

Seeing the Elephant: Multidisciplinary Perspectives on Urban Sprawl

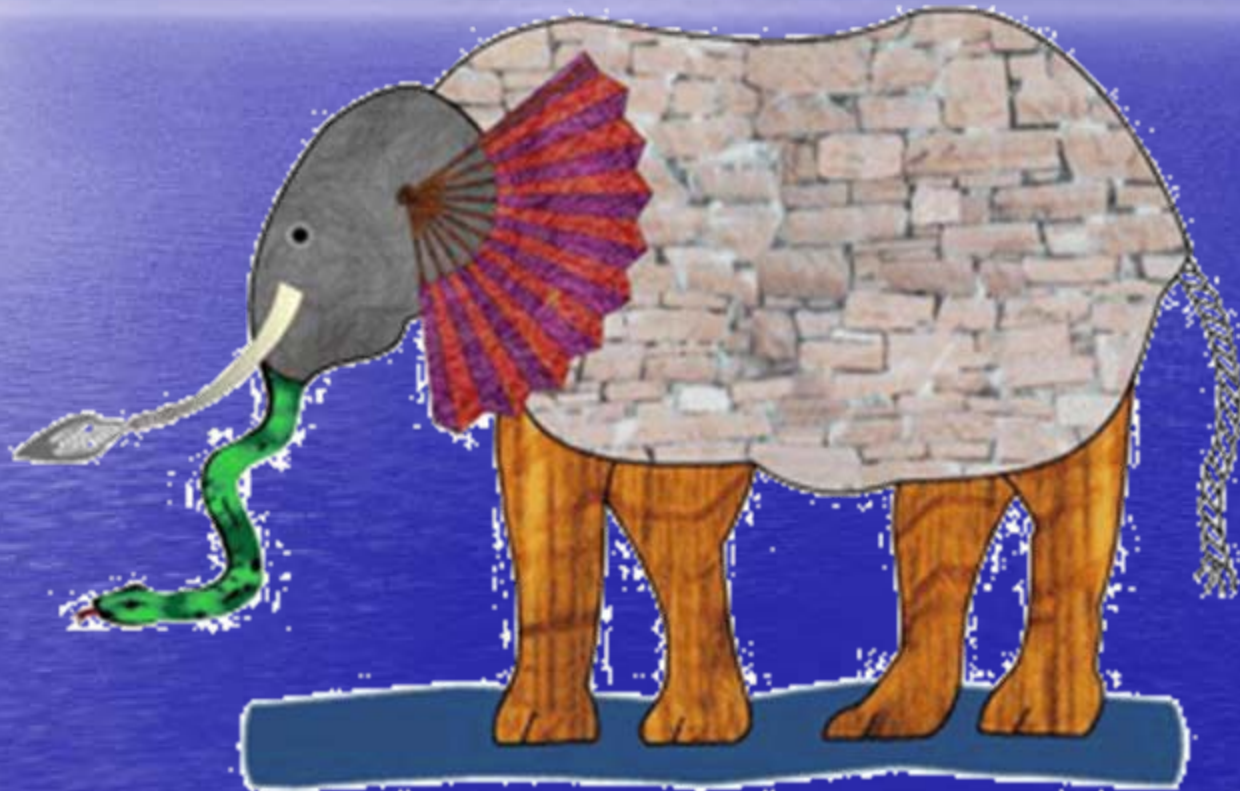
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Clifton, and Reid Ewing

National Center for Smart Growth
University of Maryland



www.smartgrowth.umd.edu

The Blind Men and the Elephant



By American poet John Godfrey Saxe (1816-1887)
based the following poem on a fable which was told in India many years ago.

The Blind Men and the Elephant

by John Godfrey Saxe

It was six men of Indostan
To learning much inclined,
Who went to see the Elephant
(Though all of them were blind),
That each by observation
Might satisfy his mind



The Blind Men and the Elephant

by John Godfrey Saxe

The First approached the Elephant,
And happening to fall
Against his broad and sturdy side,
At once began to bawl:
“God bless me! but the Elephant
Is very like a wall!”



The Blind Men and the Elephant by John Godfrey Saxe

Moral:

So oft in theologic wars,
The disputants, I ween,
Rail on in utter ignorance
Of what each other mean,
And prate about an Elephant
Not one of them has seen!



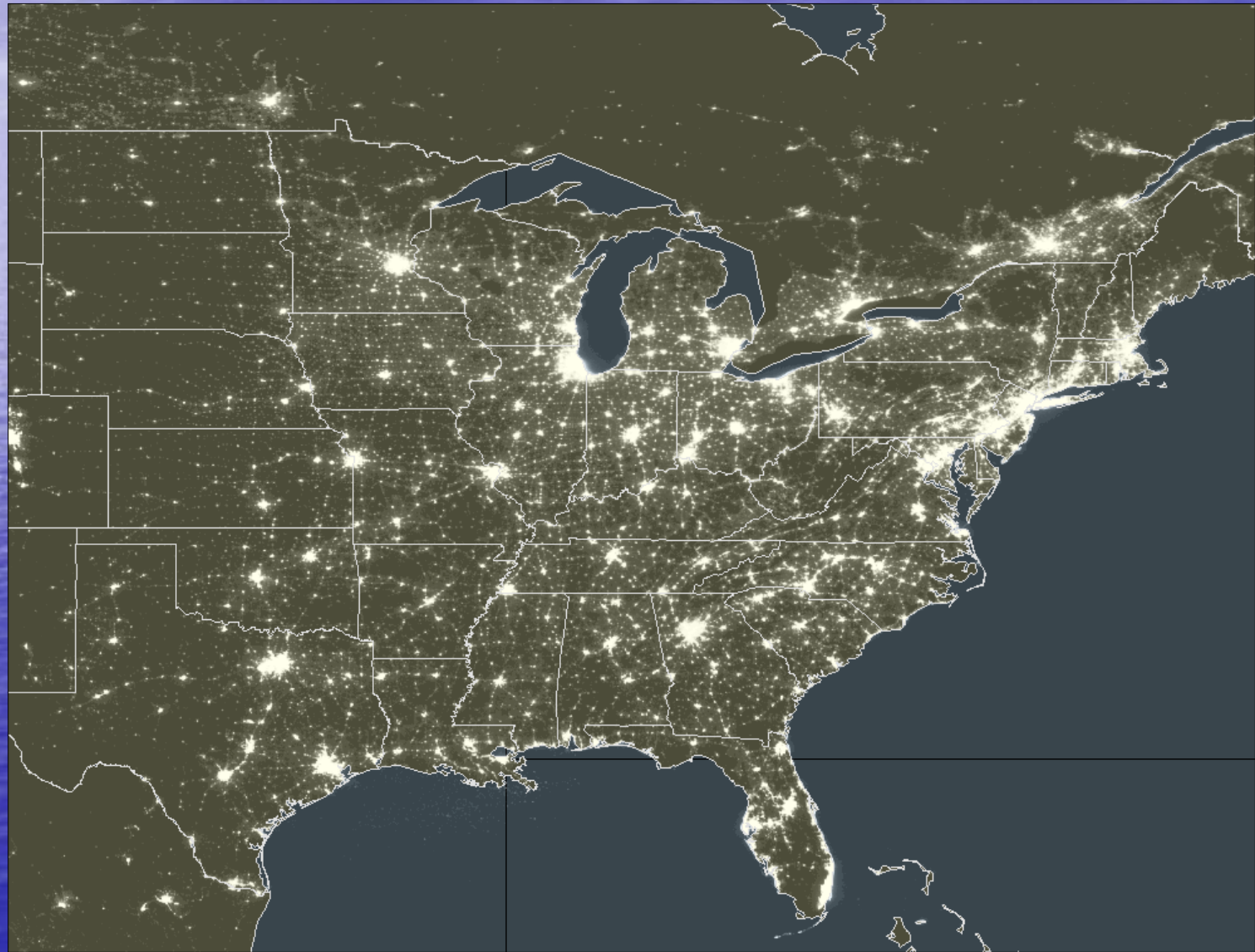
Perspectives on urban form

- Global Scale (urbanists)
- Regional Scale (ecologists)
- Metropolitan scale (urban economists)
- Sub-metropolitan scale (transportation planners)
- Community scale (urban planners)
- Block-face scale (urban designers)

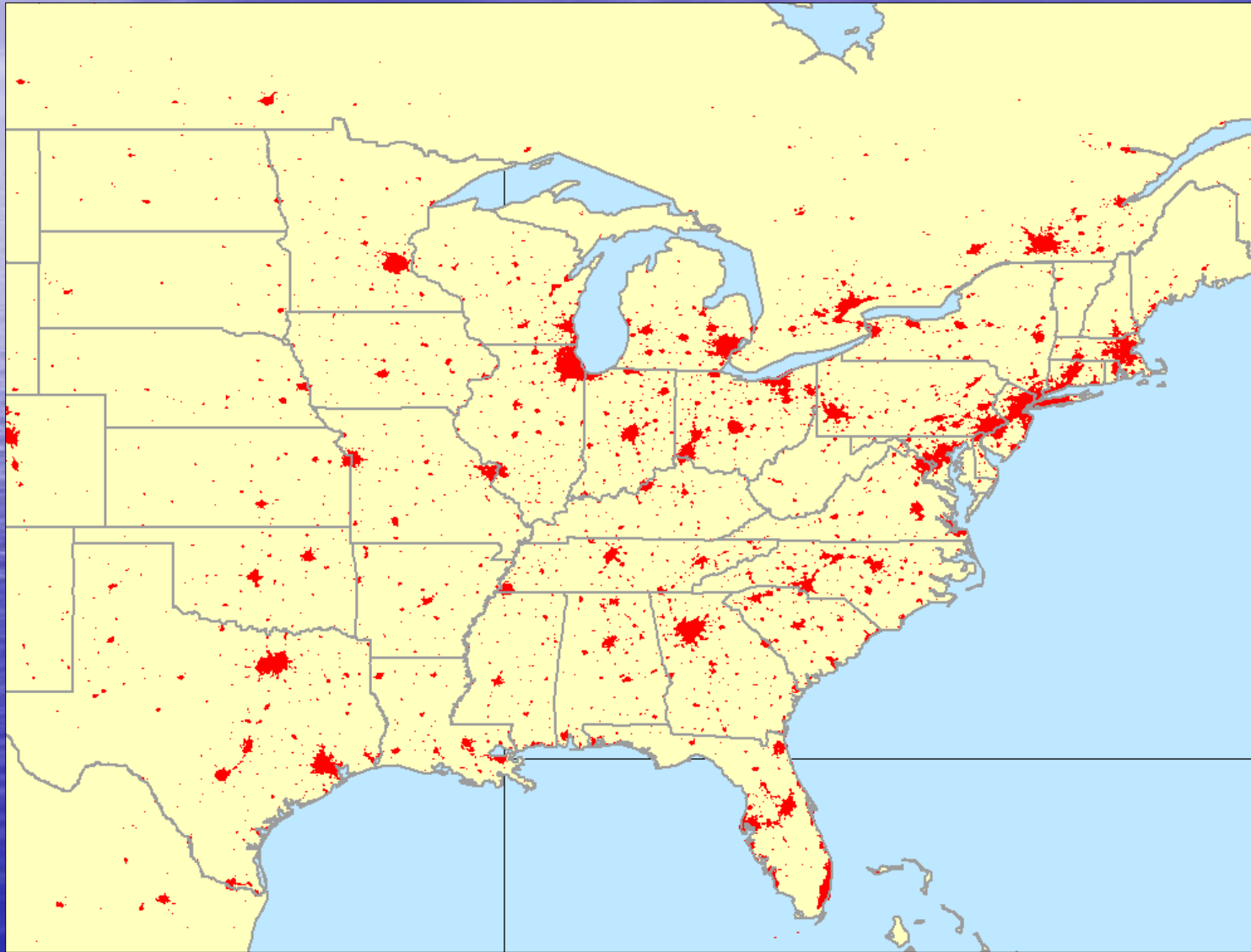


The Global Perspective

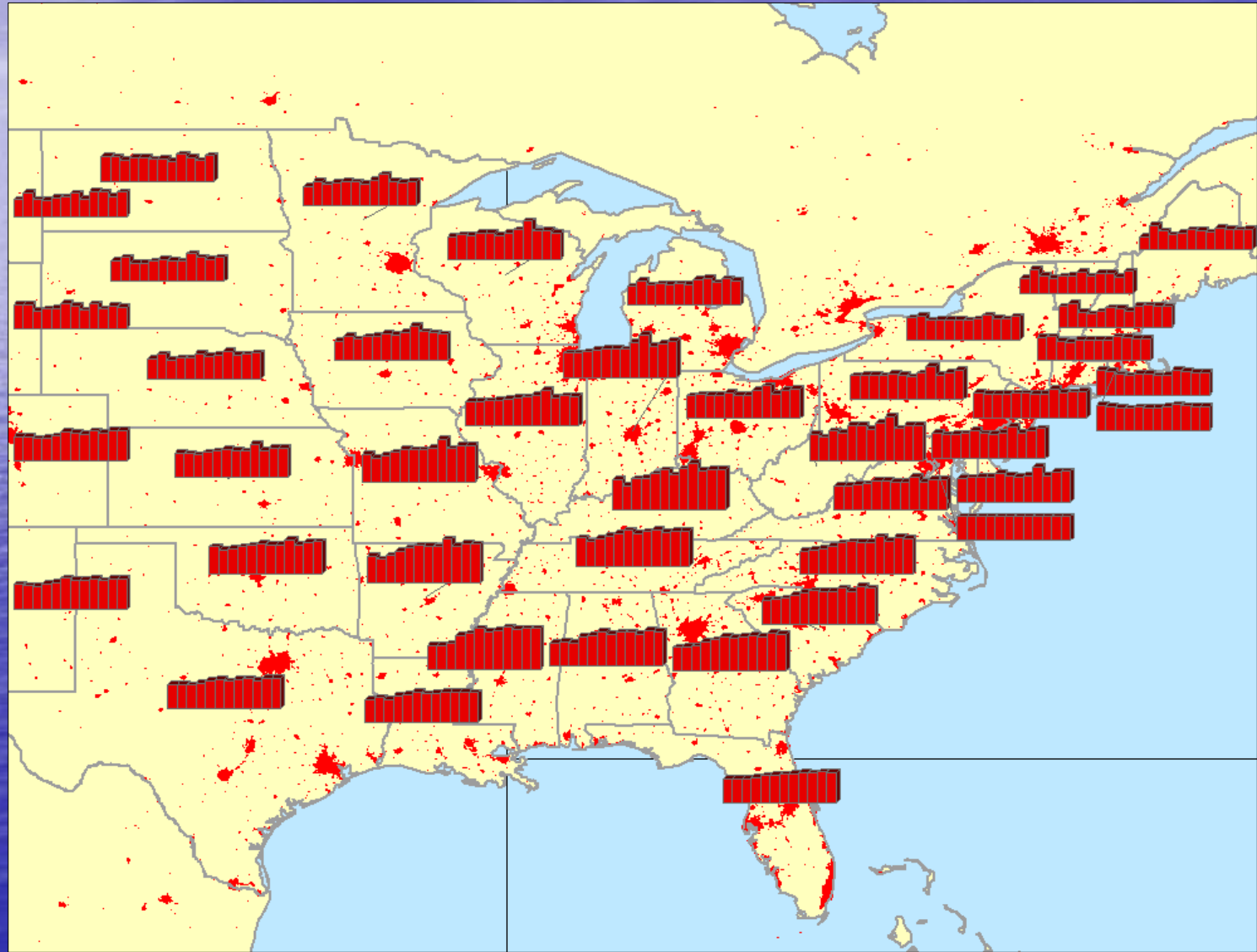
US East Light Intensities (2000)



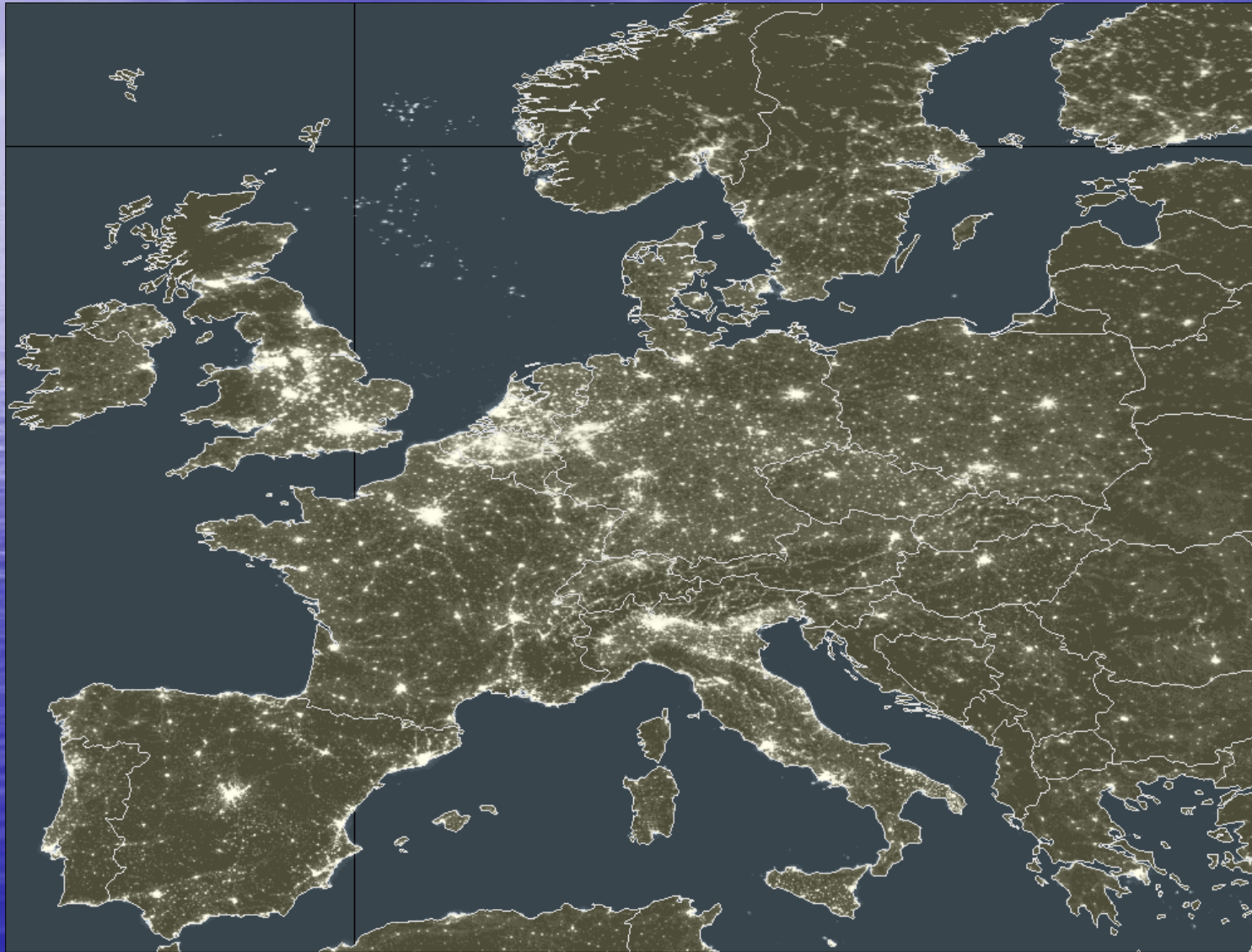
US East Light-Based Urban Footprints



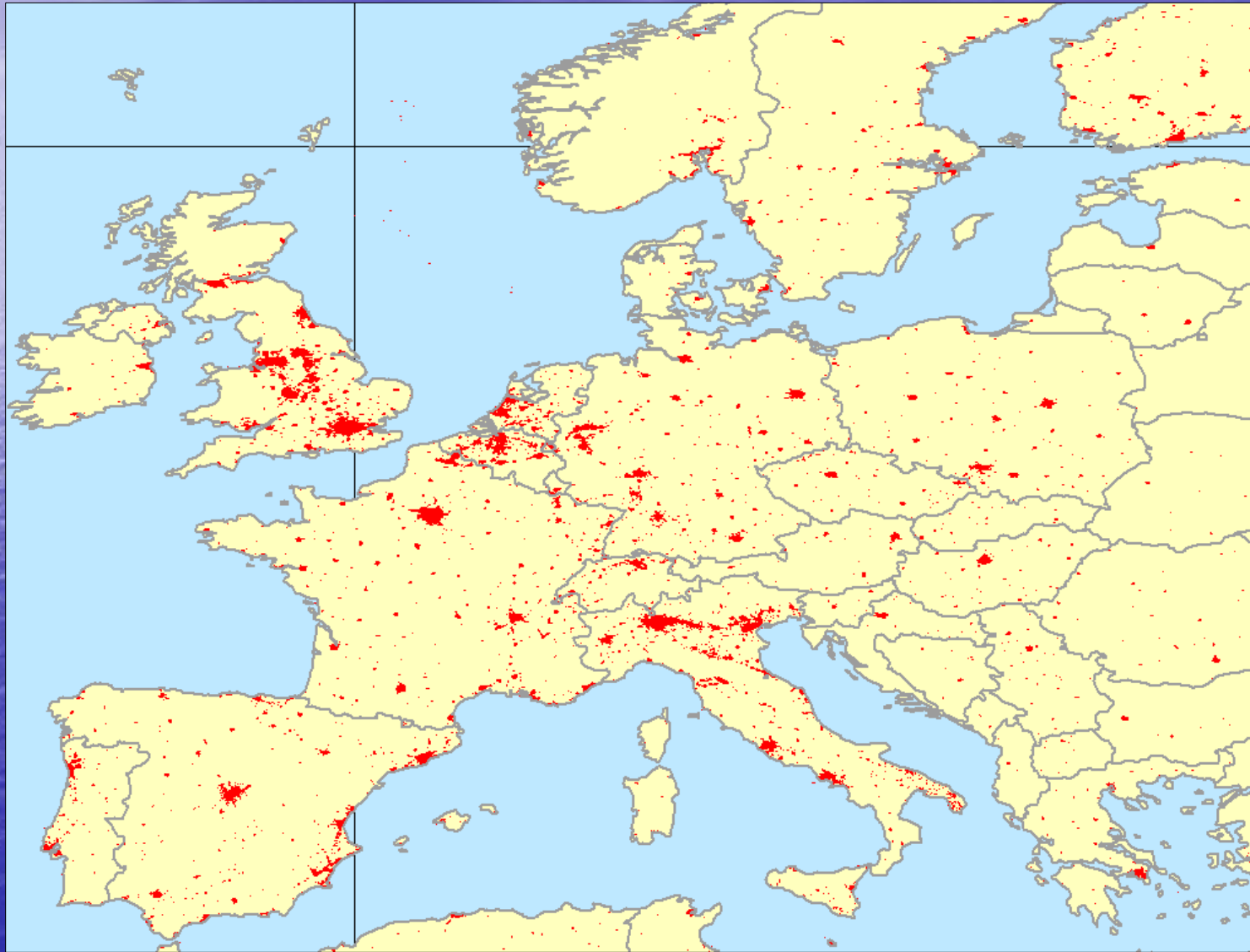
US East Growth Trends



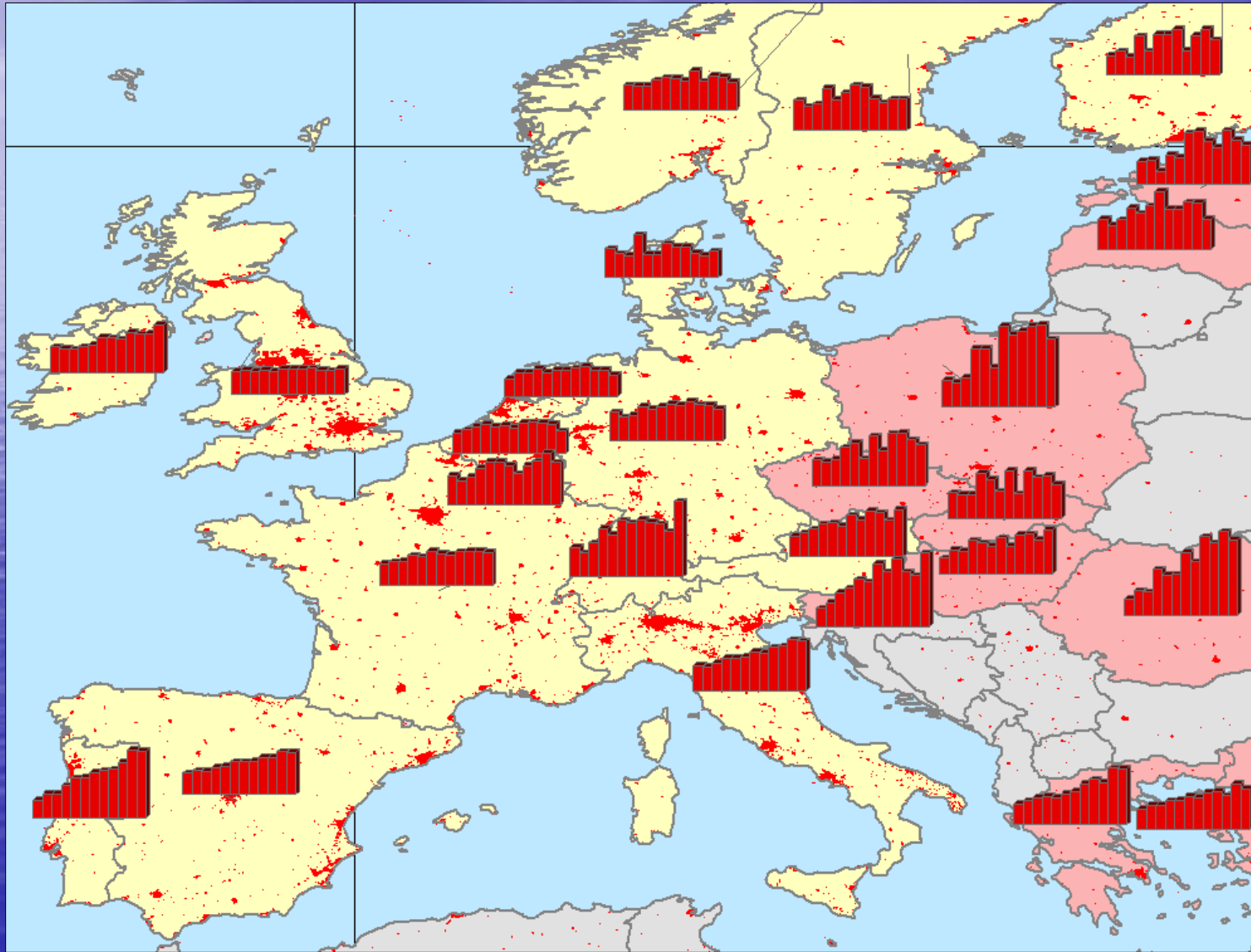
Europe Light Intensities (2000)



Europe Light-Based Urban Footprints



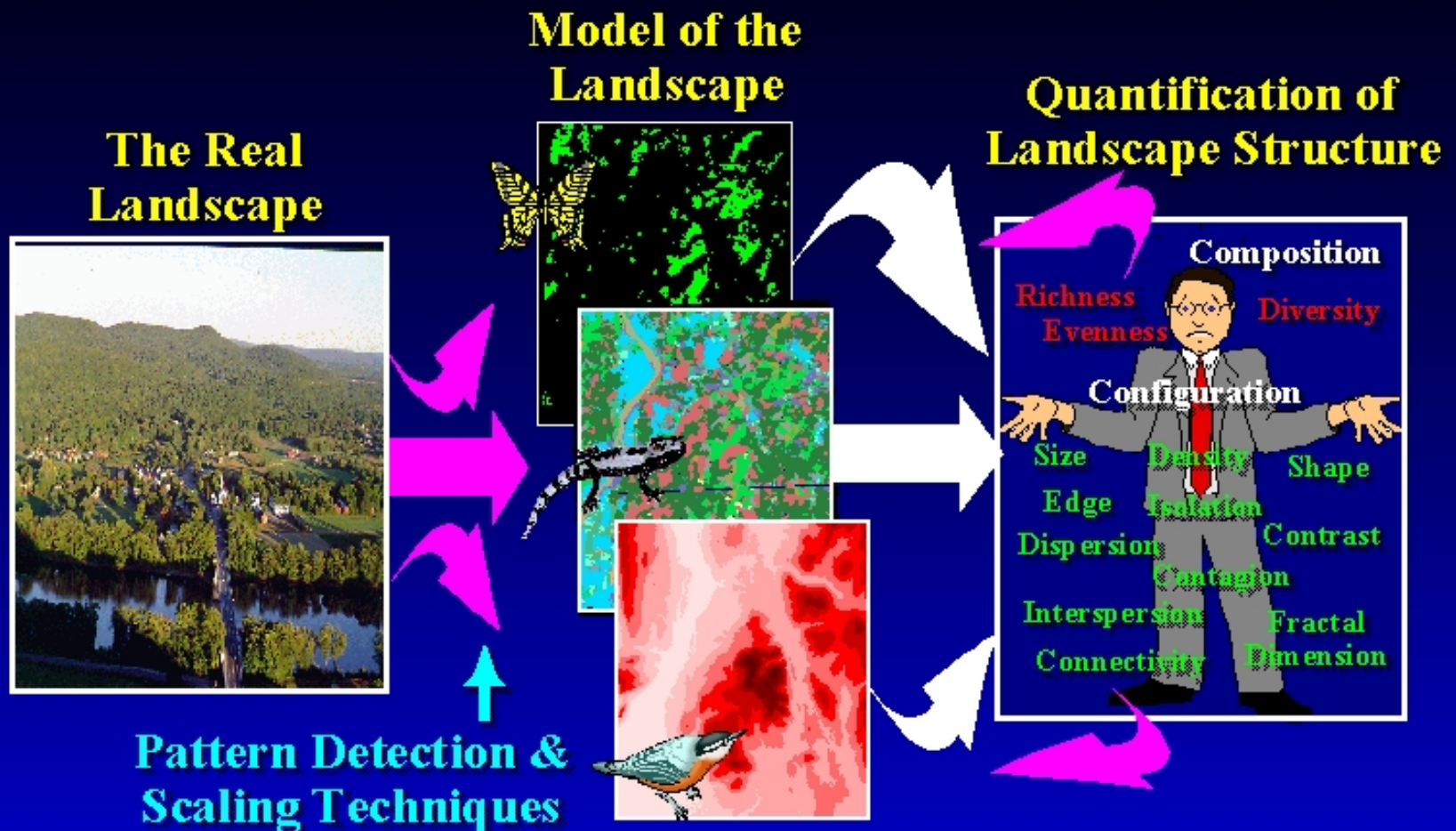
Western and Eastern Europe Growth Trends






Ecologists perspective

(1) From Metric Development to Metric Understanding and Synthesis



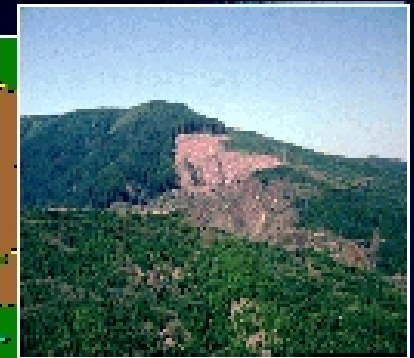
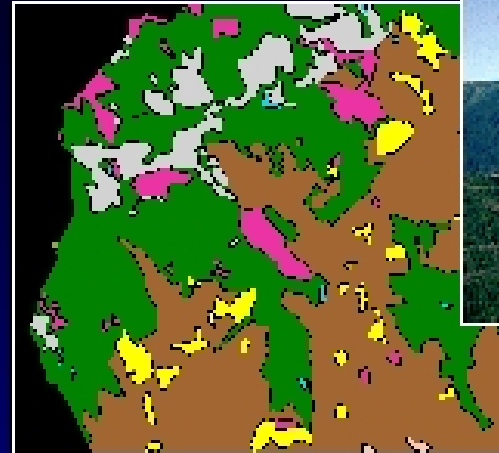
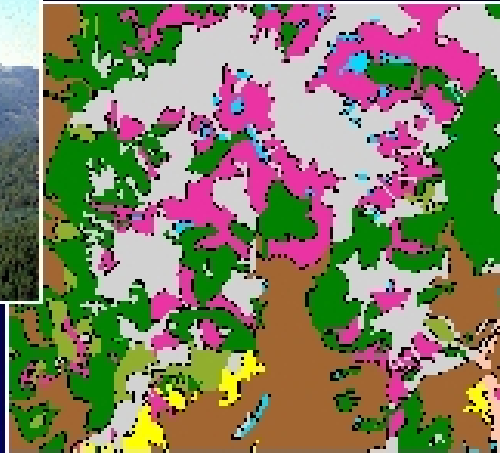
Landscape Composition...the variety and abundance of landscape elements



	Mixed Conifer	45%
	Spruce-Fir	42%
	Aspen	5%
	Shrubland	4%
	Nonforested	4%

- **Number of Patch Types**
- **Proportion of each Patch Type**
- **Diversity**
- **Evenness**

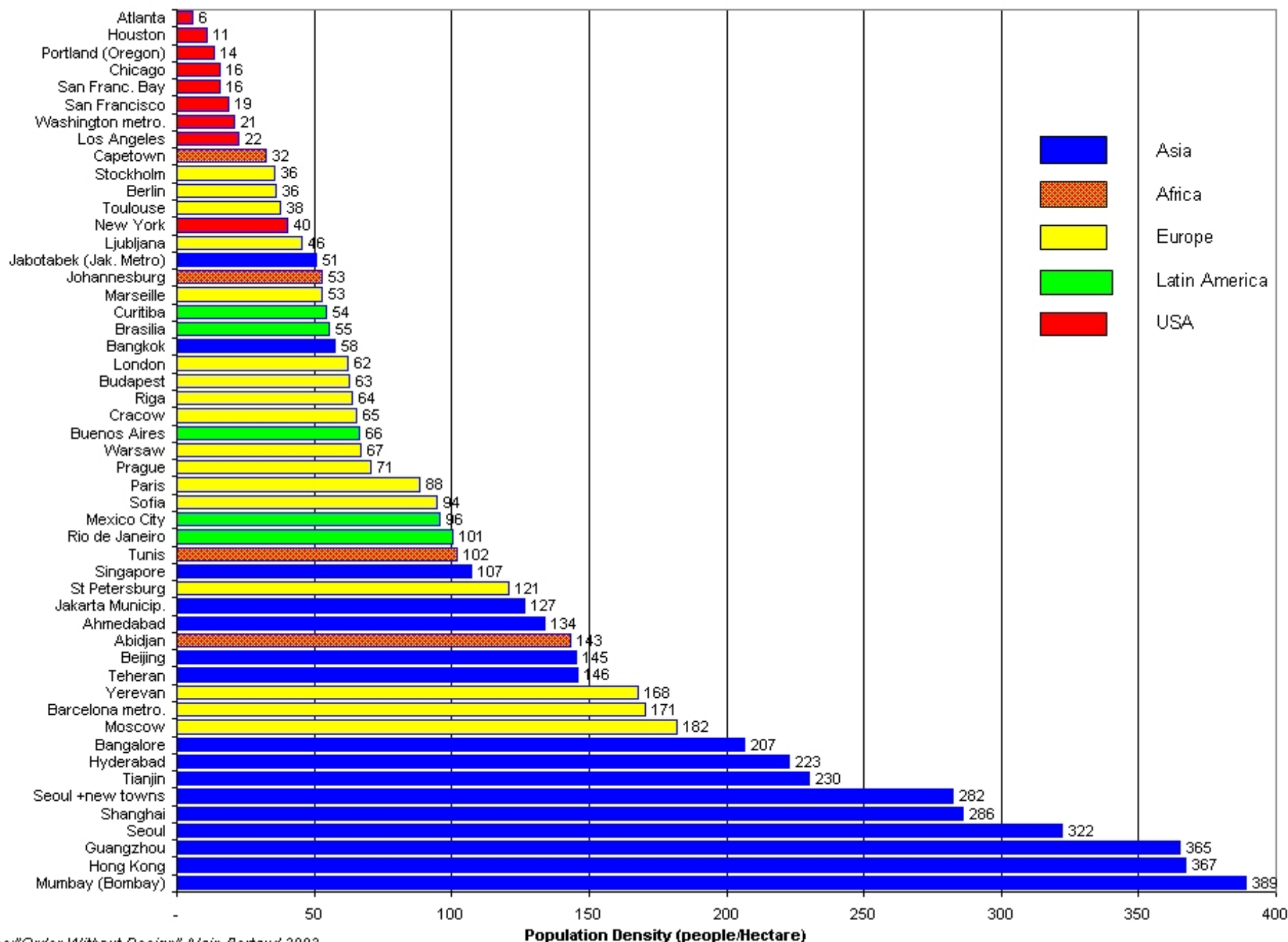
Landscape Configuration...the spatial relationships



- Patch size distribution & density
- Shape complexity
- Core area
- Isolation/proximity
- Contrast
- Dispersion
- Contagion/interspersion
- Subdivision
- Connectivity

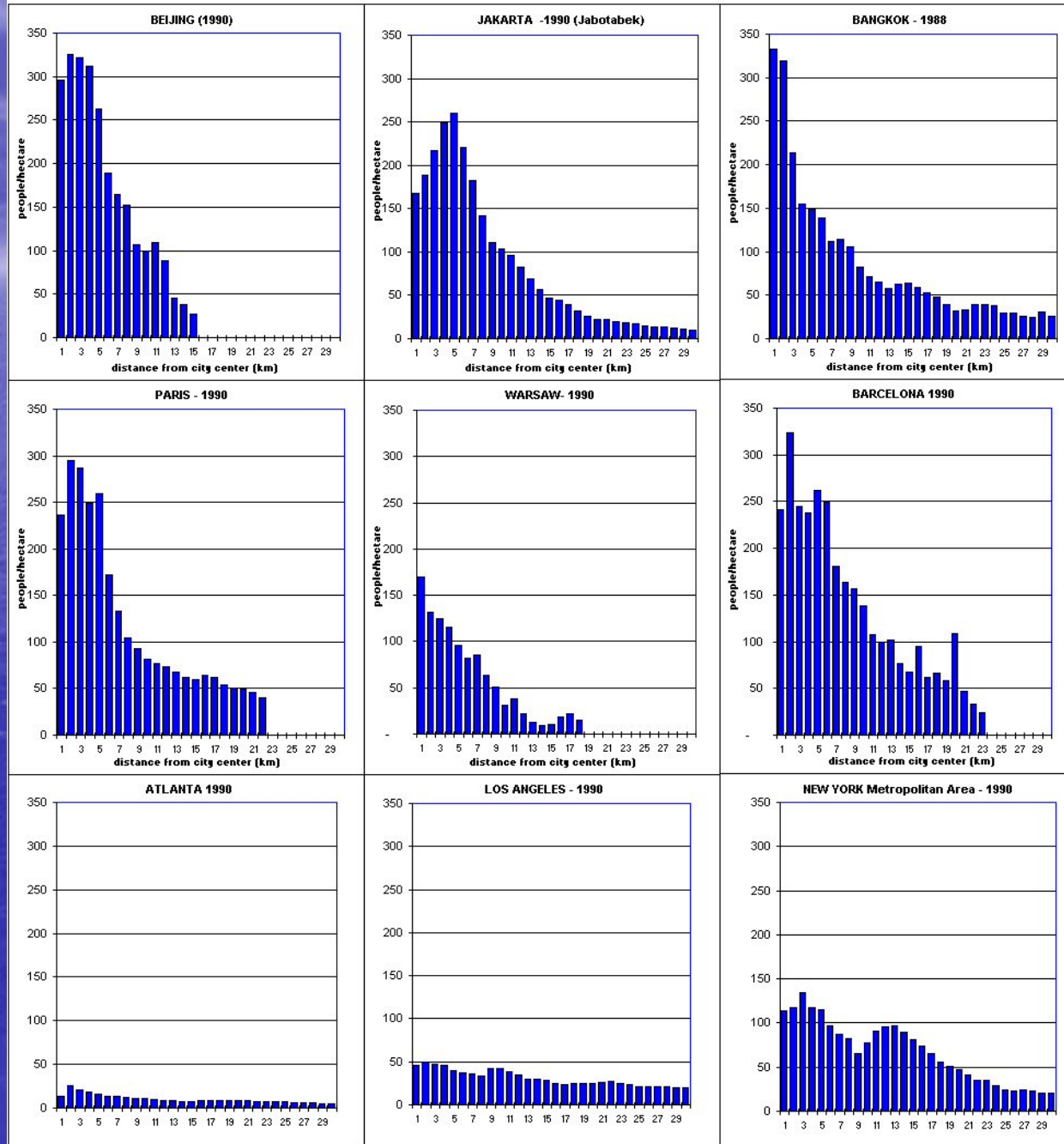
Urban Economists Perspective

Comparative average population densities in built-up areas in 48 metropolitan areas

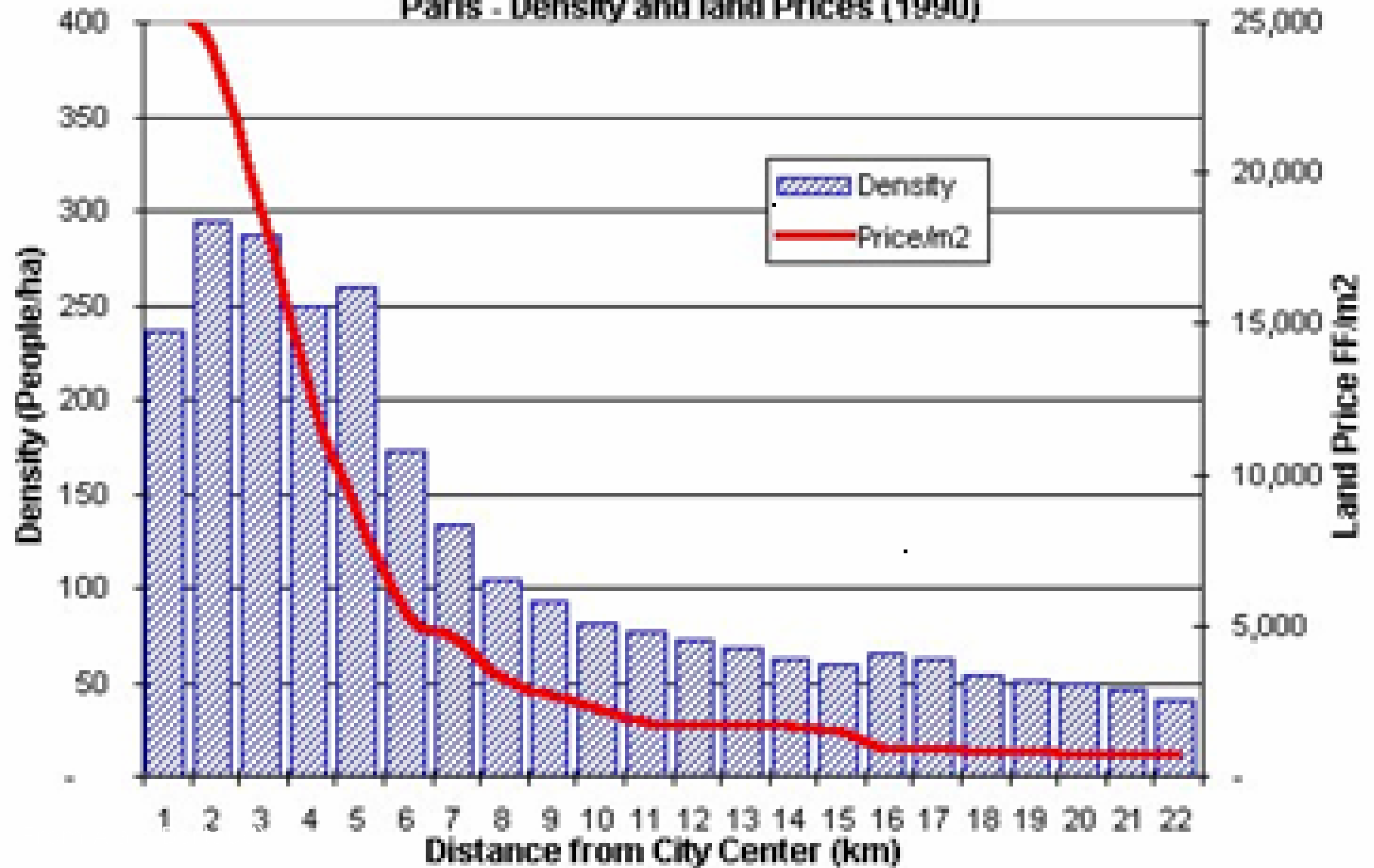


Comparative density profile between 9 cities in Asia, Europe and USA

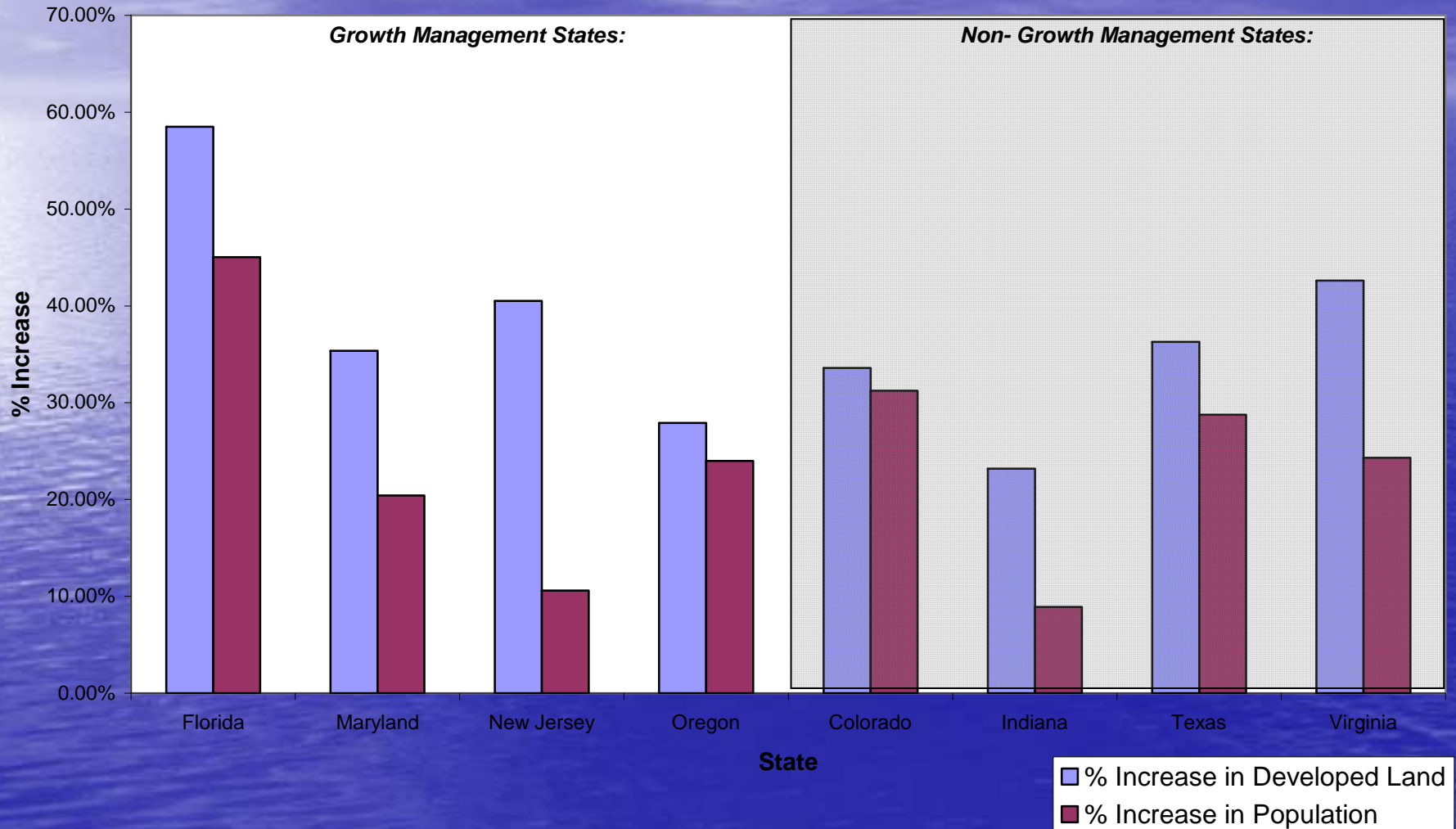
COMPARATIVE POPULATION DENSITIES IN THE BUILT-UP AREAS OF SELECTED METROPOLITAN AREAS



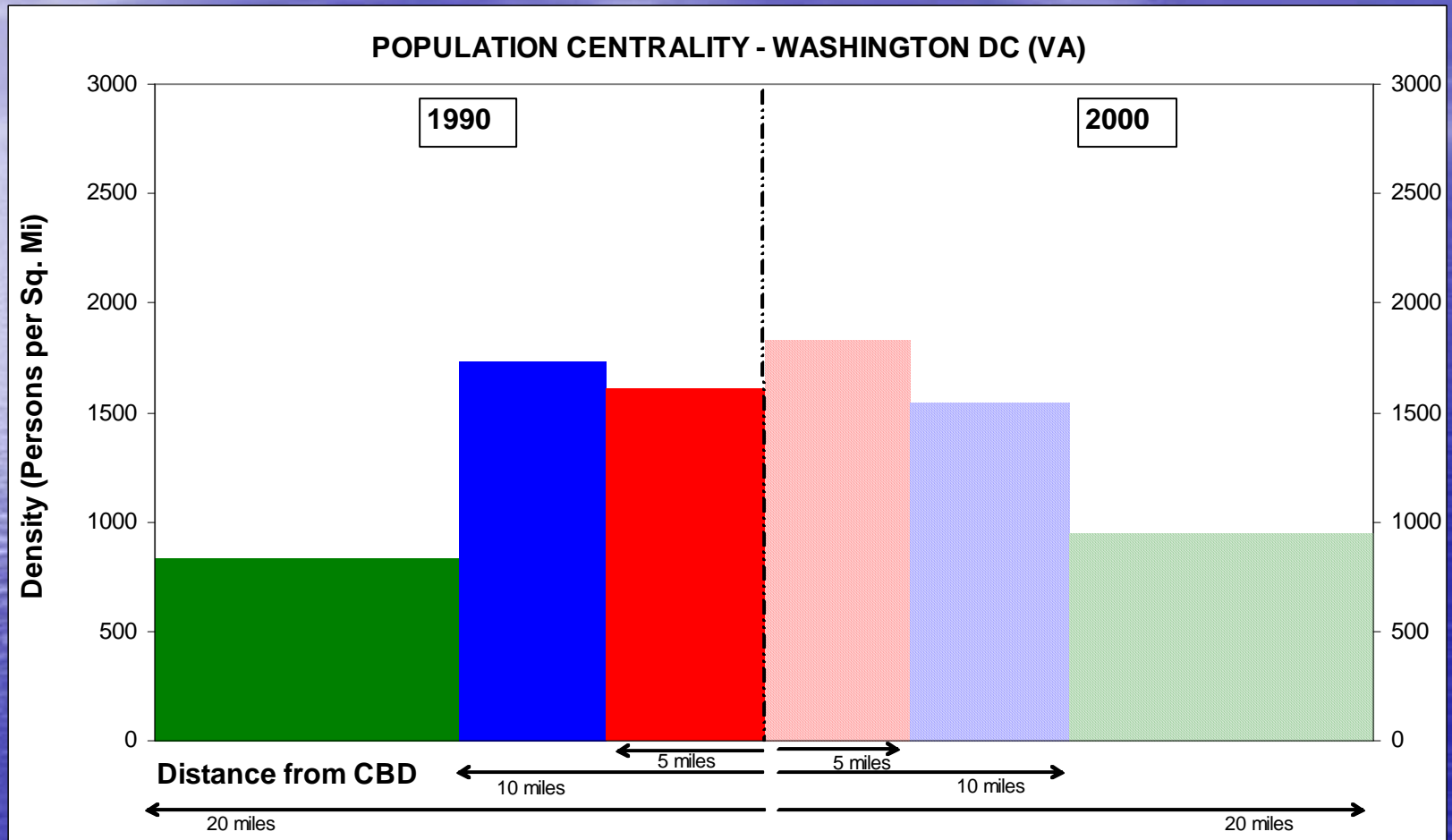
Paris - Density and land Prices (1990)



Increase in Developed Land and Increase in Population 1982-1997

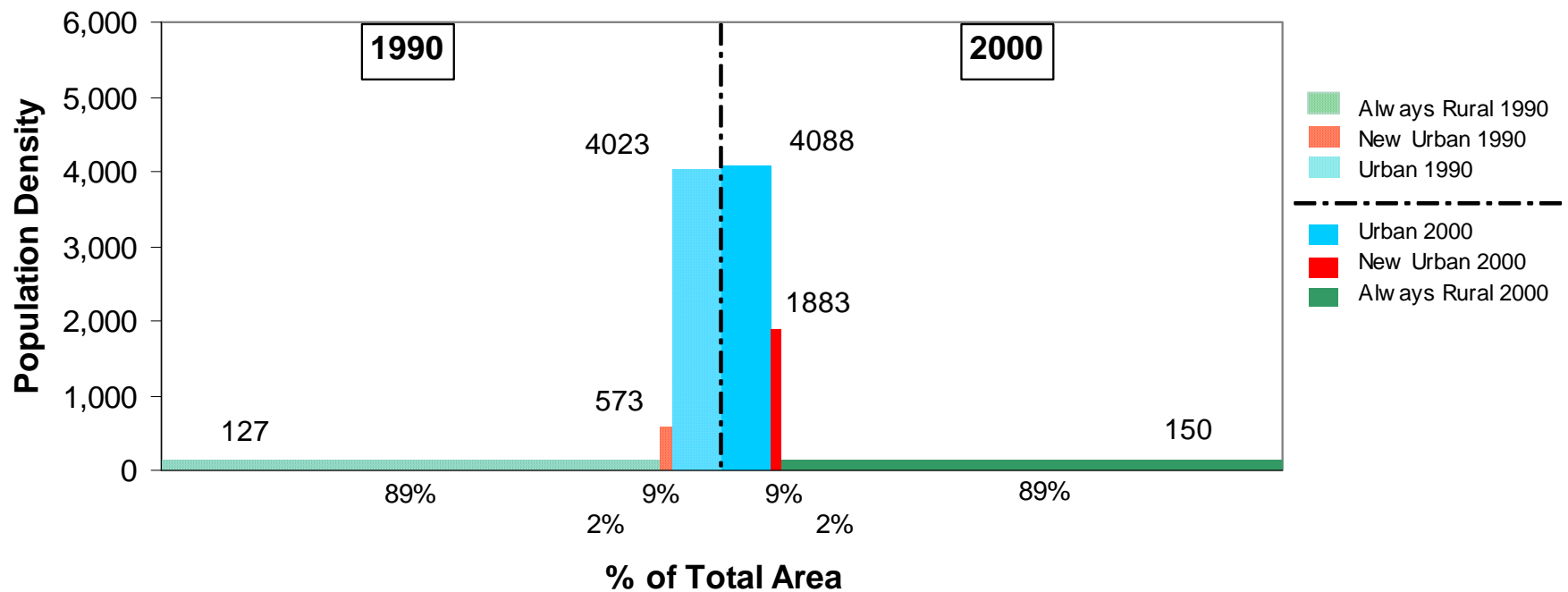


Sources: USDA Natural Resources Inventory, 1997 Summary Report; U.S. Census Statistical Abstract

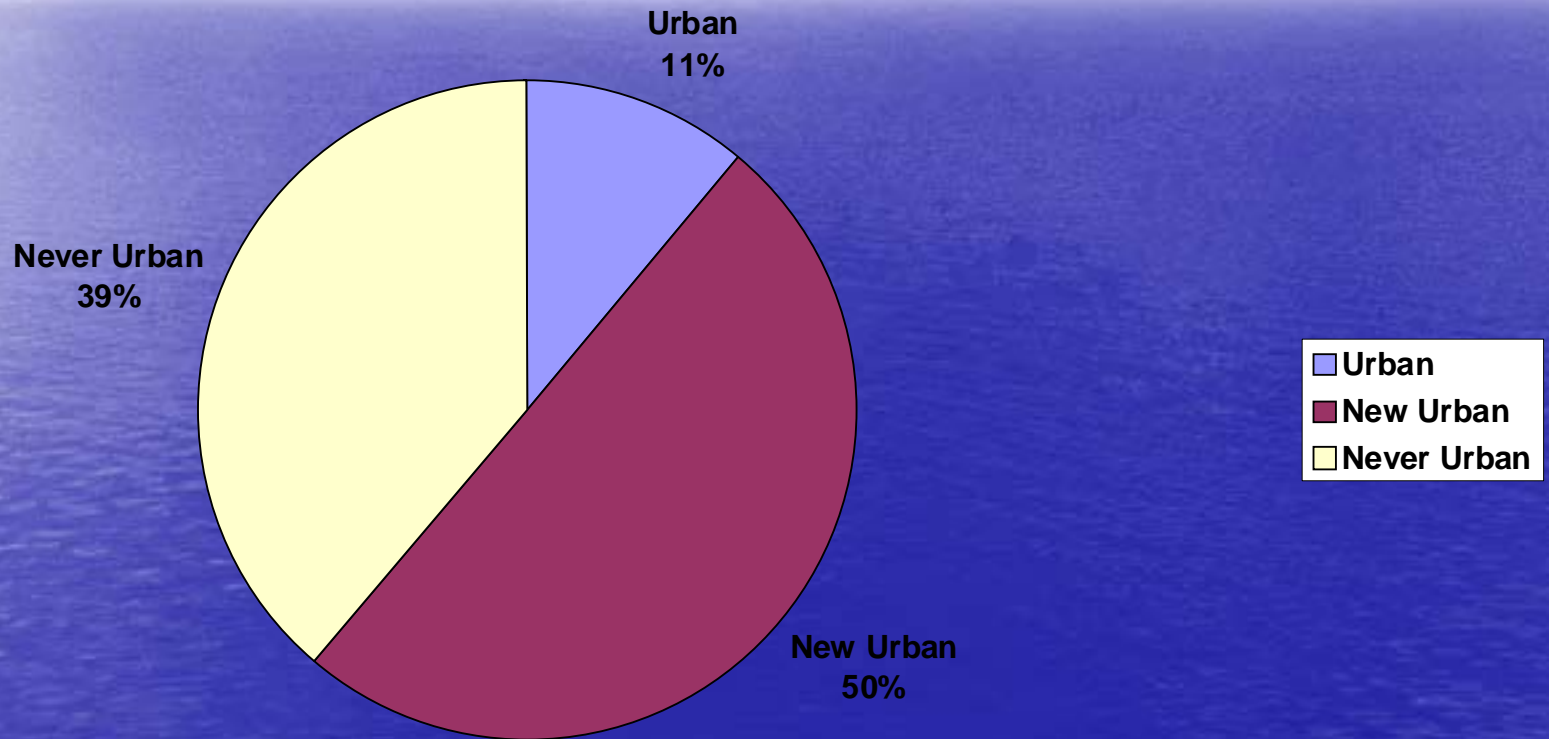


Sources: Census 2000; GeoLytics 1990 CensusCD 1990 Long Form in 2000 Boundaries

Maryland



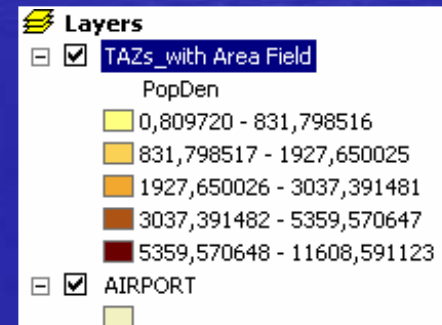
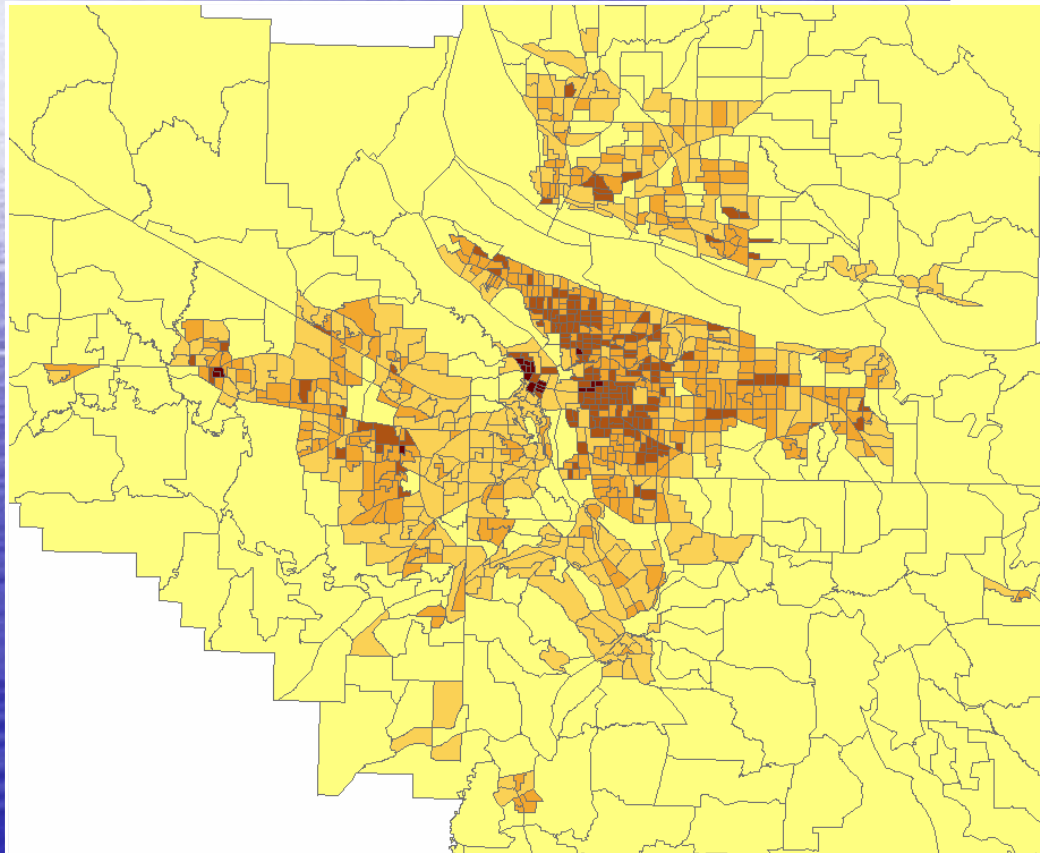
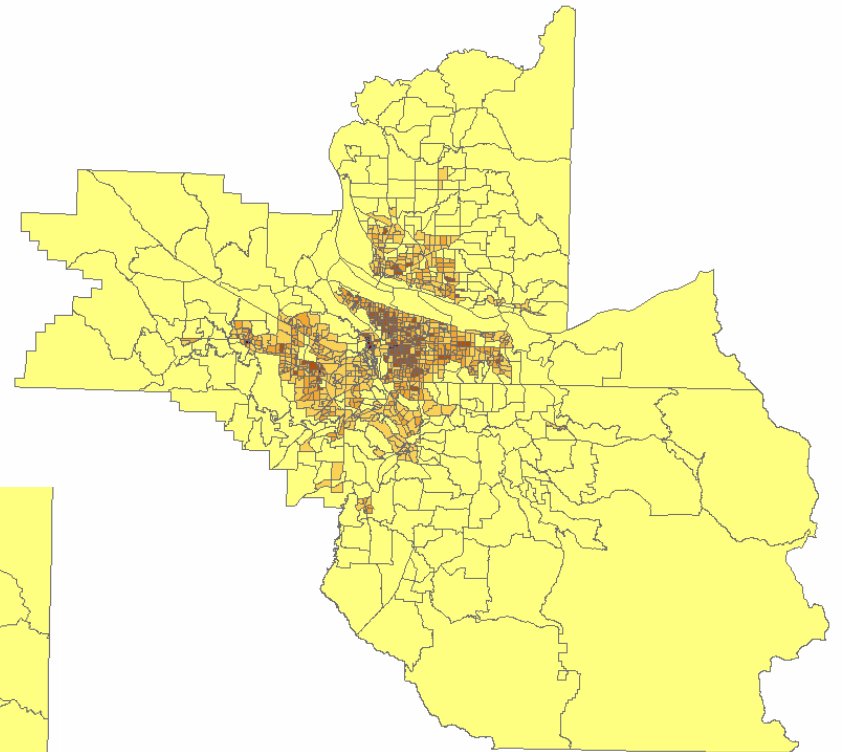
Percentage of Population Growth in Each Category MARYLAND



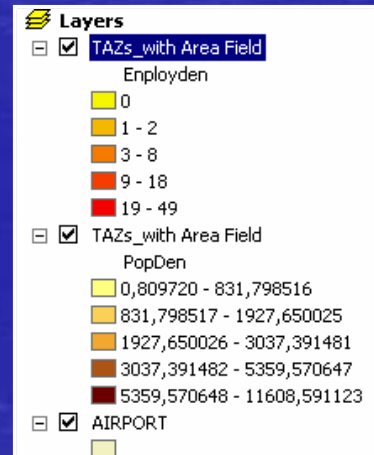
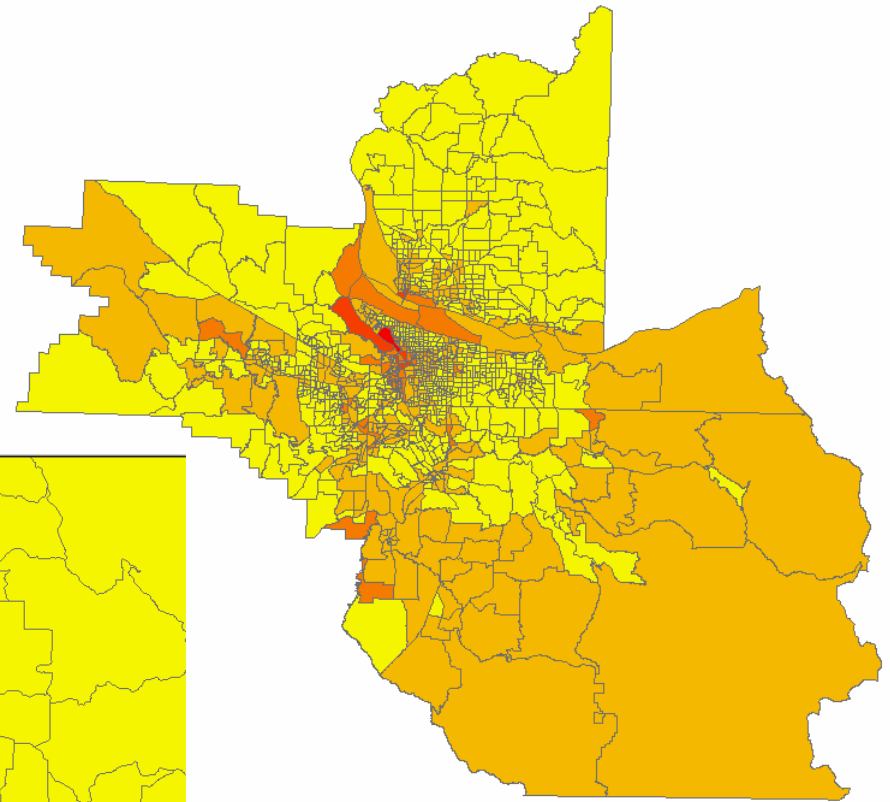
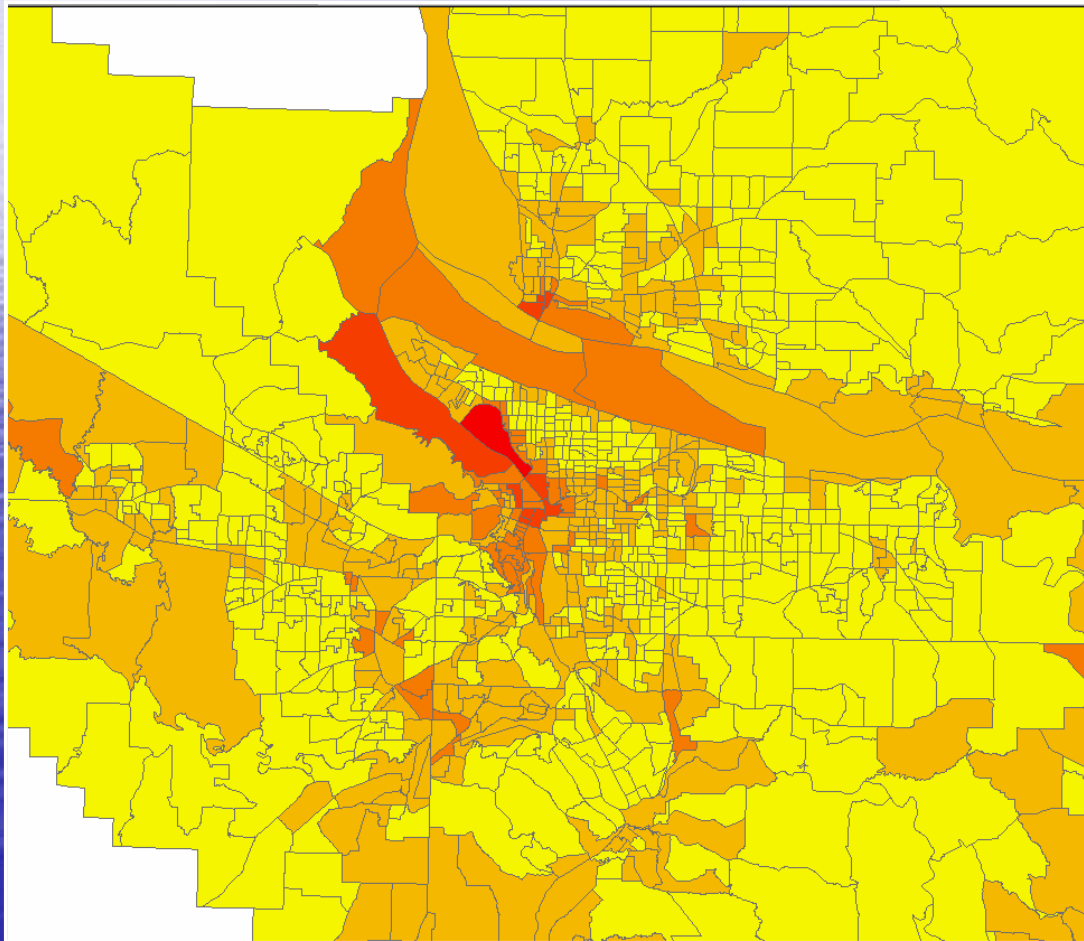


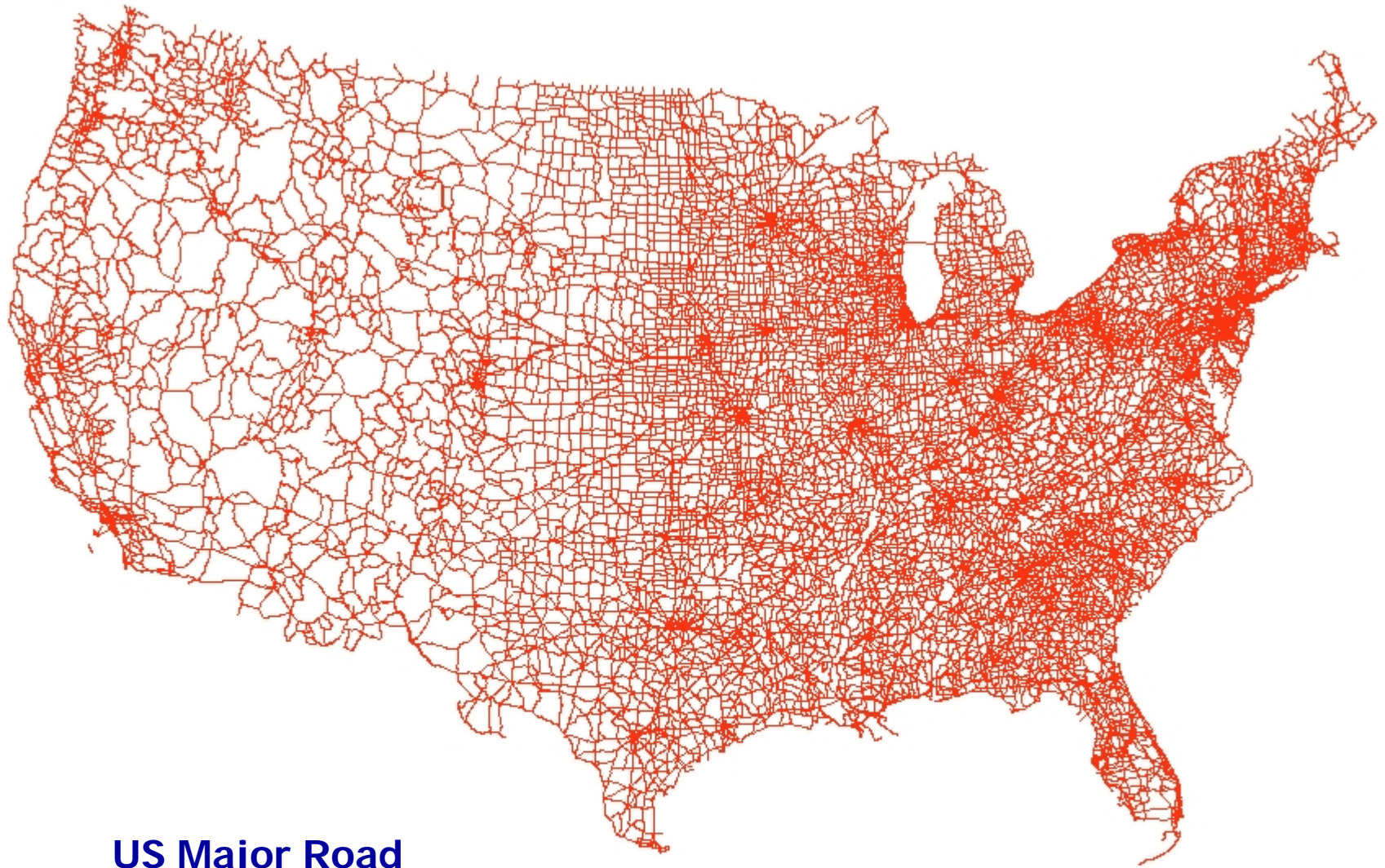
Transportation Planners perspective

Population Density in Portland Metro Area in 2000

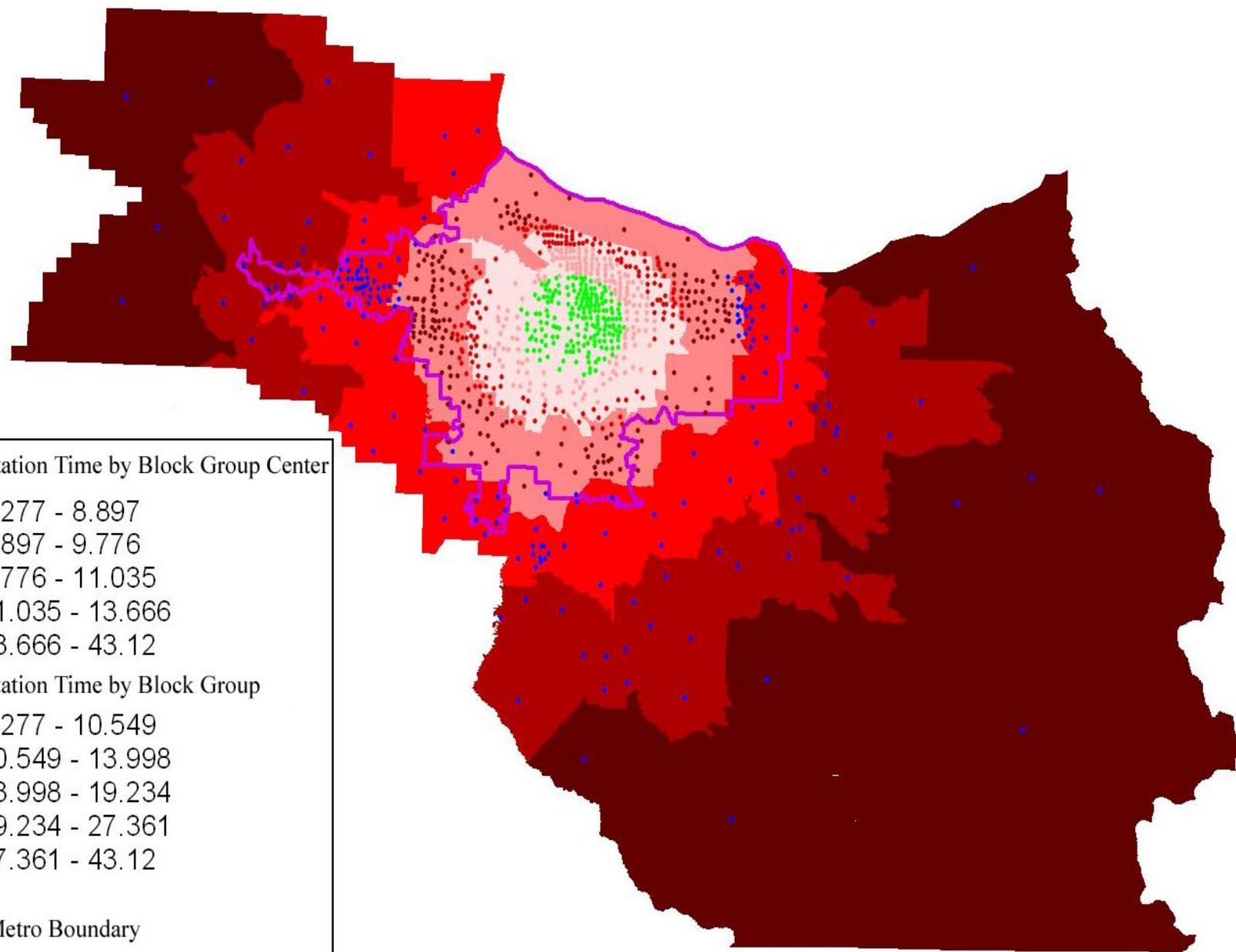


Employment Density in Portland Metro Area in 2000





US Major Road
Network

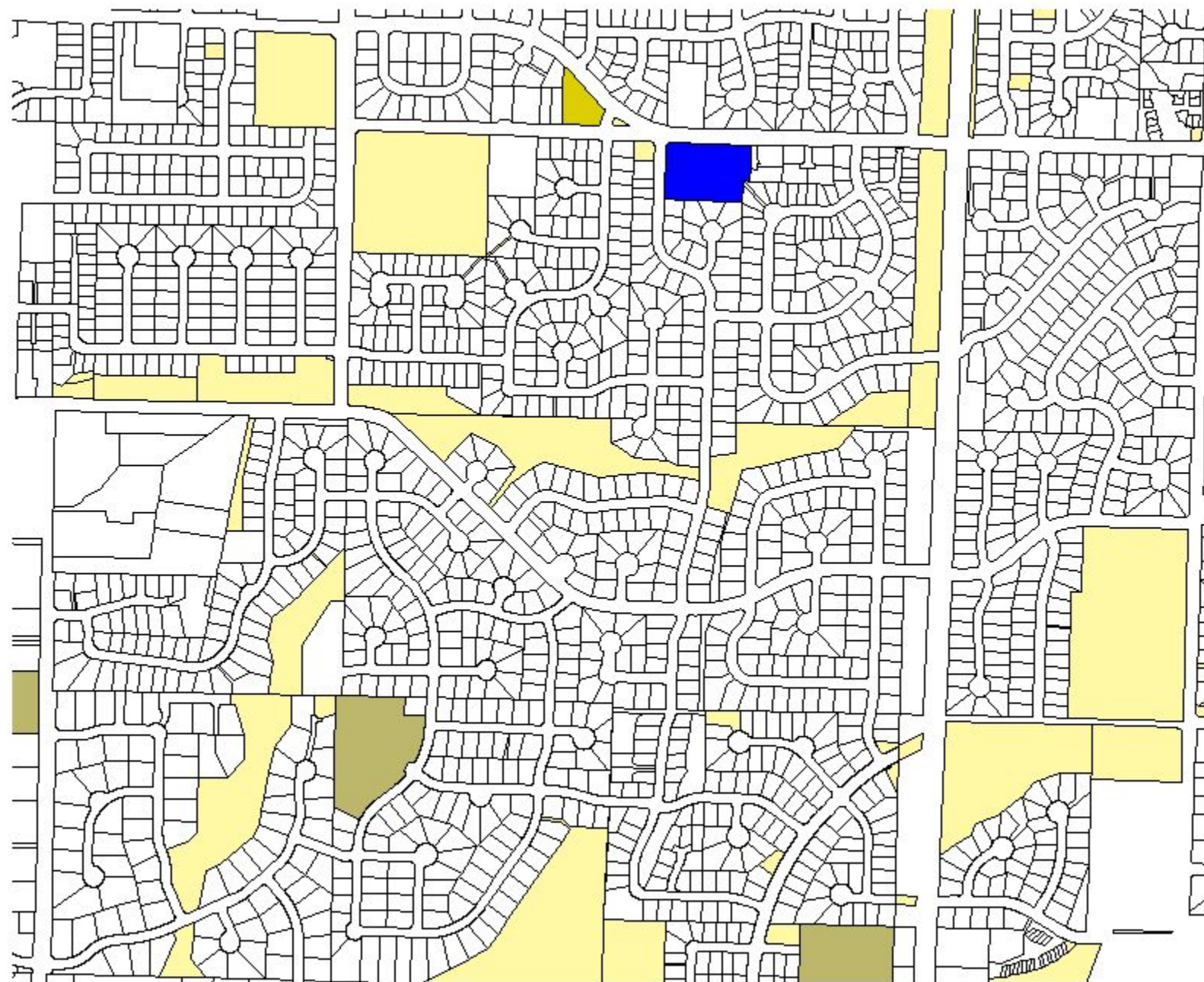




City Planners Perspective

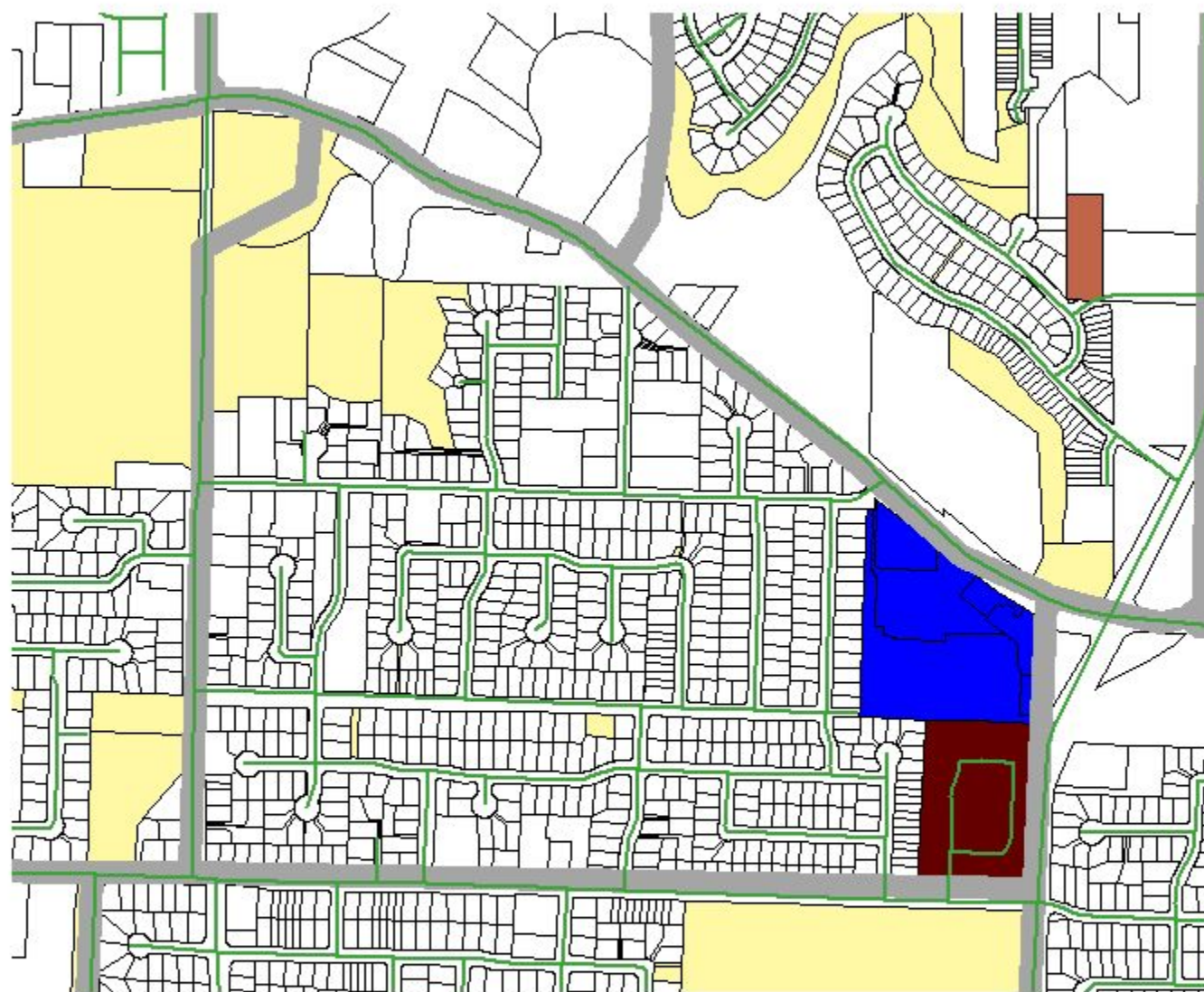
City Planning Measures of Urban Form

- Street Design and Circulation Systems:
 - *Internal Connectivity* – ratio of the number of street intersections versus the sum of intersections and cul-de-sacs (Criterion, 1999);



Street Design and Circulation Systems (Cont):

- External Connectivity
 - median distance between Ingress/Egress (access) points in feet (Criterion, 1999);

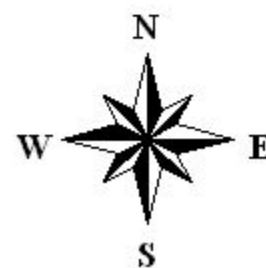


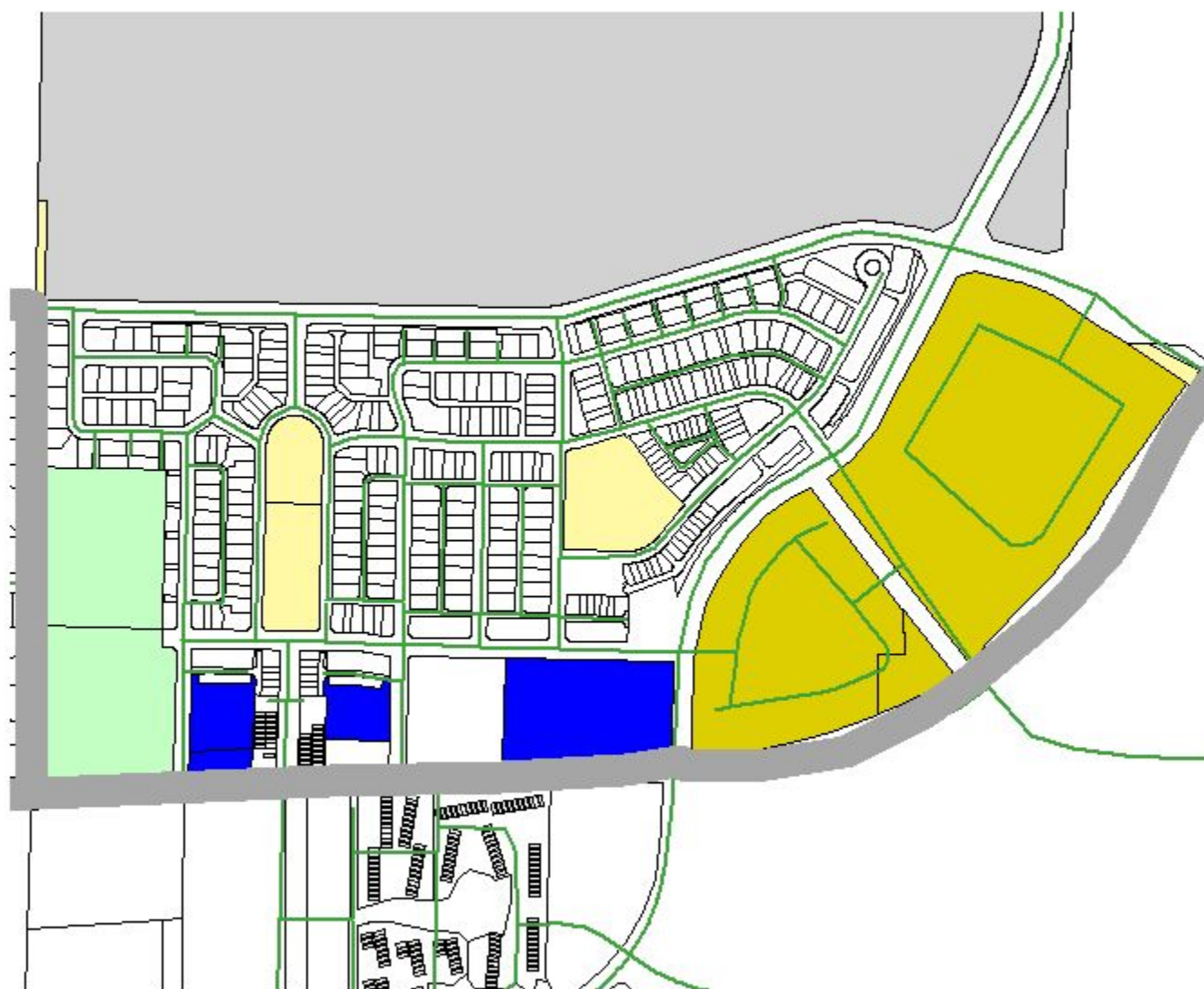
- Busstops
- Streets
- Cityhall
- Neighborhood Boundary

Taxlots

- AGR
- COM
- FOR
- IND
- MFR
- PUB
- RUR
- SFR
- VAC



0.2 0 0.2 0.4 Miles



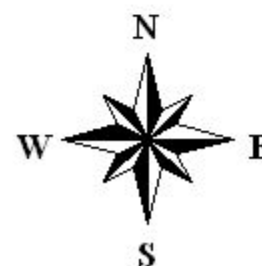


-  Busstops
-  Streets
-  Cityhall
-  Neighborhood Boundary

Taxlots

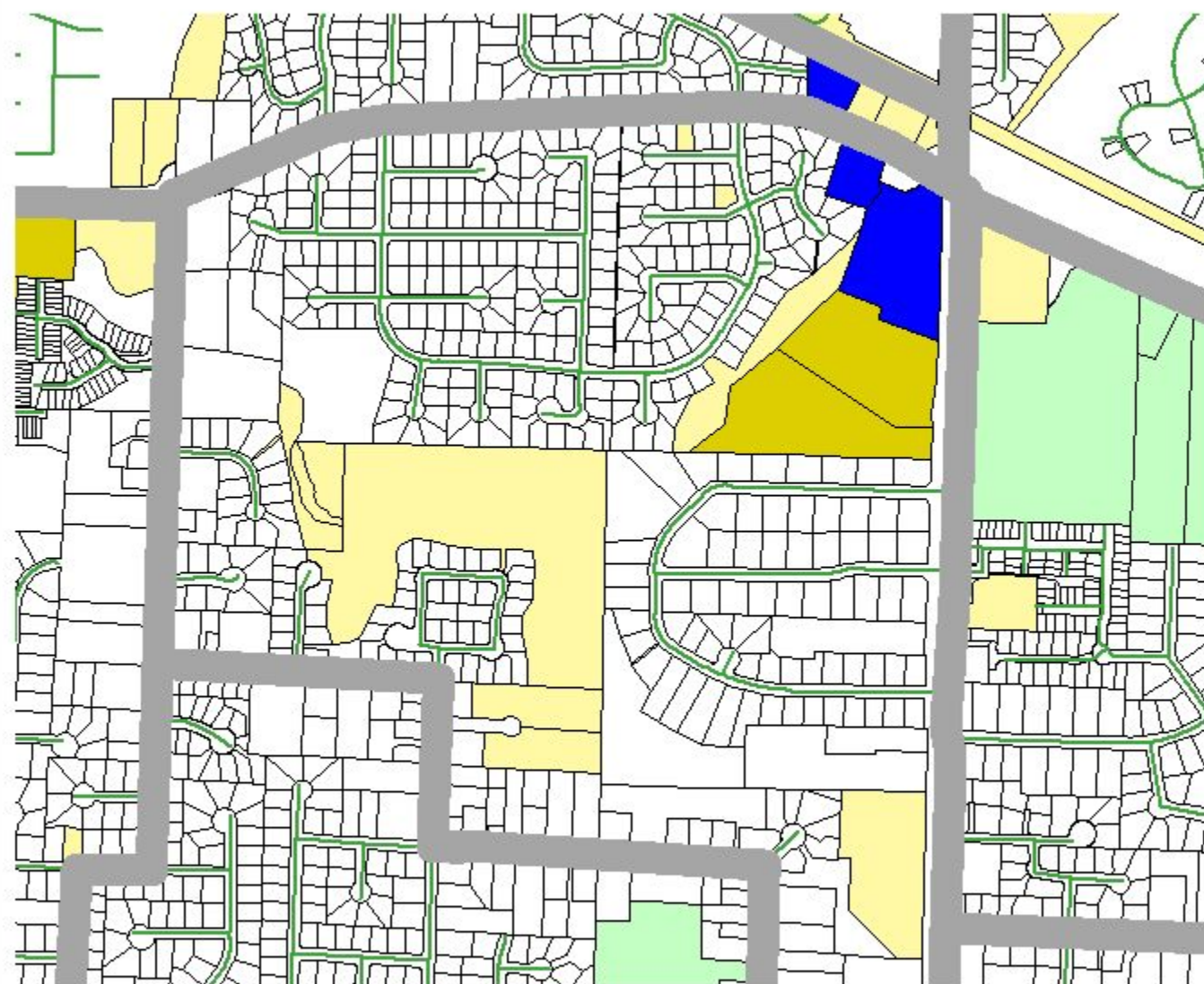
-  AGR
-  COM
-  FOR
-  IND
-  MFR
-  PUB
-  RUR
-  SFR
-  VAC

0.1 0 0.1 0.2 Miles



Pedestrian Walkability Characteristics:

- Pedestrian Access to Commercial Uses
 - percentage of SFR units within walkable distance of commercial uses;
- Pedestrian Access to Transit
 - percentage of SFR units within walkable distance of bus stops;



Walkable Network
from Commercial Use

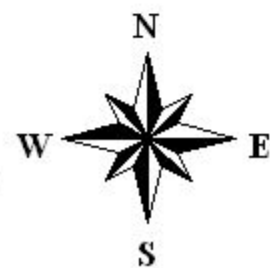
Neighborhood
Boundary

Streets

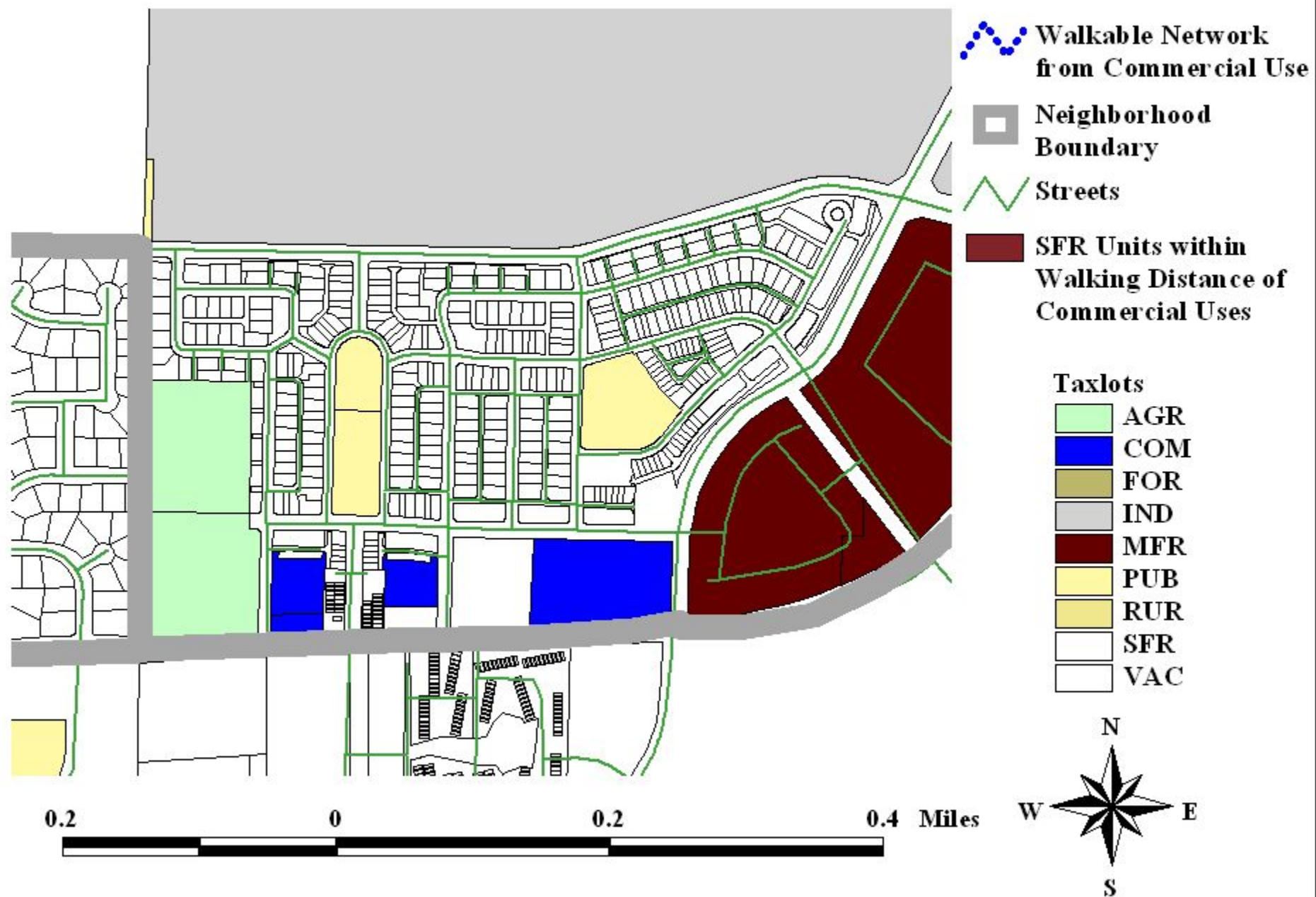
SFR Units within
Walking Distance of
Commercial Uses

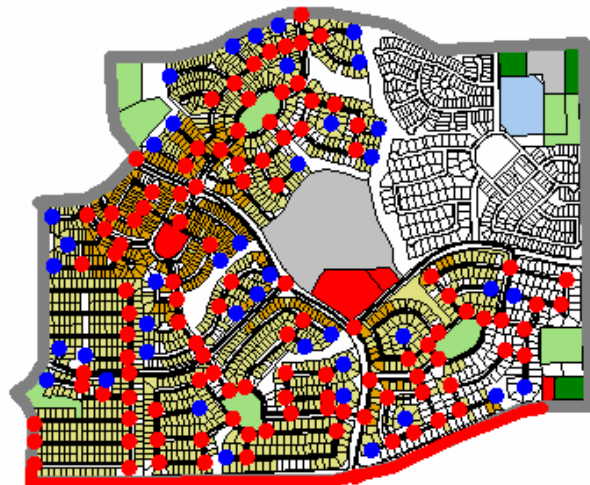
Taxlots

AGR
COM
FOR
IND
MFR
PUB
RUR
SFR
VAC

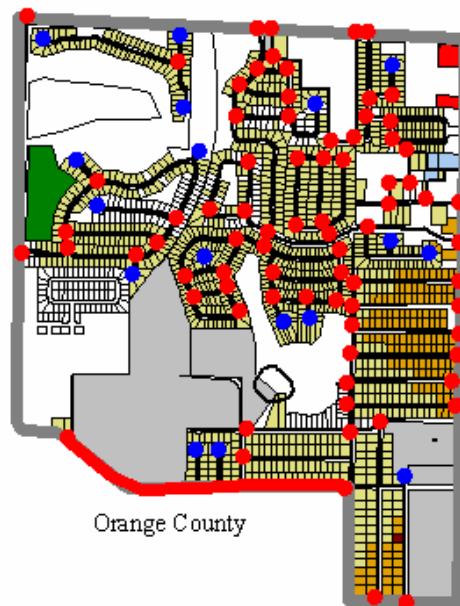


0.3 0 0.3 0.6 Miles

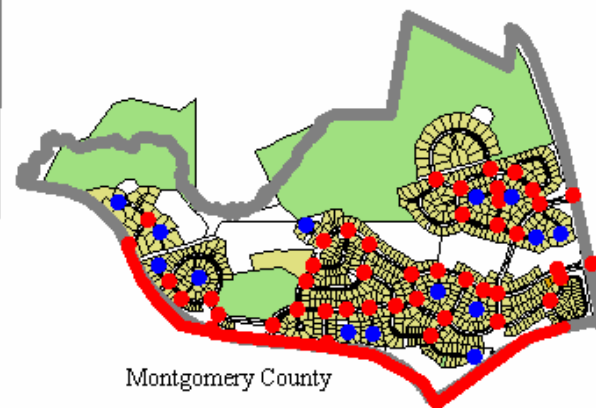




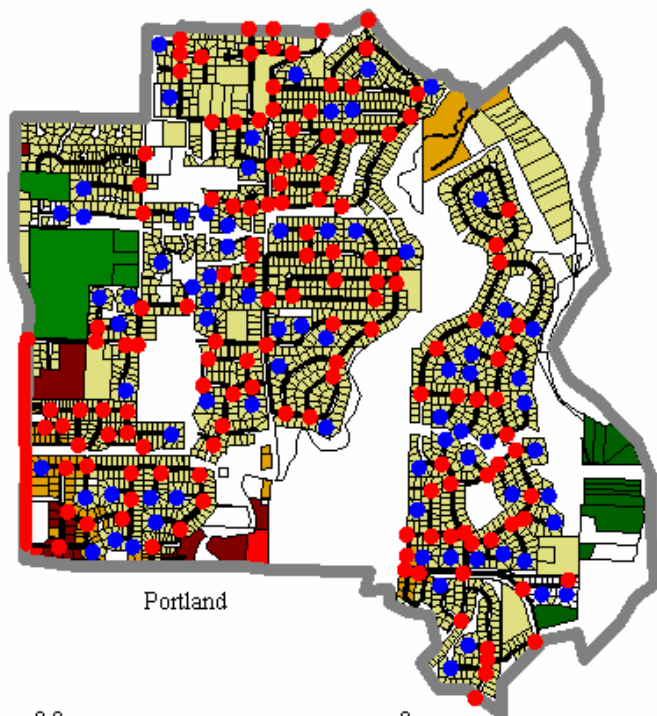
Maricopa County



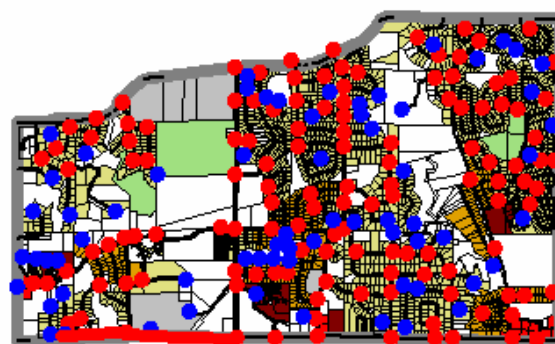
Orange County



Montgomery County

















Portland



Twin City

LEGEND

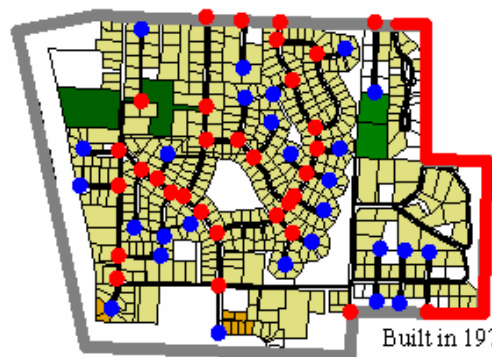
-  Single family
-  Single family parcels with pedestrian access to commercial stores
-  Agricultural
-  Commercial
-  Industrial
-  Open space
-  Public
-  Multi-family
-  Vacant
-  TAZ Boundary
-  Intersections
-  Cul-de-sacs
-  Street segment indicating external connectivity
-  Streets

0.8 0 0.8 1.6 Miles

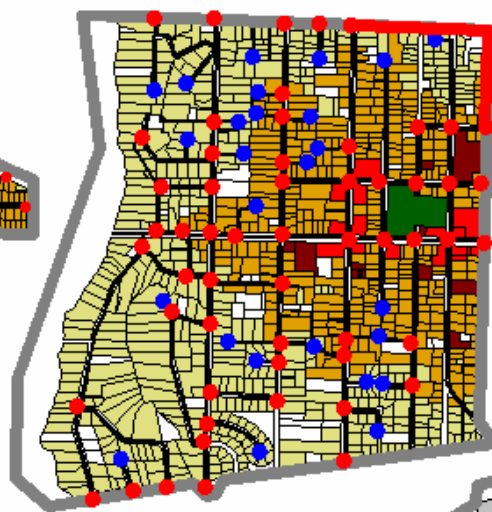




Built in 1940s

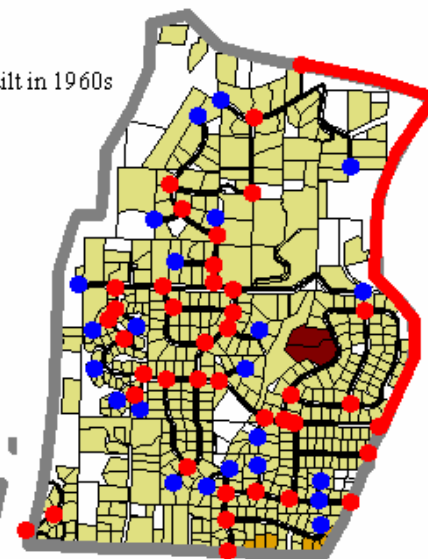


Built in 1970s

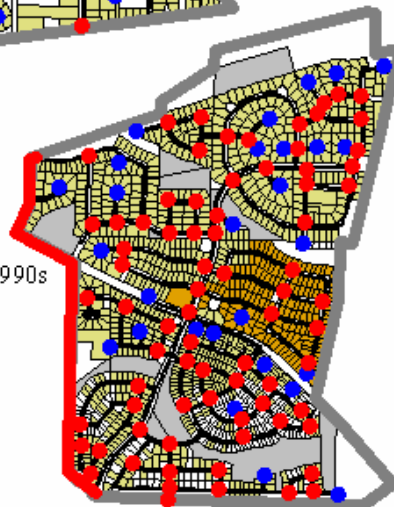


Built in 1950s

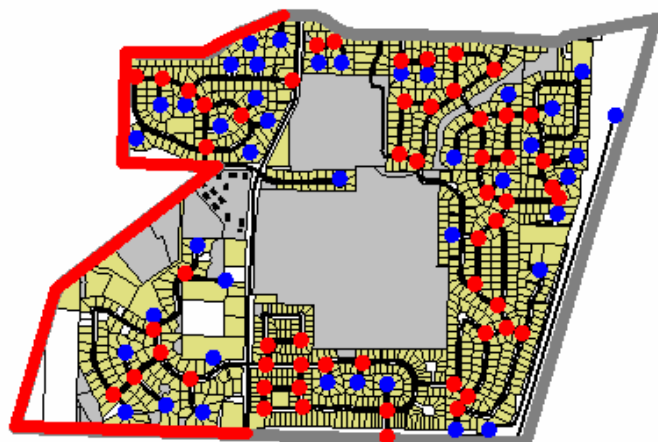
Built in 1960s



Built in 1990s

















Built in 2000



Built in 1980s

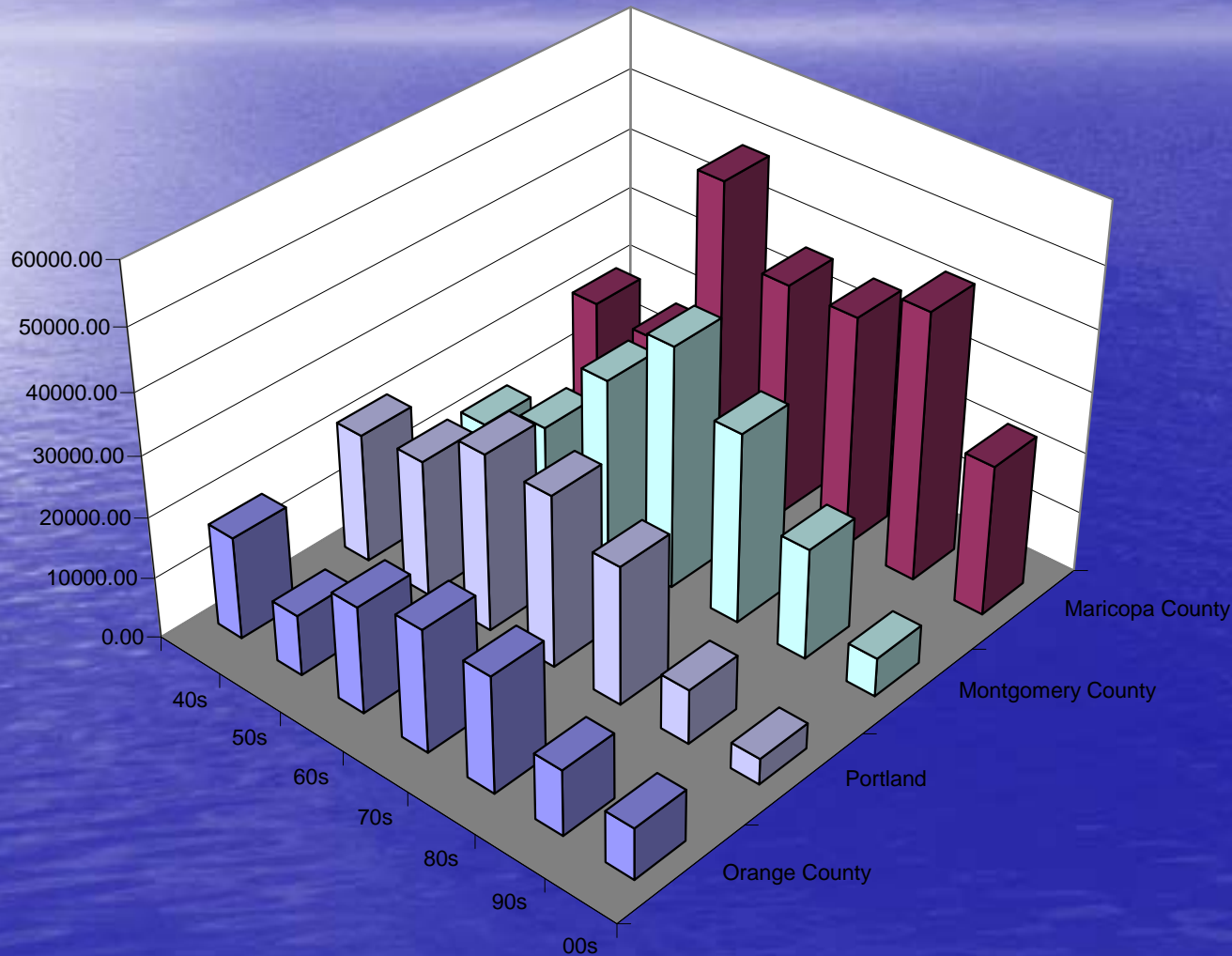
LEGEND

-  Single family
-  Single family parcels with pedestrian access to commercial stores
-  Agricultural
-  Commercial
-  Industrial
-  Open space
-  Public
-  Multi-family
-  Vacant
-  TAZ B boundary
-  Intersection
-  Cul-de-sac
-  Streets
-  Street segment indicating external connectivity

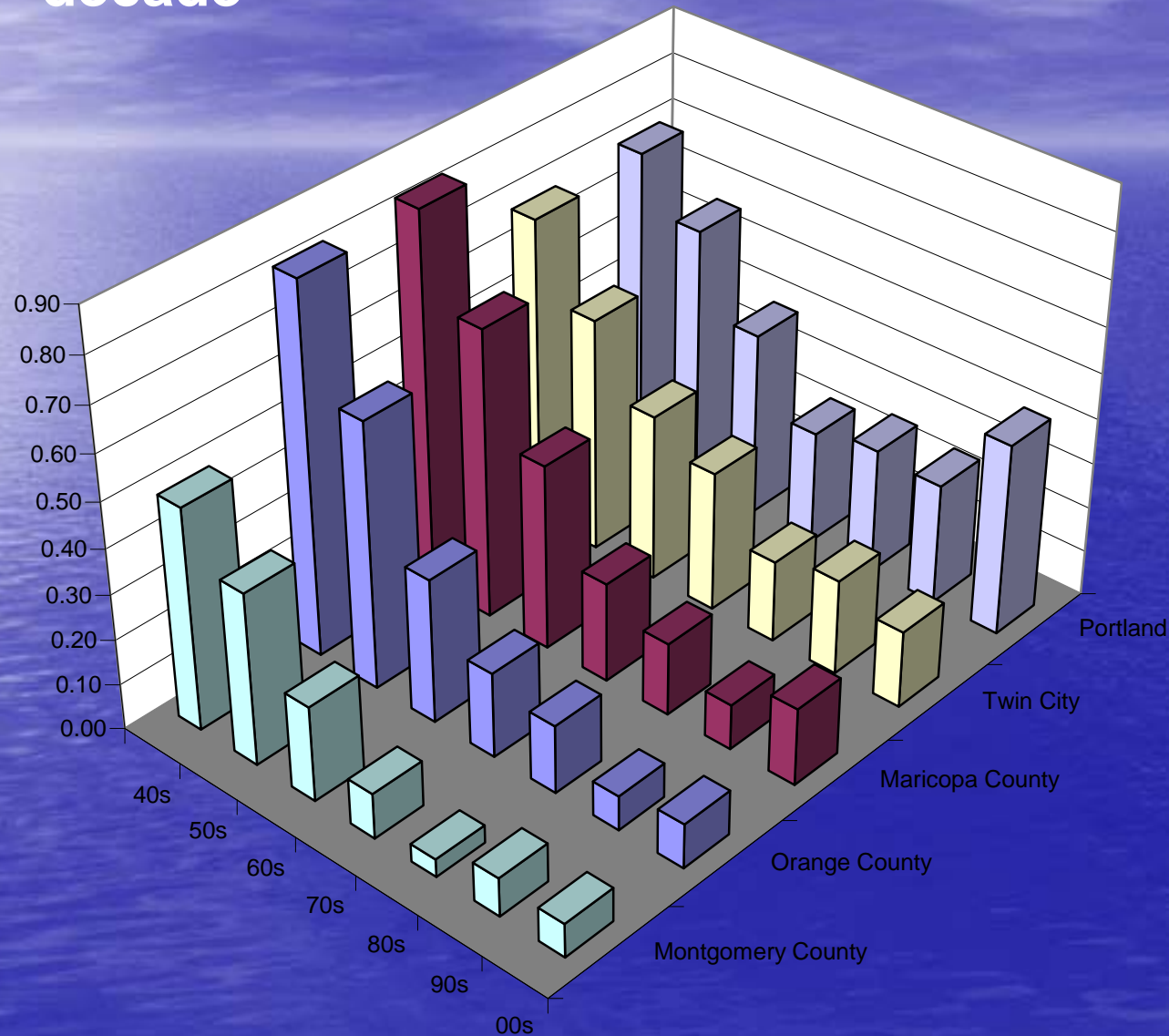
0.7 0 0.7 1.4 Miles



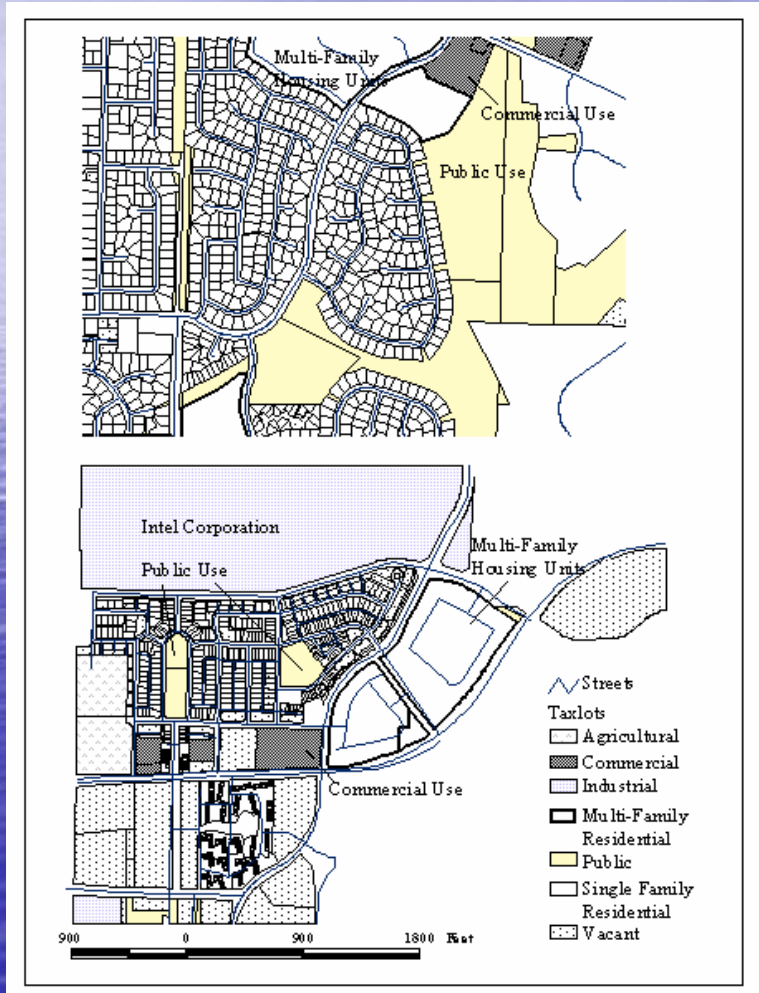
Median value of Lot Size (in sq. ft.) by each decade



Median value of Pedestrian Accessibility by each decade



Measuring, Monitoring, and Evaluating Urban Form



Urban Form Measurements (Unit of measurements)	Forest Glen	Orenco Station	Trend of changes	Price Premium of Orenco
(1) Street Design and Circulation Systems:				
Internal Connectivity_Beta	1.22	1.45	Decreased until 1990, then reversed	+
External Street Connectivity (feet between access points)	569	1016	Increased all the time	+
Length_Street (feet)	95	204	No change	+
Block Perimeter (feet)	3365	830	Increased until 1991, then reversed	+
Number of Blocks per Housing Unit	0.026	0.15	Decreased until 1992, then reversed	+
Median Length of Cul-De-Sacs (feet)	203	106	Decreased all the time	+
(2) Density:				
Lot Size (Square feet)	8675	3500	Decreased all the time	-
Floor Space (Square feet)	1911	1648	Increased all the time	-
Pop_Density (#person/acre)	2.02	2.62	No change	-
DU_Density (#Units/acre)	5.14	11.93	Increased all the time, but expedited after 1990	-

Aggregated Value

	Suburban	Orenco Station
Sales Price	132,731	156,986
Premium from NU		24,255



Urban designers Perspective

Measuring Urban Design



Source: www.urban-advantage.com

TUNGSTEN



Recd 133 of 133

▼ Unfiled

0 A B C D SA

4. Type(s) of Ped Facilities

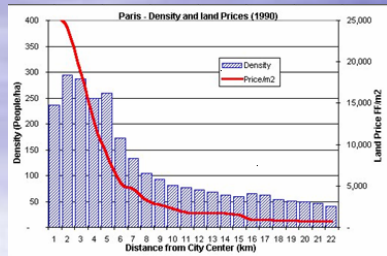
- Footpath: ☐
Paved Trail: ☐
Sidewalk: ☒
Ped Street: ☐

5. Path Material

- Asphalt: ☐
Concrete: ☒
Bricks/Stone: ☐
Gravel: ☐

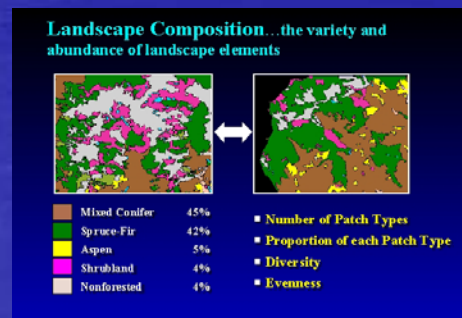
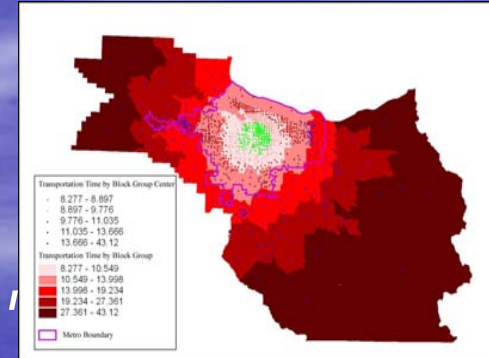


The Elephant of Urban Sprawl



Moral:

So oft in theologic wars,
The disputants, I ween,
Rail on in utter ignorance
Of what each other mean,
And prate about an Elephant
(urban sprawl)
Not one of them has seen!



The background is a solid blue gradient. On the left side, there is a bright, circular sun flare that fades into the blue. At the top of the image, there are thin, wispy white clouds. The text "Thank you." is centered in the middle of the image.

Thank you.

- A guy walks into a Washington D.C. curio shop. After browsing, he comes across an exquisite brass rat.
- "What a great gag gift," he thinks to himself. After dickering with the shopkeeper over the price, the man purchases the rat and leaves.
- As he's walking down the street, he hears scurrying sounds behind him. Stopping and looking around, he see hundreds, then thousands of rats pouring out of alleys and stairwells into the street behind him. In a panic, he runs down the street with the rats not far behind.
- The street ends at a pier. He runs to the end of th pier and heaves the brass rat into the Potomac River. All of the rats scurry past him into the river, where they drown.
- After breathing a sigh of relief and wiping his brow, the man heads back to the curio shop, finds the shopkeeper, and asks, "Do you have any brass economists?"
- --Taken from Jeff Thredgold, On the One Hand: The Economist's Joke Book.

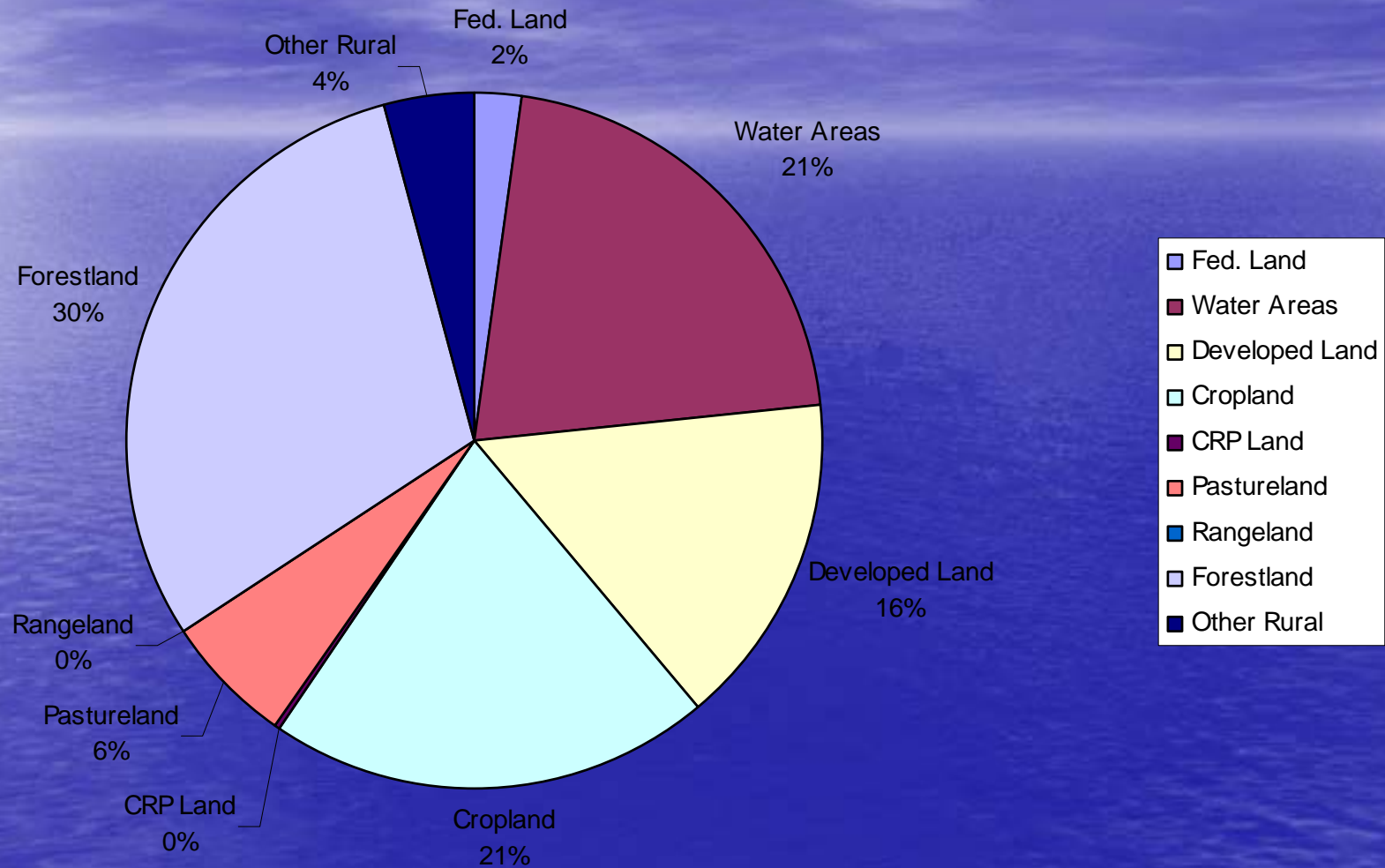
Some work in progress

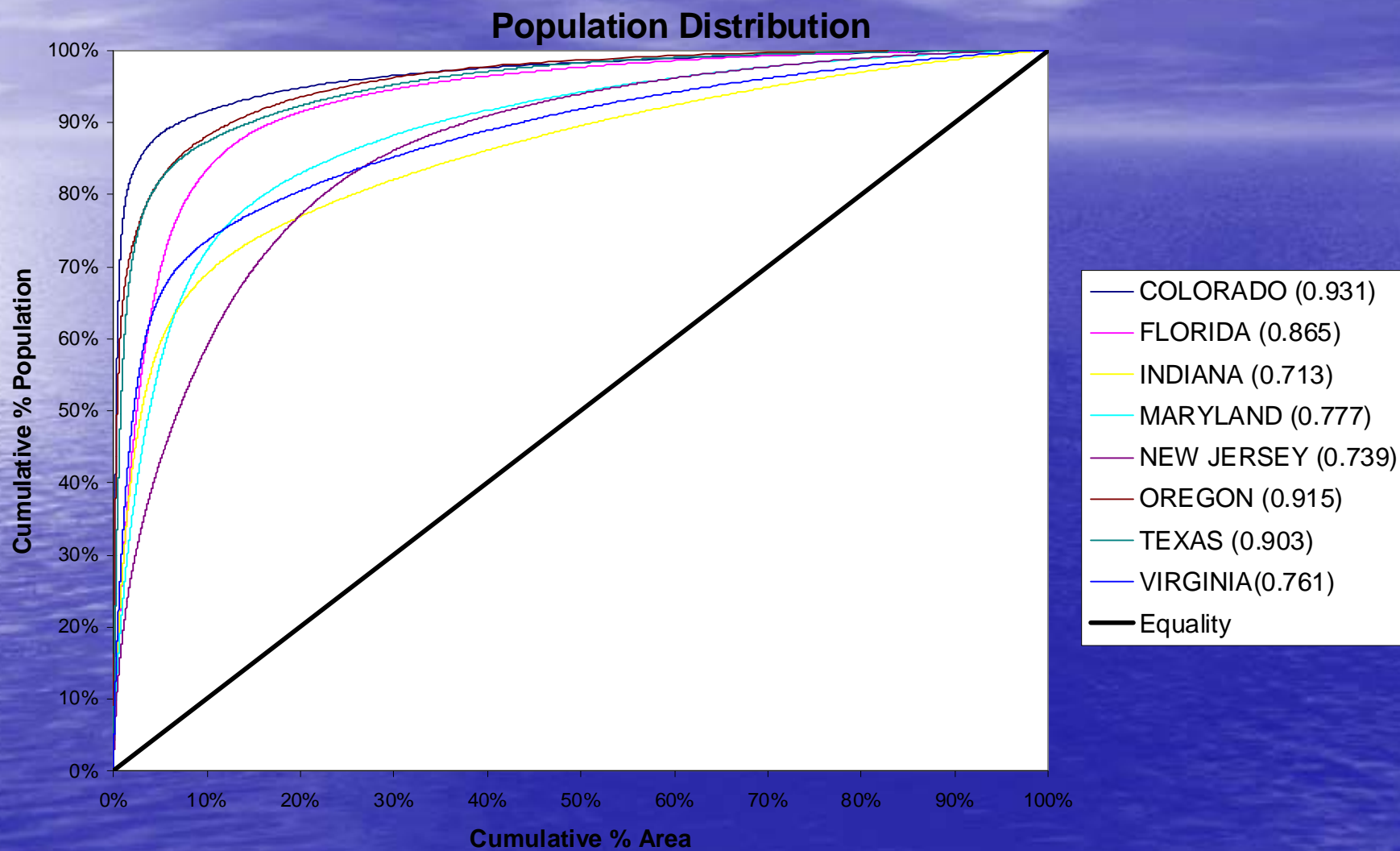
Does State Growth Management Work

Funded by

Lincoln Institute of Land Policy

Maryland 1997





Sources: GeoLytics 1990 CensusCD 1990 Long Form in 2000 Boundaries

Nighttime Lights Data

Source

- Collected by the USAF Defense Meteorological Satellite Program
- Processed by NOAA's National Geophysical Data Center.
 - Base inter-year calibration by Dr. Chris Elvidge, Director of the NGDC Earth Observation Group.
- Recalibration to match US land use trends by our group.

Description

- Annual average nighttime light intensity
 - Data for years 1992 through 2003
- 30 arc second resolution
 - Approximately 1km²
- Global coverage between 65° and -65° latitude
- Approximately 40 to 60 cloud free observations processed to produce each pixel
- Collected by 4 different satellites
 - Duplicate datasets for several study years
 - Urbanized area estimates averaged when two observations in the same year