can contribute to a resilient Georgia

- How to prevent scattershot, low-density development that undercuts ecological value

- How to create an ecological foundation for Georgia's future

- How to sustainably weigh ecological factors against other land uses required by a growing state

Reminder:
Intentional and thoughtful decisions about land put our communities in greatest control of their future resilience.
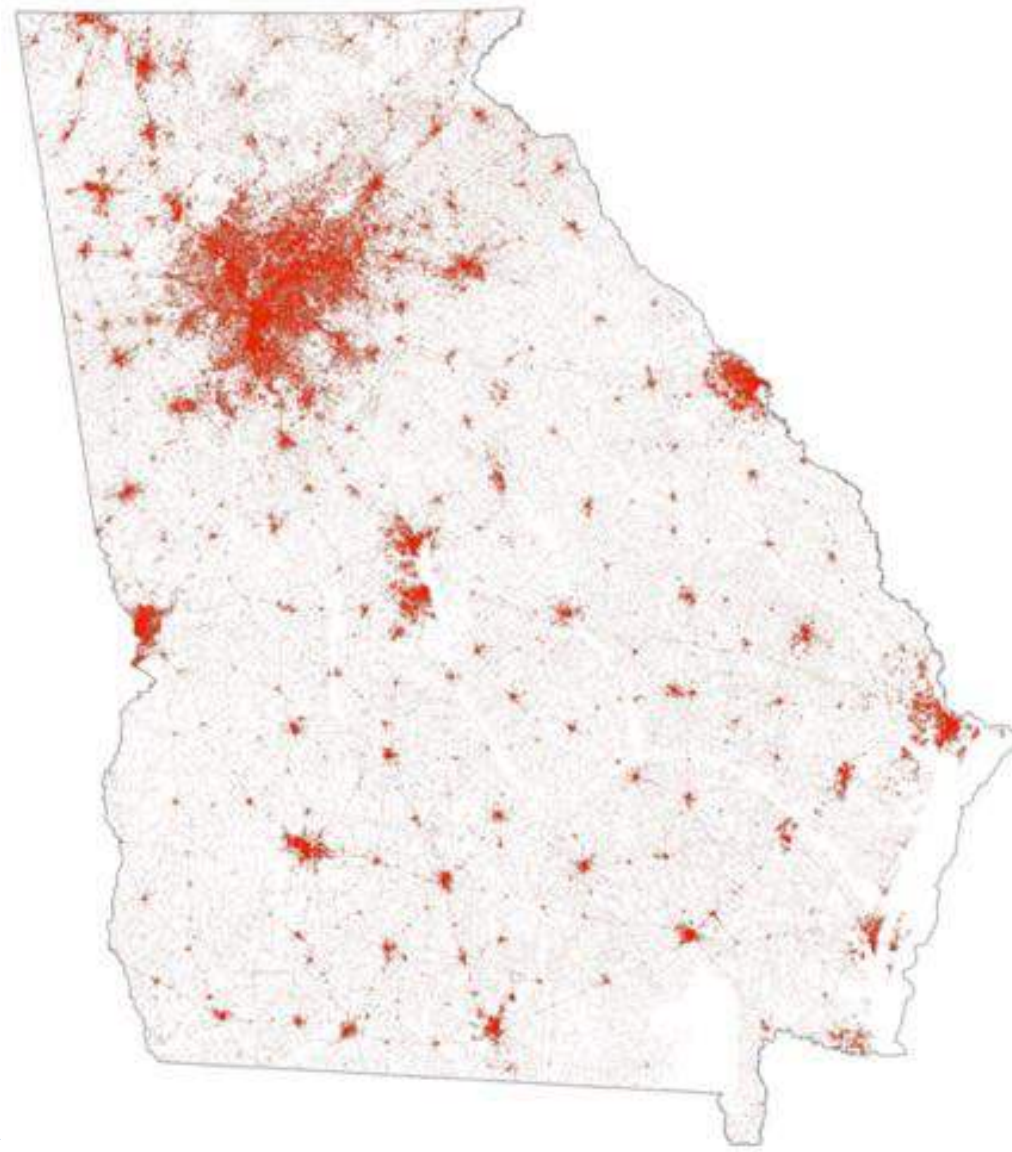
What can GNF tell us?

What can GNF tell us?

| LAND CONSERVATION | LAND USE | LAND STEWARDSHIP |

What can GNF tell us?

LAND CONSERVATION	LAND USE	LAND STEWARDSHIP

GC mission:

to protect Georgia through ecological and economic solutions for **stewardship**, **conservation**, and sustainable **use** of the land and its resources.

What can GNF tell us?

LAND CONSERVATION

LAND USE

LAND STEWARDSHIP

MANDATE:

Identify and protect high-functioning lands that store carbon, provide habitat for biodiverse wildlife, and clean our water and air.

POTENTIAL POLICIES:

- Identify conservation priorities & reduce barriers for land trusts interested in carbon mitigation banking projects.

- Encourage competitive property tax relief and/or serve as "buyer of first priority" for tracts on the urban fringe experiencing development pressure.

- Develop Conservation Plans and advance them by applying for conservation funding (Georgia Outdoor Stewardship Program, Land & Water Conservation Fund).

- Develop relationships with organizations that promote the creation of Working Farms & Forests.

What can GNF tell us?

LAND CONSERVATION	LAND USE	LAND STEWARDSHIP

MANDATE:

Reduce development pressure on lands farther away from city centers/ developed areas by investing in smarter growth strategies.

POTENTIAL POLICIES:

- Revise zoning codes to *legalize* infill and redevelopment in areas already disturbed by pavement.

- Revise tree ordinances to prioritize new planting as much as old canopy.

- Found/reinvigorate local Land Bank Authorities for purchasing & restoring dilapidated properties for renovation.

- Offer tax incentives/waived fees for developers conducting retrofit or infill projects.

- Promote equitable growth strategies that make it possible for households to choose homes close to services & jobs.

What can GNF tell us?

LAND CONSERVATION

LAND USE

LAND STEWARDSHIP

MANDATE:

Tend to land, conserved or disturbed, in ways that restore natural systems and support multiple ecological functions.

POTENTIAL POLICIES:

- Landscape scale: Educate landowners on benefits of prescribed fire for habitat management & nutrient cycling.

- Suburban scale: Encourage planting of pollinators and diverse ground cover to reduce runoff and increase biodiversity.

- Urban scale: Infuse public green-space with high-functioning natural systems, like food forests or bioswales for stormwater mitigation.

- Multiple scales: Identify carbon asset restoration resources & projects.

Conservation-Minded Planning   *Focus 1:*

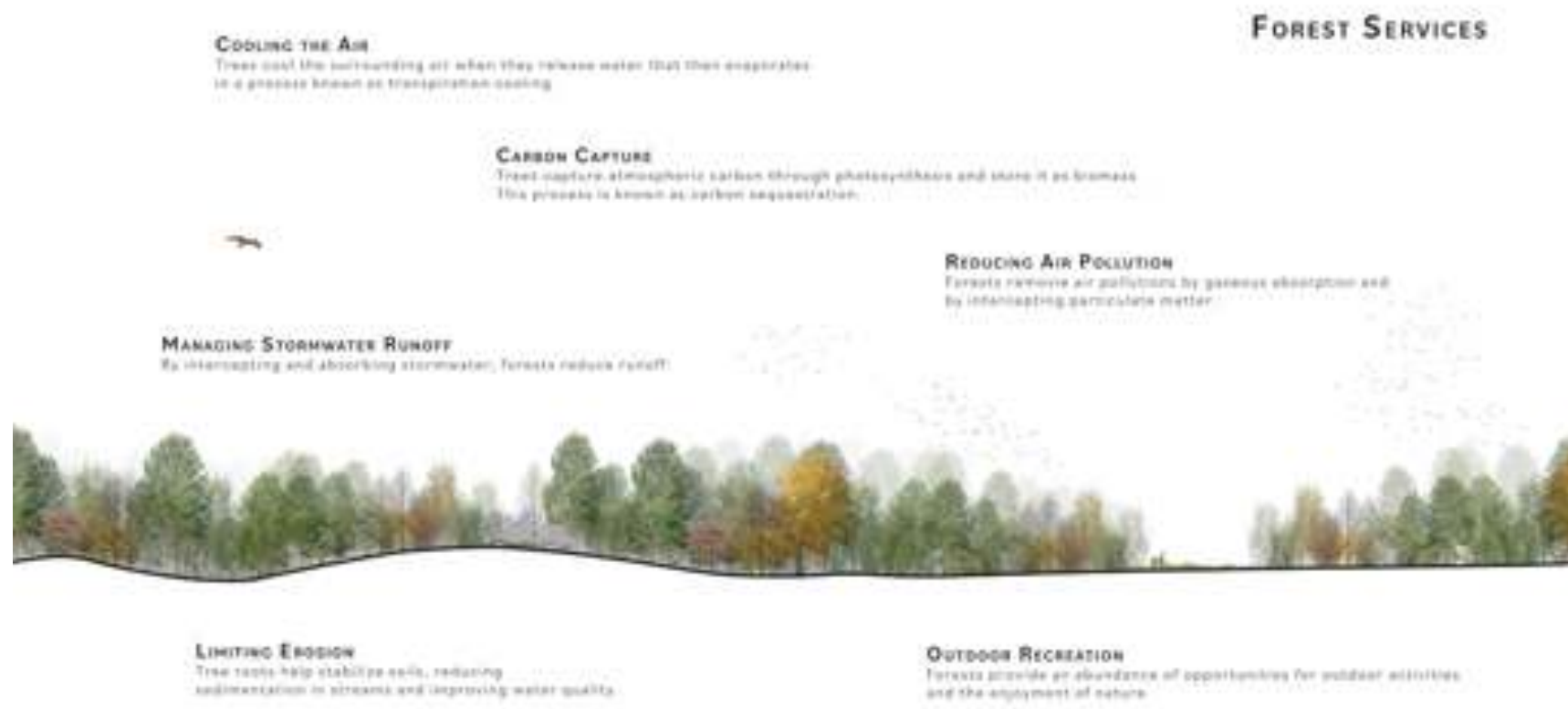## We must curb the proliferation of low-intensity development.

- fragments landscapes
- houses fewer people
- increases cost of community services, often rendering systems unsustainable
- de-socializes communities

Conservation-Minded Planning *Focus 2:*

We must identify highest-priority natural resources & protect them at all costs.

- carbon sinks (i.e. forests, swamps, peatlands)
- critical habitats
- critical waterways
- working farmlands, especially small-scale tracts
- scenic landscapes, both for environmental services and economic benefits

FOREST SERVICES

COOLING THE AIR
Trees cool the surrounding air when they release water that then evaporates in a process known as transpiration cooling

CARBON CAPTURE
Trees capture atmospheric carbon through photosynthesis and store it as biomass. This process is known as carbon sequestration.

REDUCING AIR POLLUTION
Forests remove air pollutants by gaseous absorption and by intercepting particulate matter

MANAGING STORMWATER RUNOFF
By intercepting and absorbing stormwater, forests reduce runoff.

LIMITING EROSION
Tree roots help stabilize soils, reducing sedimentation in streams and improving water quality

OUTDOOR RECREATION
Forests provide an abundance of opportunities for outdoor activities and the enjoyment of nature

Conservation-Minded Planning *Focus 3:*

We must invest in solutions that render environmentally-minded choices easy and feasible for low-income households.

- locating new housing within walking distance of jobs and services

- investing in pedestrian infrastructure and transit where feasible

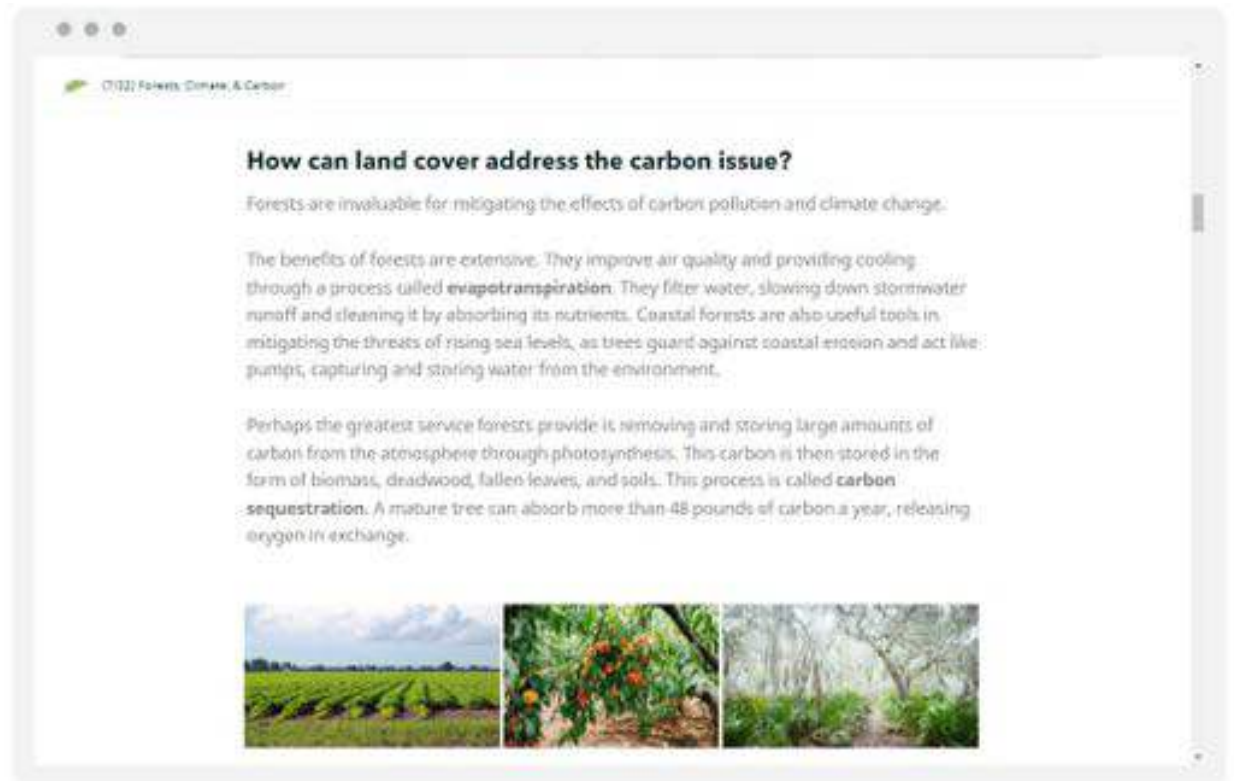- advancing alternative models like Community Land Trusts (CLTs)

ESRI StoryMap

- Detailed synopses of various aspects of land cover
  - Forests, climate, & carbon sequestration
  - Working farmlands & food impacts
  - Development & infrastructure
  - Habitats & wildlife

- Interactive data visualization and analysis tools, broken down by county and watershed

- **Ahead:** forward-looking projections to be added to analysis

www.georgiaconservancy.org/GNF

(7/22) Forests, Climate, & Carbon

(7/22) Forests, Climate, & Carbon
How does land cover affect our climate and ecosystem?

How can land cover address the carbon issue?

Forests are invaluable for mitigating the effects of carbon pollution and climate change.

The benefits of forests are extensive. They improve air quality and providing cooling through a process called **evapotranspiration**. They filter water, slowing down stormwater runoff and cleaning it by absorbing its nutrients. Coastal forests are also useful tools in mitigating the threats of rising sea levels, as trees guard against coastal erosion and act like pumps, capturing and storing water from the environment.

Perhaps the greatest service forests provide is removing and storing large amounts of carbon from the atmosphere through photosynthesis. This carbon is then stored in the form of biomass, deadwood, fallen leaves, and soils. This process is called **carbon sequestration**. A mature tree can absorb more than 48 pounds of carbon a year, releasing oxygen in exchange.

Sneak peek at our Story Map!

Three Axes for Better Planning

LAND CONSERVATION	LAND USE	LAND STEWARDSHIP

Making choices that align with these three axes can help local governments and planning practitioners advance a higher and more sustainable quality of life over the long-term.

But the choices must be made.

Thank You

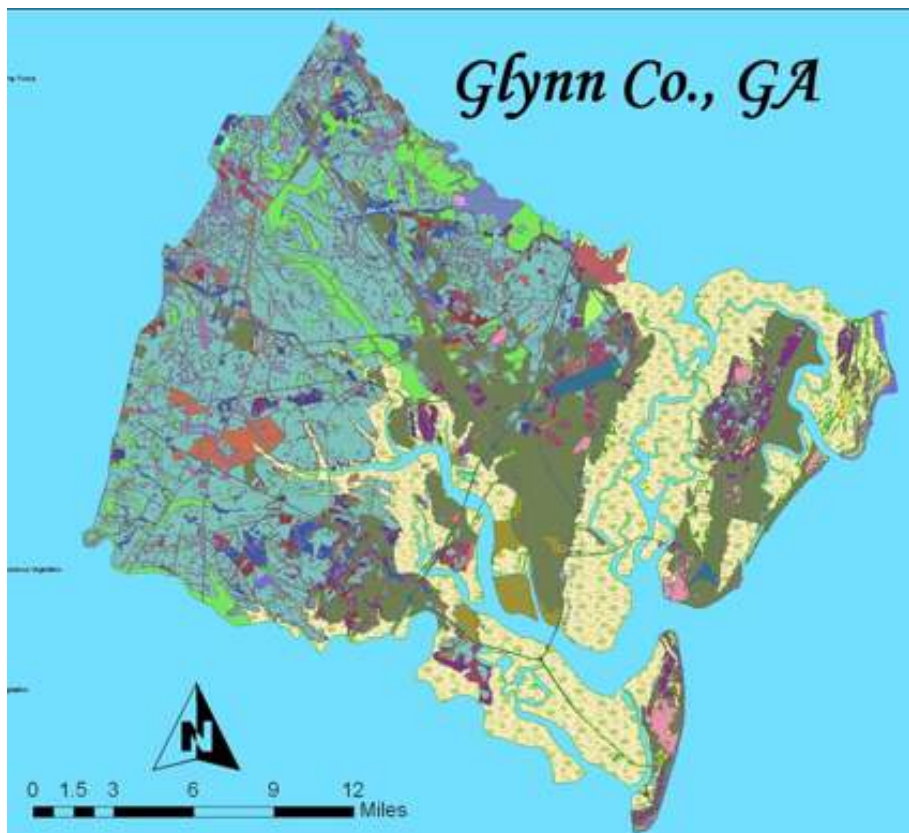Nick Johnson, Senior Planner // njohnson@gaconservancy.org

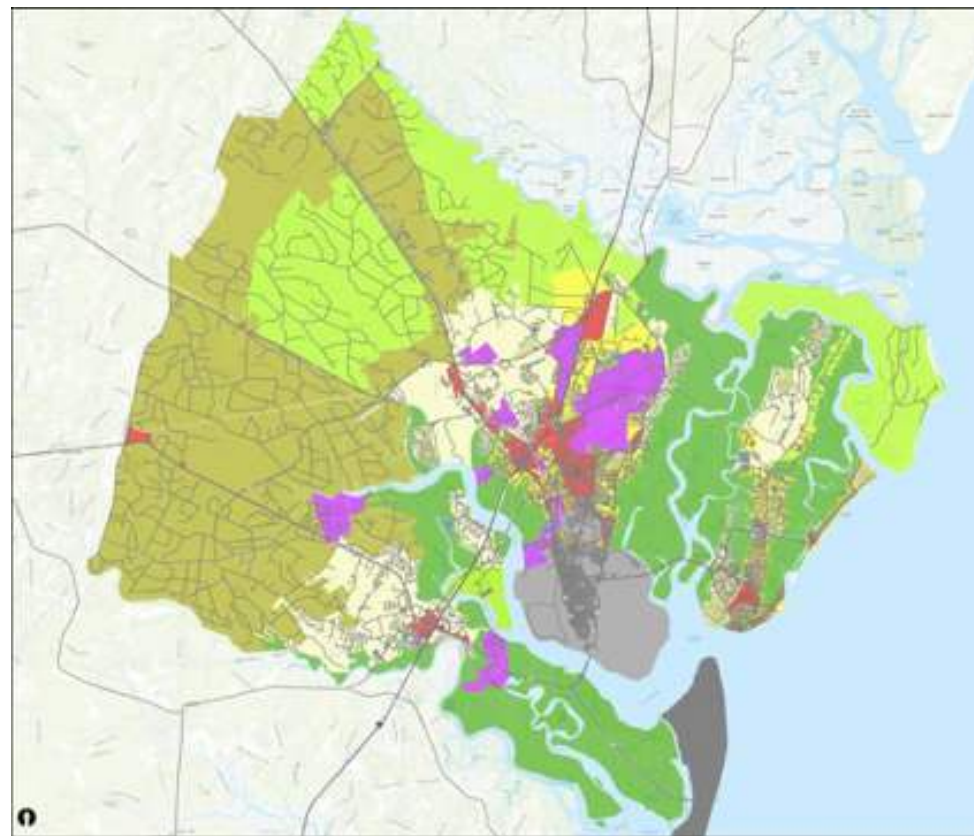Luben Raytchev, Designer + Planner // lraytchev@gaconservancy.org

Process

What does landcover tell us?

Land Cover

vs.

Land Use

Land cover is the observed (bio)physical cover on the earth's surface.

Land use shows how people use the landscape – whether for development, conservation, or a mix of uses.

Why 50 years?

FORESIGHT. Understanding, analyzing, and visualizing change over time helps us understand where we're headed.

FACTS. Science-based results make for good evidence that can inform policy.

CHANGING CONDITIONS. 50 years captures a variety of different environmental, economic, political and social conditions.

CONFIRMATION. This data does not currently exist and would fill a gap in our knowledge about Georgia's history. Georgians "know" about the changes in our state but there isn't full, consistent data to document the changes.
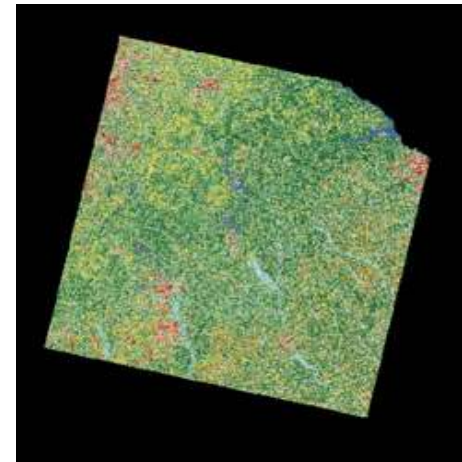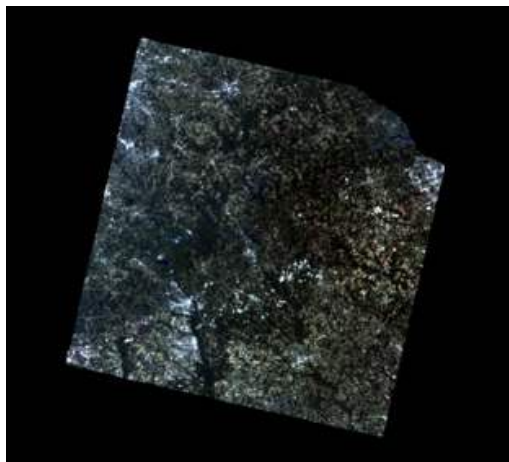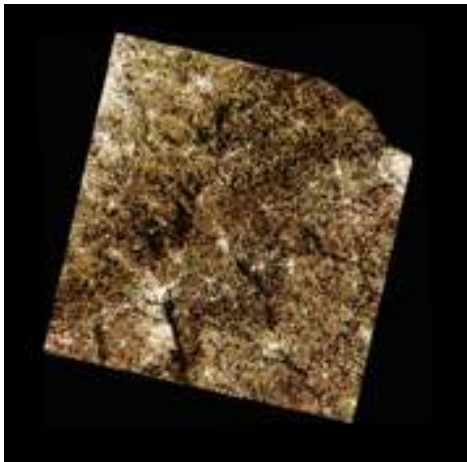
Approach to the work

Utilized two different land cover data sources, both derived from Landsat satellite imagery:

- Georgia Land Use Trends (GLUT)
  - Years: 1974, 1985
  - Resolution: 60m
- National Land Cover Database (NLCD)
  - Years: 1992, 2001, 2006, 2011, **2016** ▶
  - Resolution: 30m

Compiled and reclassified multiple classes of land cover into sets of 8 (general) and 15 (specific)
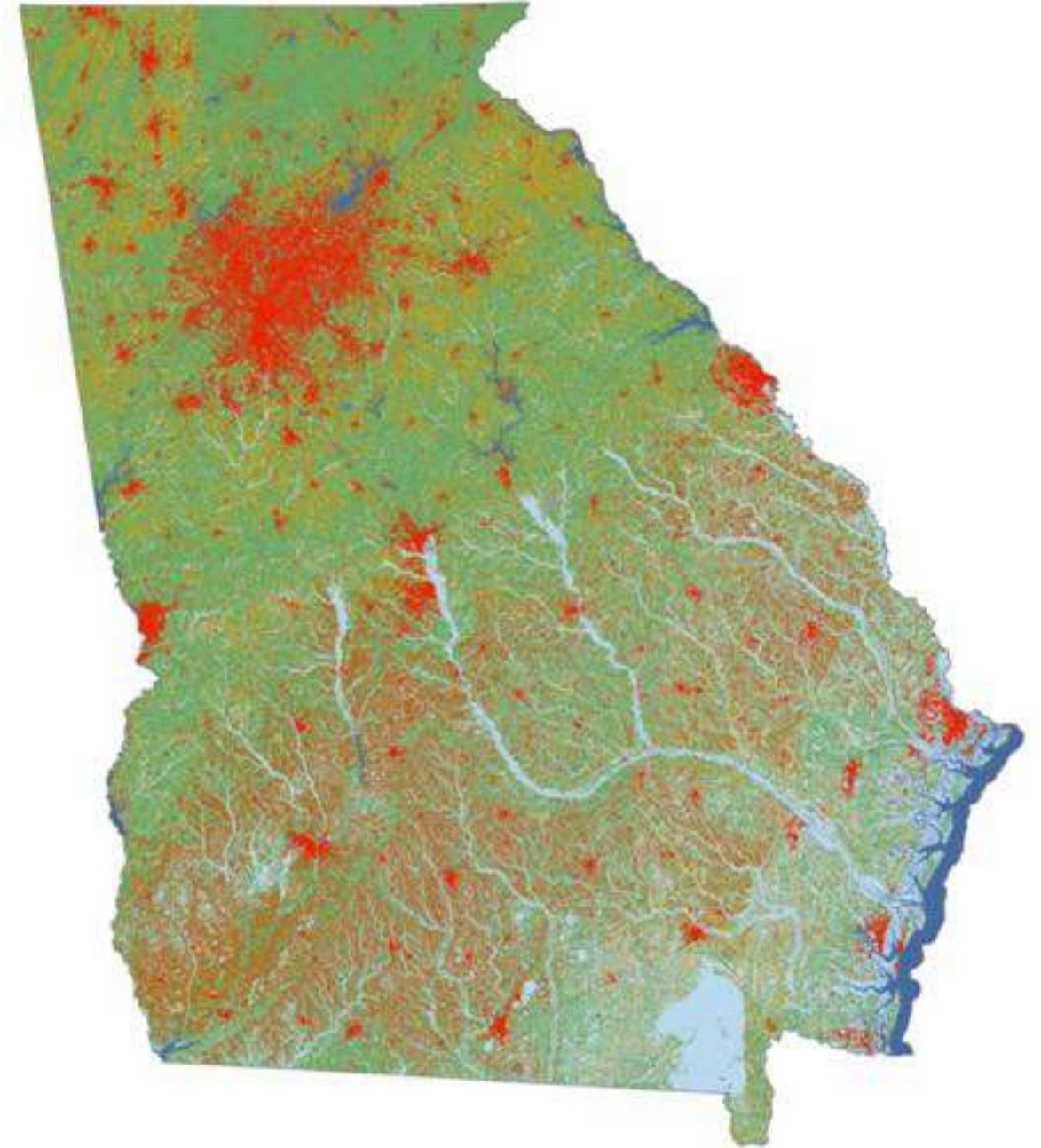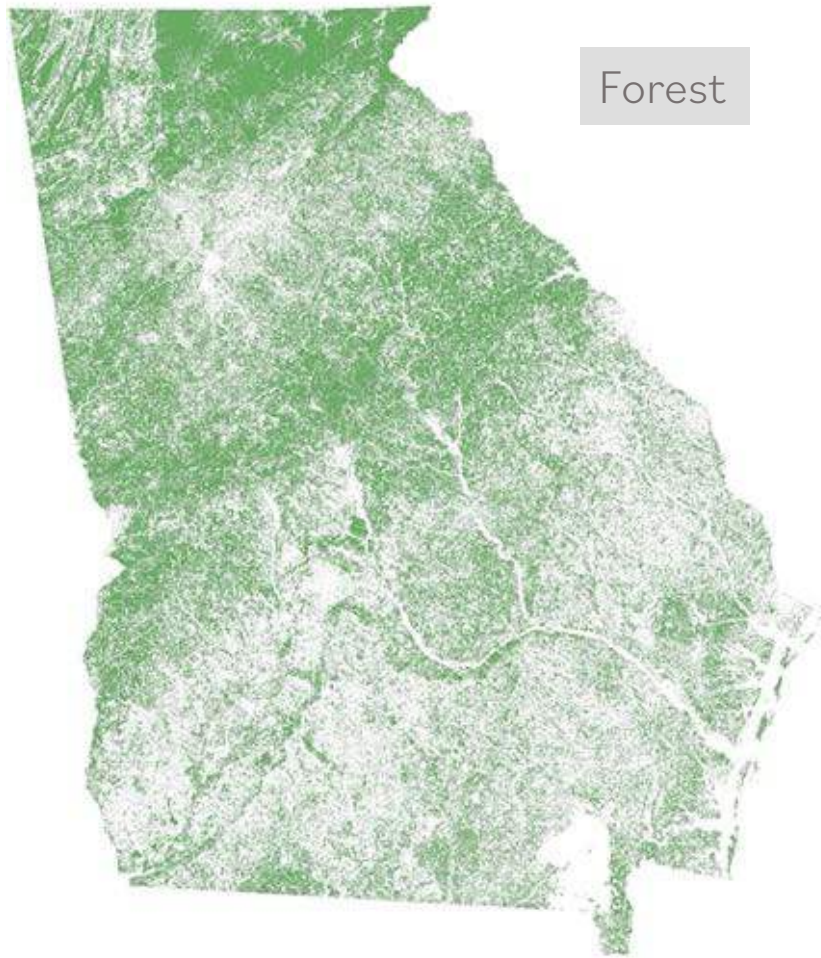
Caveats & Limitations

AVAILABILITY. We attempted to create land cover data from the '70s and '80s using historic Landsat data. This was a time-intensive and very difficult process. We decided to use UGA GLUT data as a substitute for creating our own data.

STANDARDIZATION. Certain decades were more difficult to compare to each other. Some had different classes than others. The solution was to standardize the data across year by collapsing land classes into broader categories.

Legend:
- Open Water (11)
- Perennial Ice/Snow/ (12)
- Developed, Open Space (21)
- Developed, Low Intensity (22)
- Developed, Medium Intensity (23)
- Developed, High Intensity (24)
- Barren Land (Rock/Sand/Clay) (31)
- Unconsolidated Shore (32)
- Deciduous Forest (41)
- Evergreen Forest (42)
- Mixed Forest (43)
- Dwarf Scrub(AK only) (51)
- Shrub/Scrub (52)
- Grasslands/Herbaceous (71)
- Sedge/Herbaceous(AK only) (72)
- Lichens (Ak only) (73)
- Moss (AK only) (74)
- Pasture/Hay (81)
- Cultivated Crops (82)
- Woody Wetlands (90)
- Emergent Herbaceous Wetlands (95)

1992

2001-2016

Standardized

Open Water	Cultivated Crops
Developed	Grassland/Shrub
Barren Land	Pasture/Hay
Forest	Wetlands

Coverage Type Examples (2016)

Forest

Crops
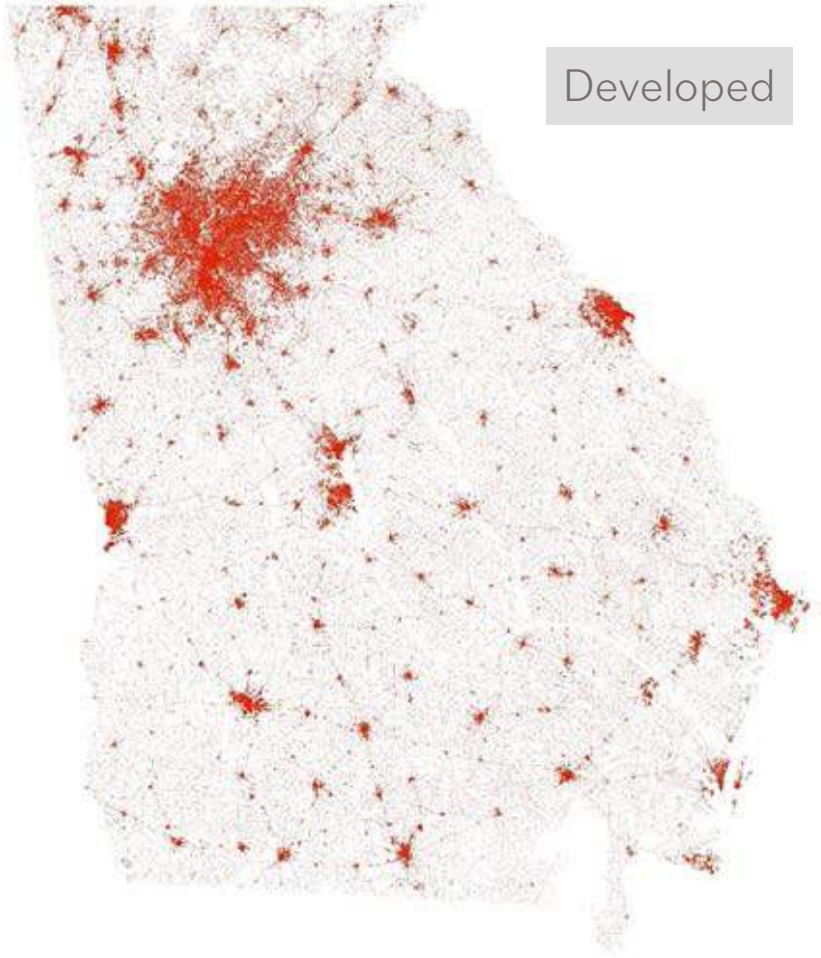
Developed

Statewide Distributions (2016)
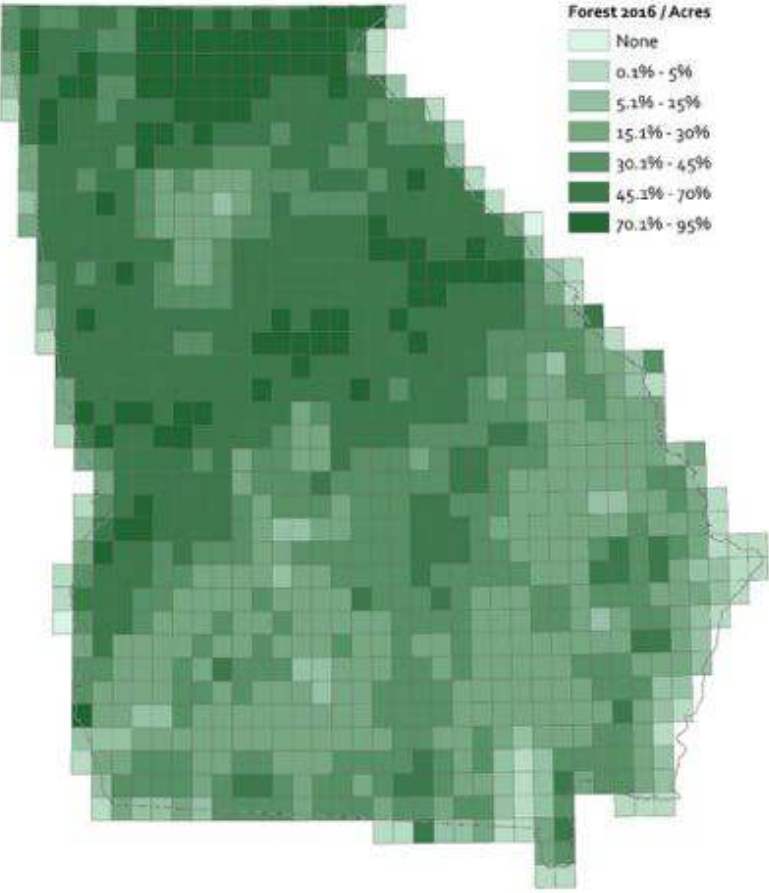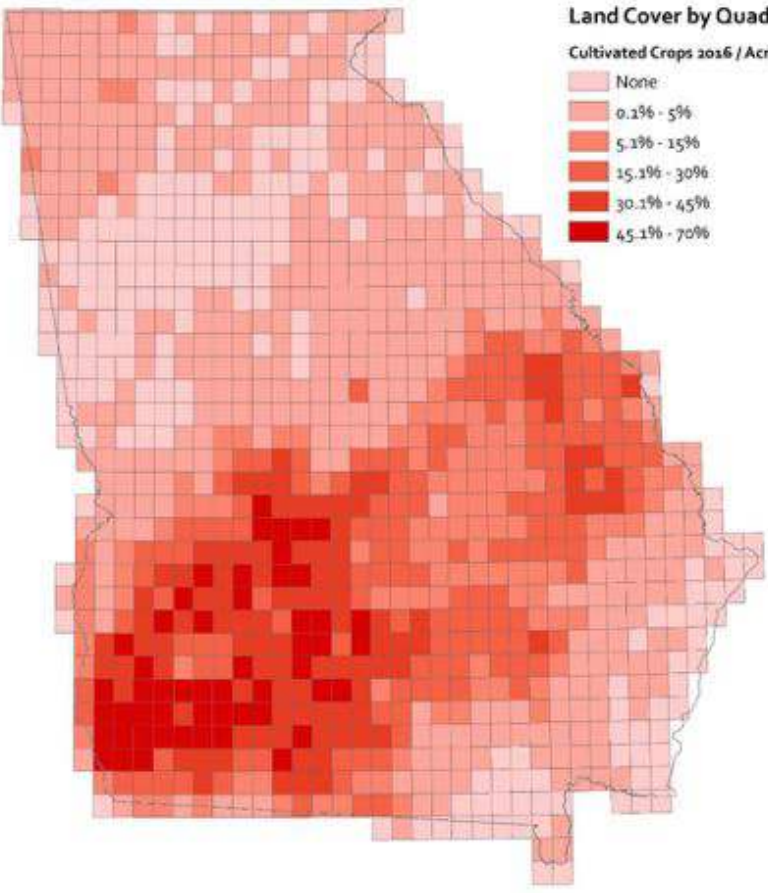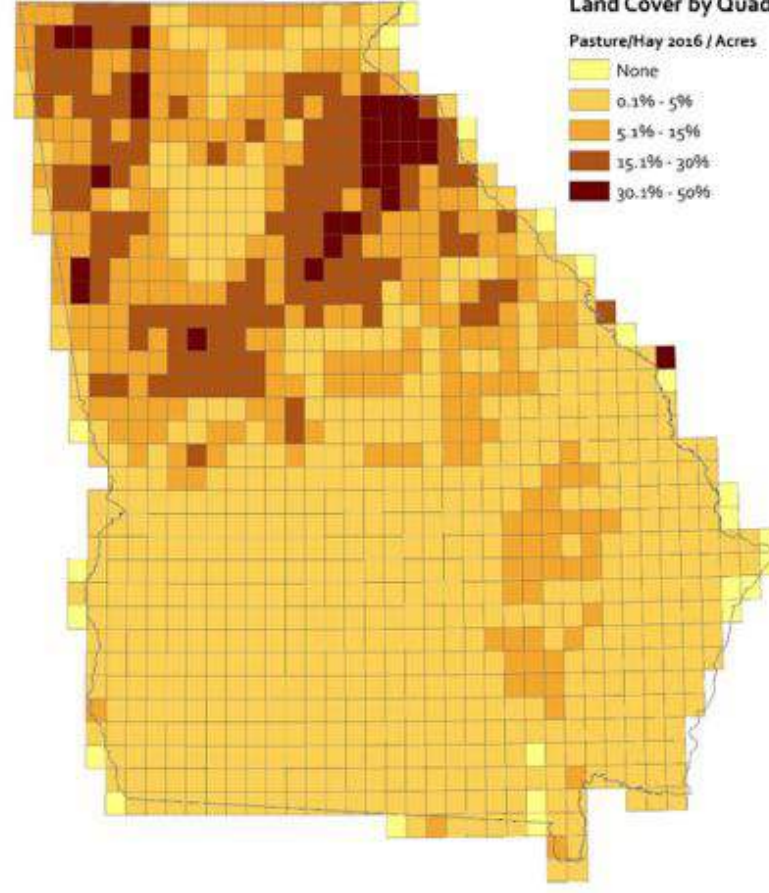
Counties by Land Cover Type: Forest

Loss/Day ('74-'16):
132.6 ac **FOREST** ▶
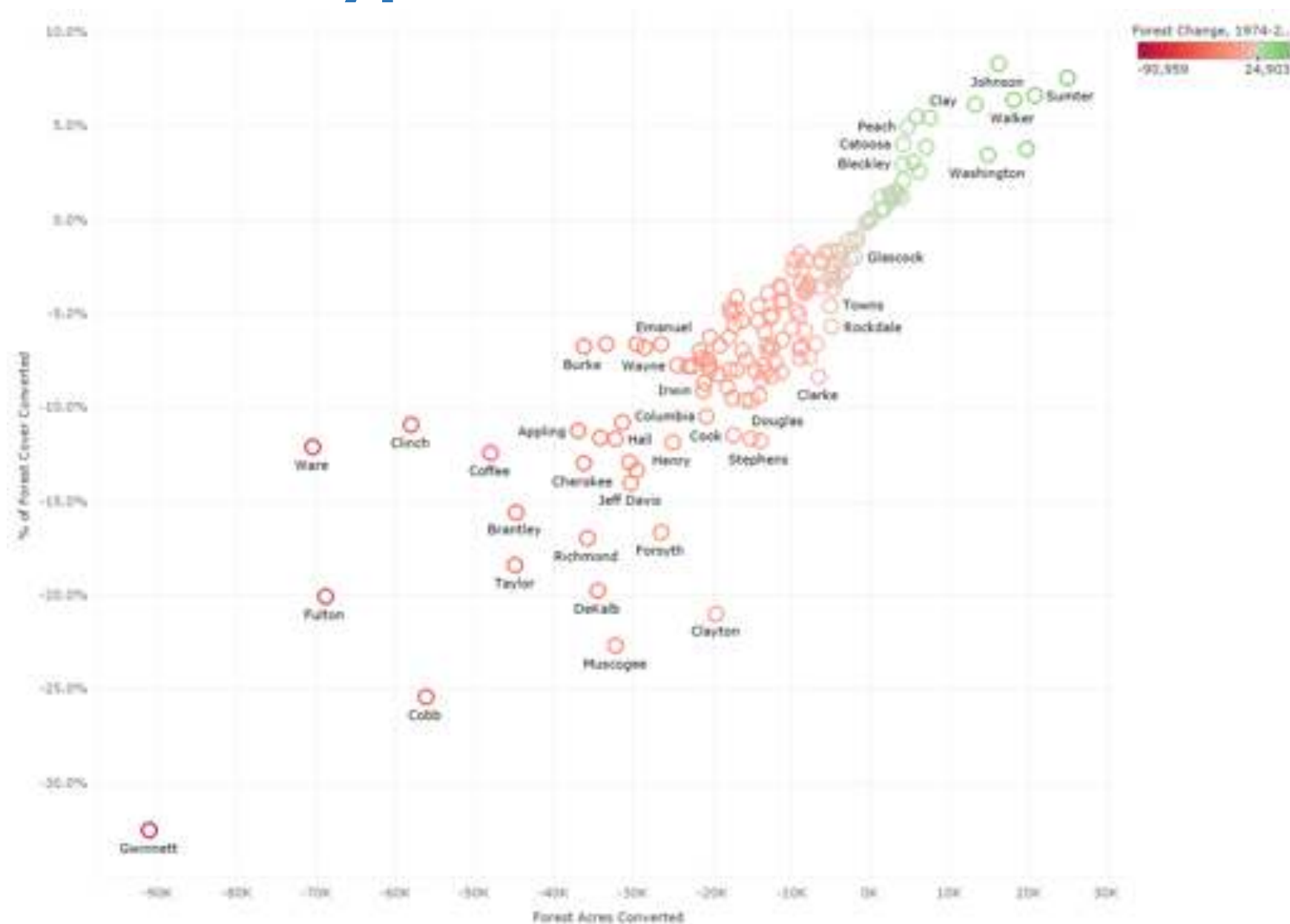43.7 ac **WETLANDS**

Loss/Day ('92-'16):
109.6 ac **CROPS**

Gain/Day ('74-'16):
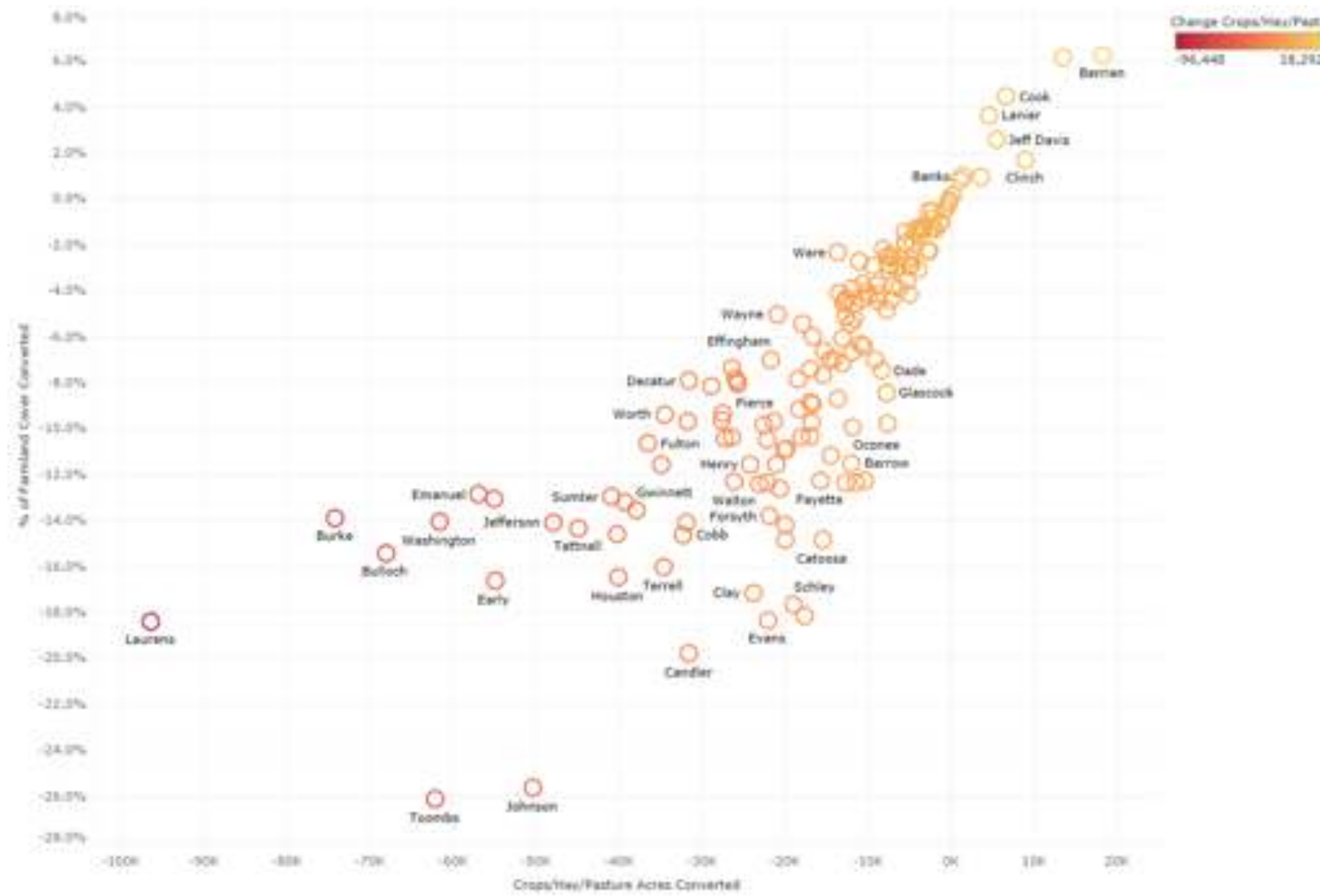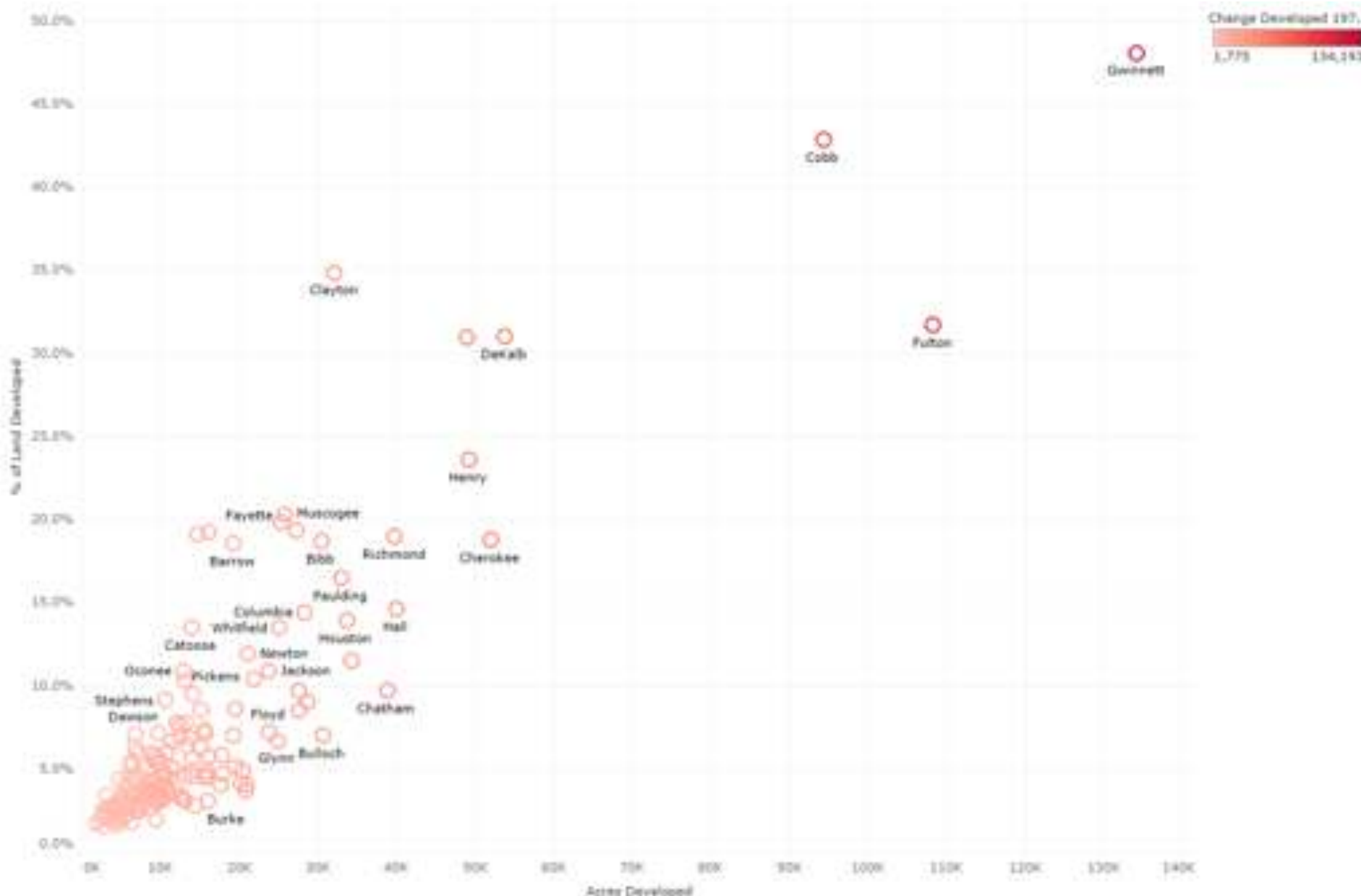162.4 ac **DEVELOPED**
78.7 ac **GRASS/SHRUB**

Counties by Land Cover Type: Pasture & Crops

Loss/Day ('74-'16):
132.6 ac **FOREST**
43.7 ac **WETLANDS**

Loss/Day ('92-'16):
109.6 ac **CROPS** ▶

Gain/Day ('74-'16):
162.4 ac **DEVELOPED**
78.7 ac **GRASS/SHRUB**

Counties by Land Cover Type: Developed

Loss/Day ('74-'16):
132.6 ac **FOREST**
43.7 ac **WETLANDS**

Loss/Day ('92-'16):
109.6 ac **CROPS**

Gain/Day ('74-'16):
162.4 ac **DEVELOPED** ▶
78.7 ac **GRASS/SHRUB**

Coastal Counties Statistical Dashboard

Loss/Day ('74-'16):
8.3 ac **FOREST**
1.2 ac **WETLANDS**

Loss/Day ('92-'16):
12.9 ac **CROPS**

Gain/Day ('74-'16):
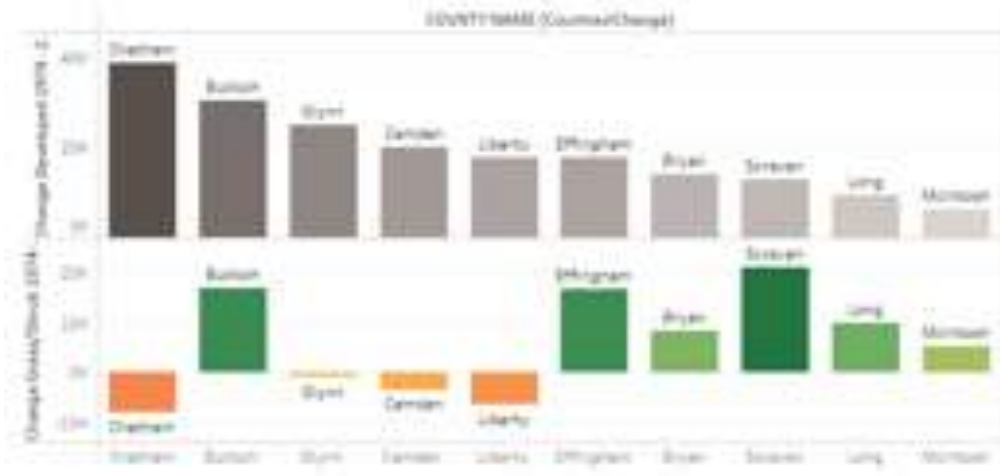12.6 ac **DEVELOPED**
3.9 ac **GRASS/SHRUB**
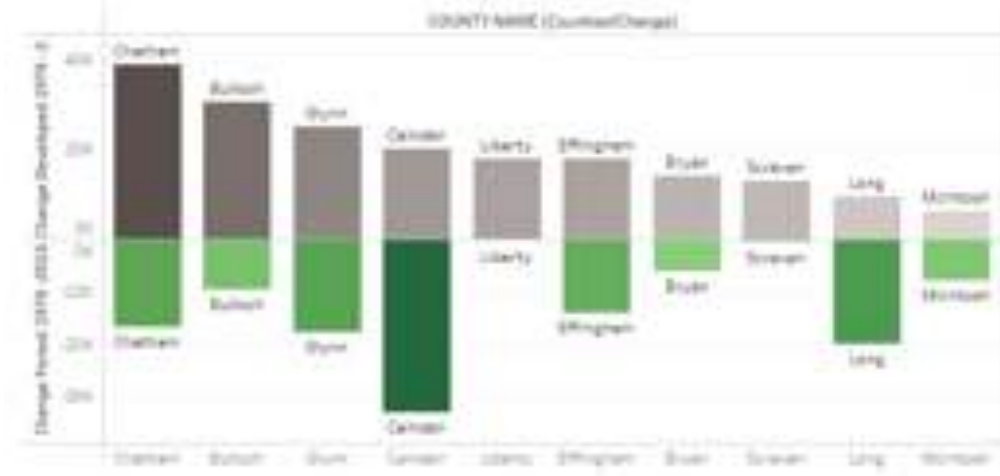
Comprehensive Land Cover Dashboard