

Comparison of Land Use Changes Due to Urban Growth in St. Louis Metropolitan Area (USA) and Greater Copenhagen Area (Denmark)

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Overview

- Introduction
 - Urban sprawl vs. urban growth
 - Objectives
- Assessment of urban sprawl in St. Louis Metropolitan area
- Assessment of peri-urban change in the Greater Copenhagen area
- Comparison, discussions, and recommendations

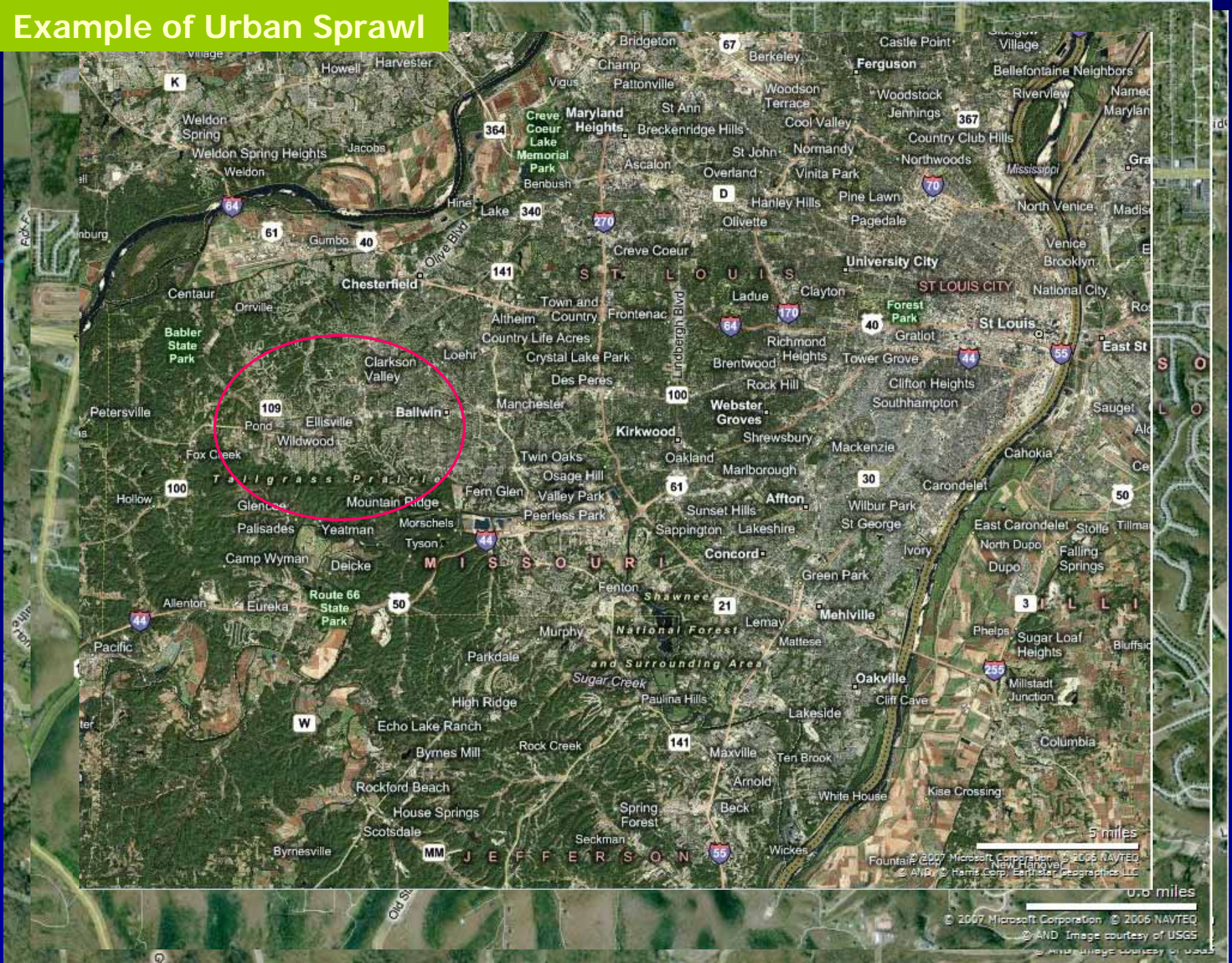
Introduction

- Suburban or peri-urban areas are rural areas in a transformation process from agriculture to urban land uses at the urban fringes
- Such areas are characterized by conflicts of environmental conservation vs. urban settlement and economic development
- Land use policies often influences the type of urban growth, i.e. Urban sprawl vs. sustainable urban development

Introduction

- Urban sprawl is a form of urban growth
 - Sprawl is characterized by low-density single-family residential and strip commercial developments
 - Sprawl often Occurs on disconnected tracts over rural and agricultural farmlands at urban fringes

Example of Urban Sprawl



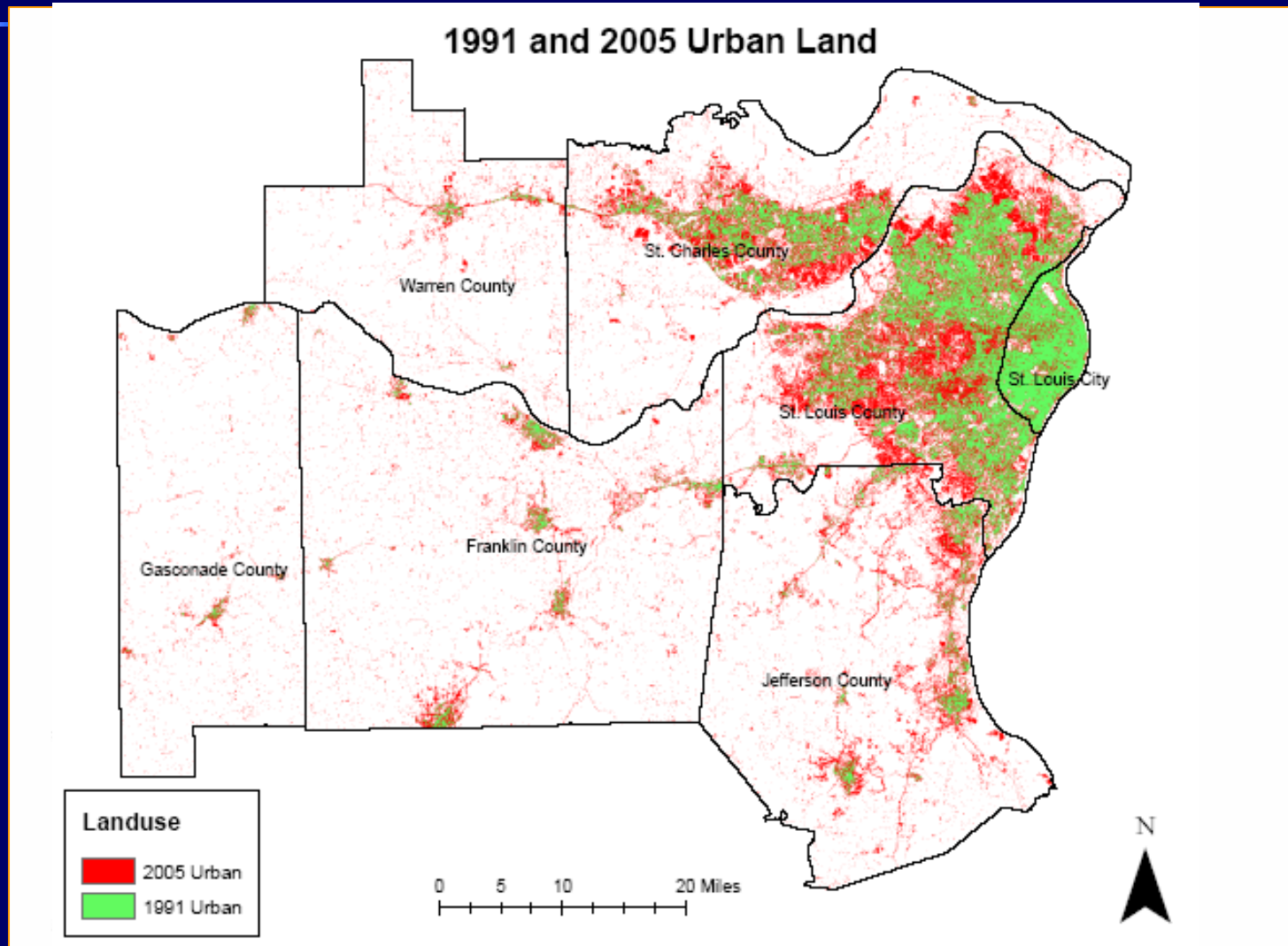
Objectives

- Compare the changes in spatial arrangements of Land Use in the Greater Copenhagen area and St. Louis Metropolitan area
- Determine the extent and types of urban sprawl in the two metro areas
- Discuss the socioeconomic and policy drivers of land use/land cover change in the two case studies

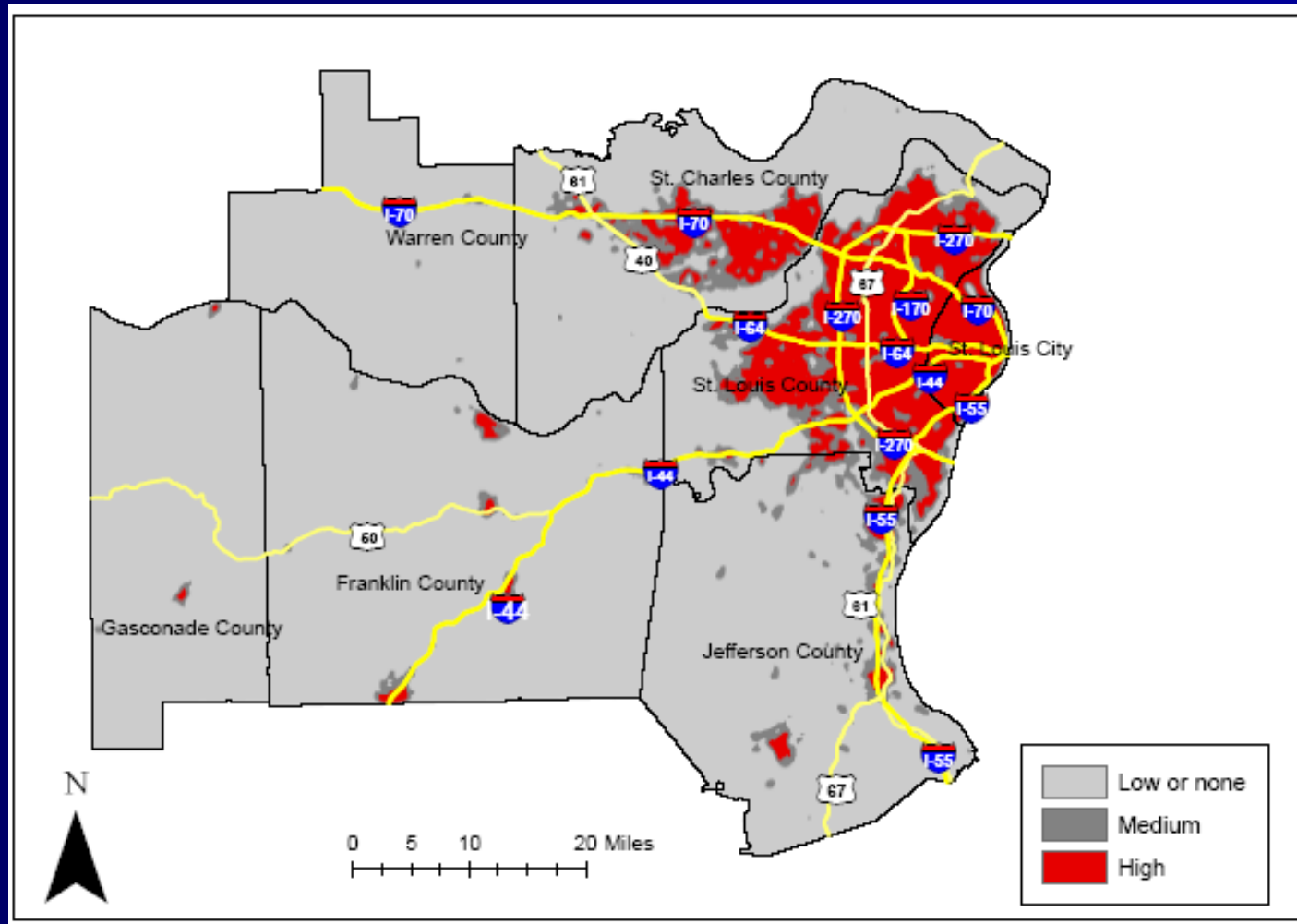
Land Use Change in St. Louis Metropolitan area

- GIS based analysis to quantify changes in Land Use between 1991 and 2002
- Overlay of Land Use change and road network to identify pattern of urban growth or sprawl
- Neighborhood statistics and density analyses to categorize the type urban sprawl into linear, cluster and leap frog sprawls

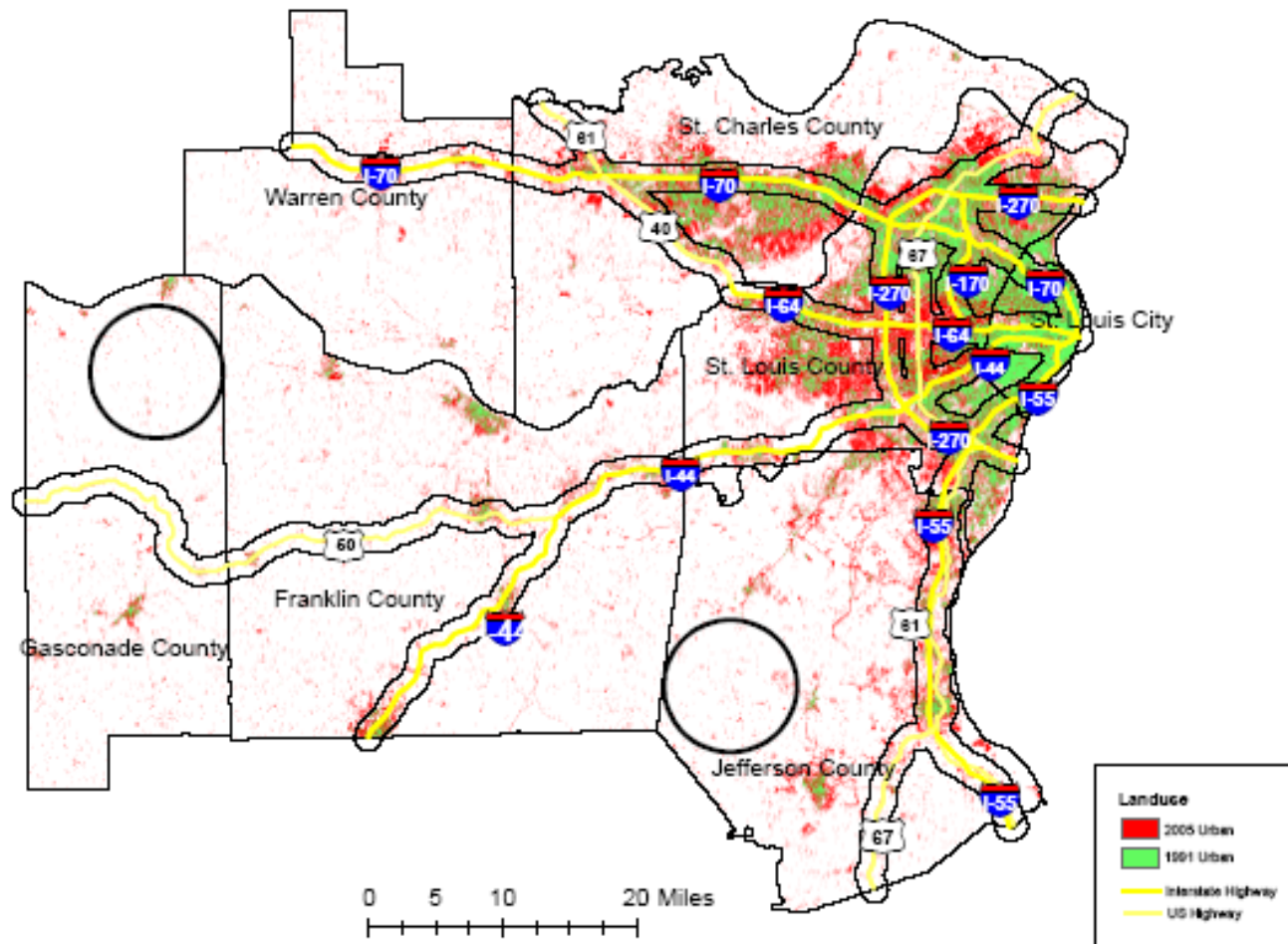
Urban Land Use Change in St. Louis Metropolitan Area



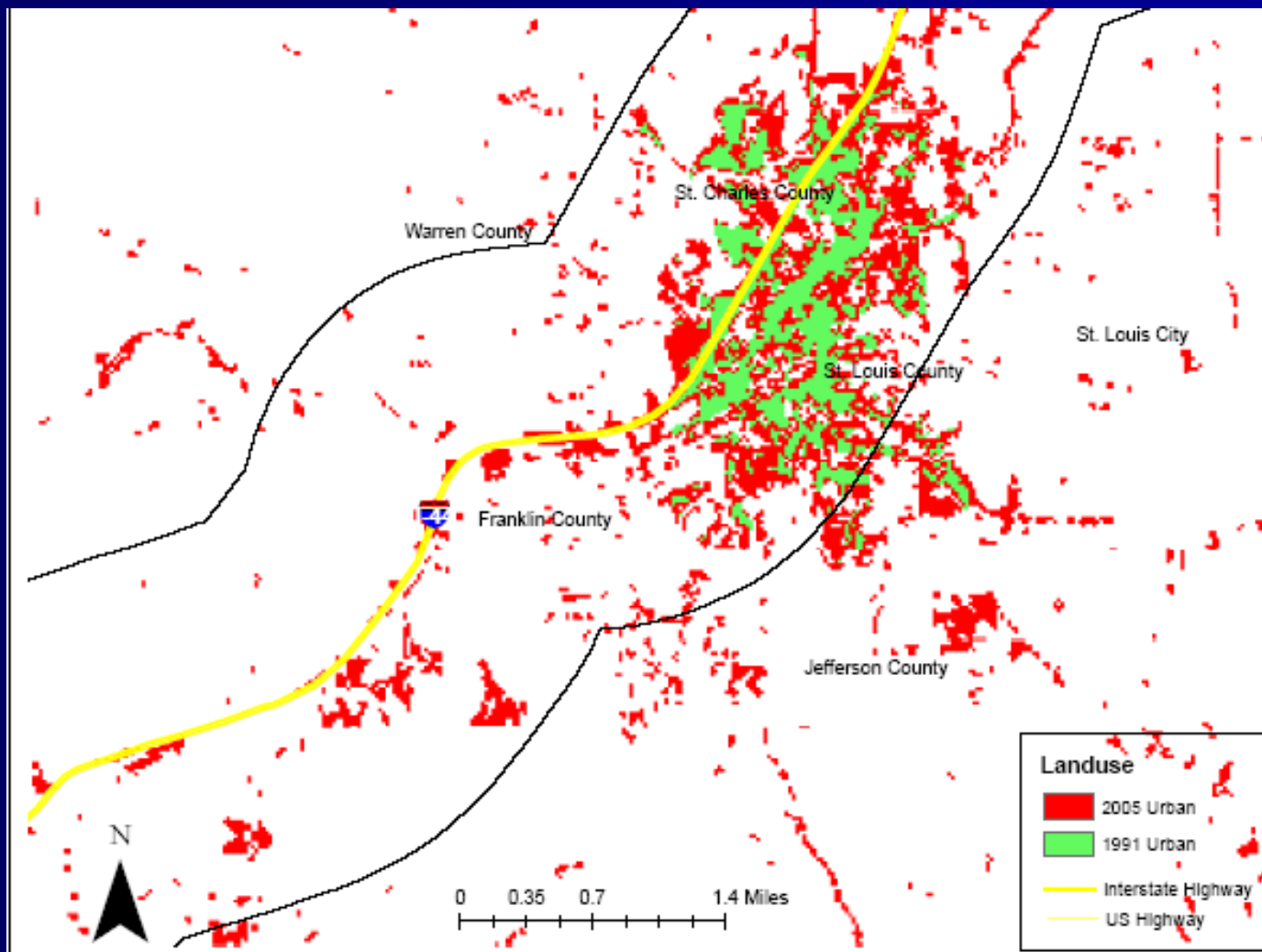
Density of Urban Land in St. Louis Metropolitan Area (2005)



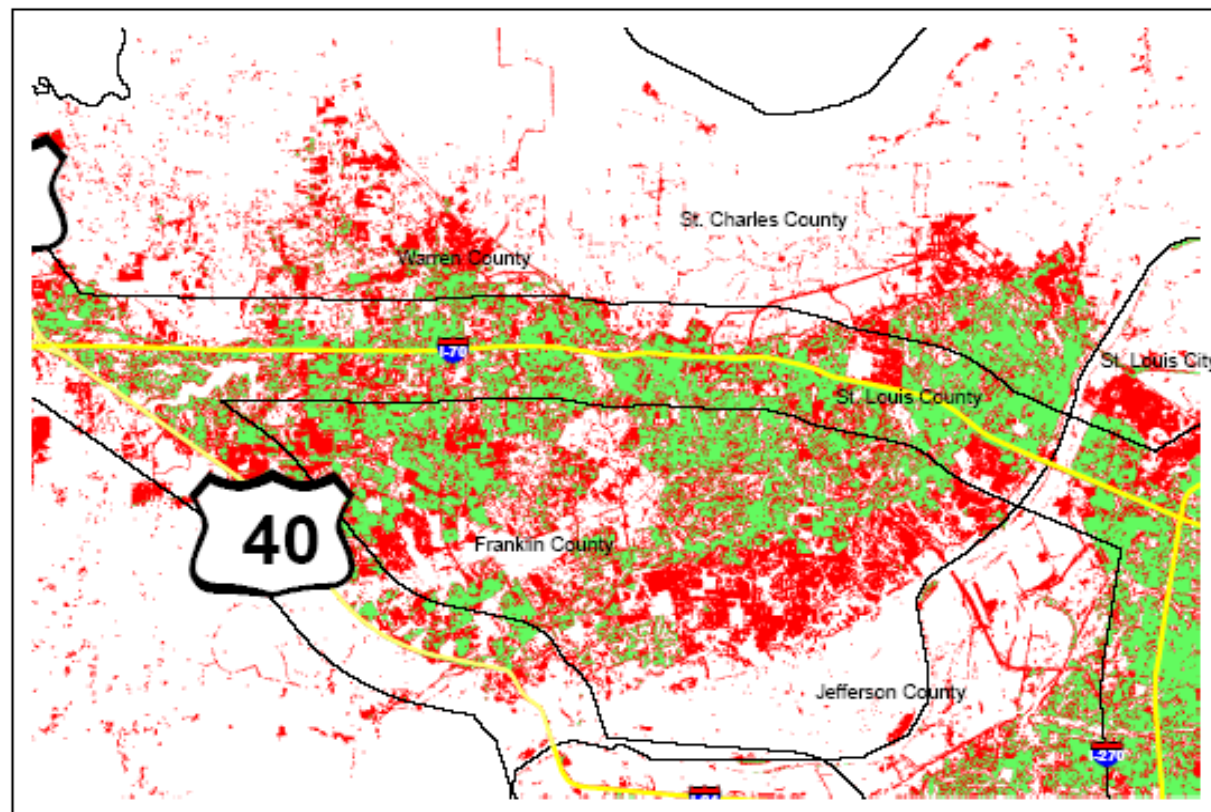
Leapfrog Pattern of Sprawl in St. Louis Metropolitan Area



Linear Pattern of Sprawl Along I-44 in St. Louis Metropolitan Area



Cluster Pattern of Sprawl in St. Louis Metropolitan Area



0 1.25 2.5 5 Miles

Landuse

- 2005 Urban
- 1991 Urban
- Interstate Highway
- US Highway

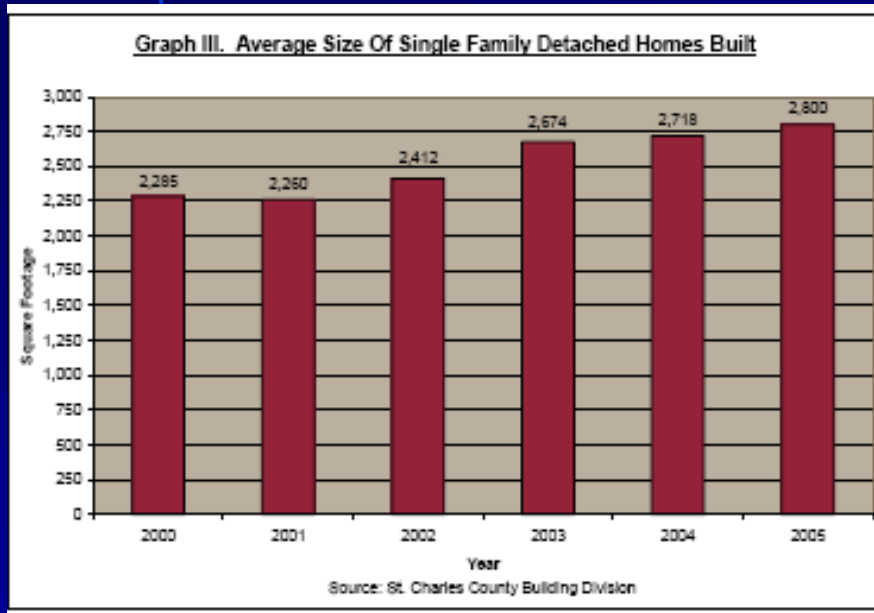
Occupational Status of Farm Owners in St. Louis Metropolitan Area

	1987	1992	2002
Full-time	2095	2071	2704
Part-time	3014	2683	2507

Agriculture Land Use in St. Louis Metropolitan Area

	1987	1992	1997	2002
Number of farms	5109	4654	5194	5211
Farm Land Area (ac)	1051686	997562	1017997	1013144
Average farm size (ac)	1238	1297	1185	1161

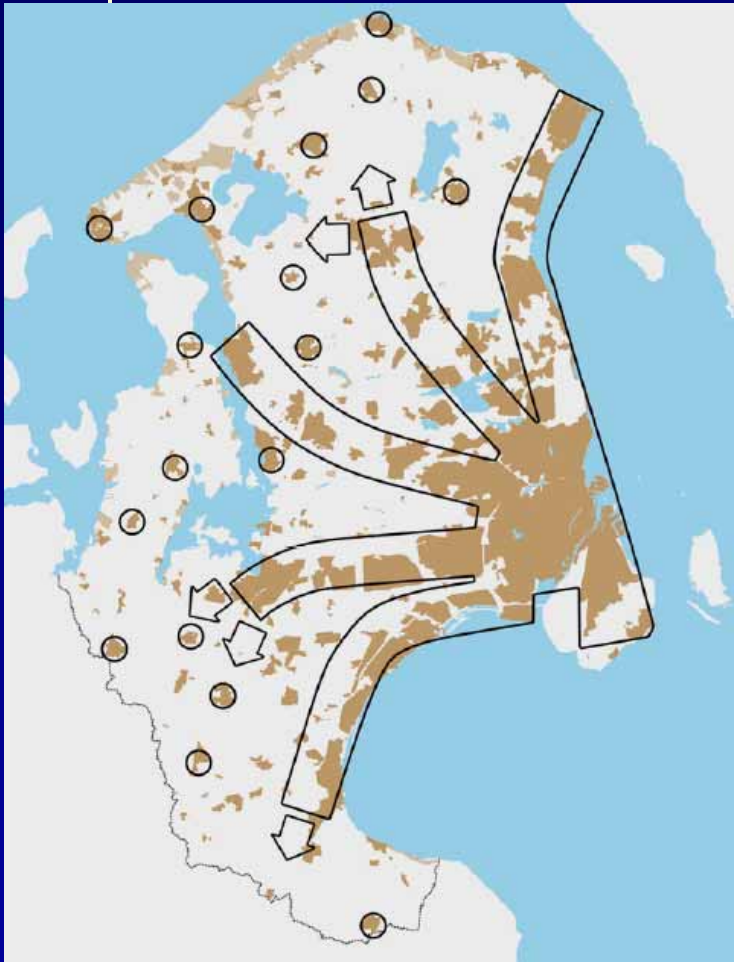
Housing Units in St. Charles County (2000 – 2005)



- Overall, 22% increase in the average size of a single family detached home between 2000 and 2005

Housing units size increase is typical with Urban Sprawl

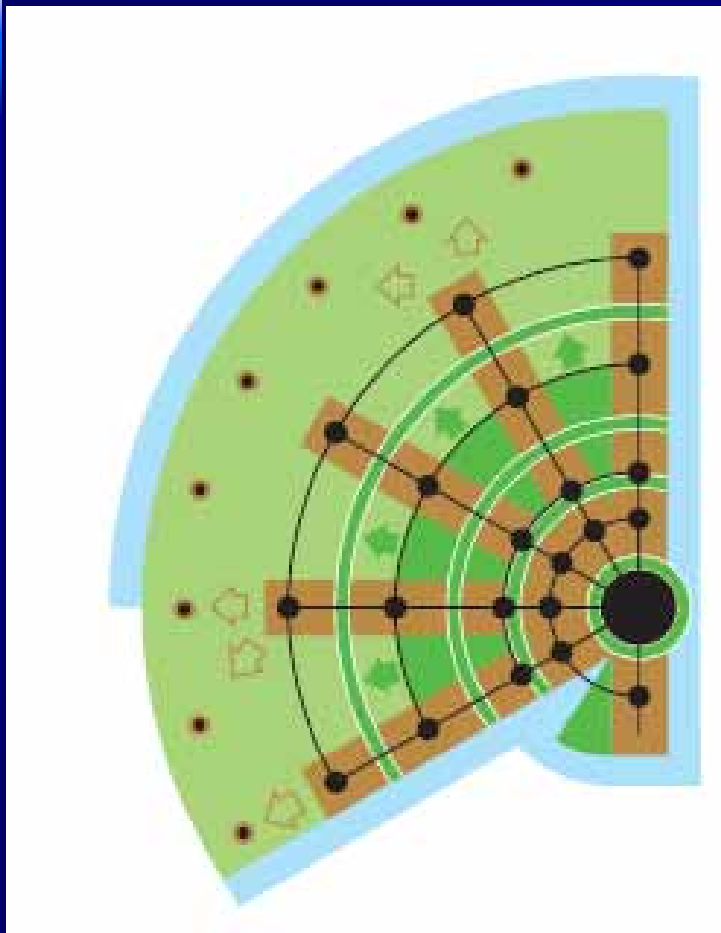
The Finger Plan of Greater Copenhagen (1947)



Objectives

- Provide high mobility live within the 'fingers'
- Good access to city and countryside
- High population density
- Reduce traffic problems in city
- Reduce environmental problems (to 88 pers/km² in Denmark)
- Protect the countryside
- Population increase approx. 1 million (1947) to approx. 1.6 million (2004)

Conceptual Model of Development in Greater Copenhagen



- Extend development along the fingers
- Provide "Green areas" to connect the developed urban areas long fingers
- Blue outline represent water along edges of Greater Copenhagen

Urban Development Since 1947

Overall structure as planned, BUT

- Inner fingers are swollen
- Palm somewhat larger
- AND 'Hidden' urbanization in 'green areas'



The 'Finger-city' 1947



The 'Urban development
as planned in 1947

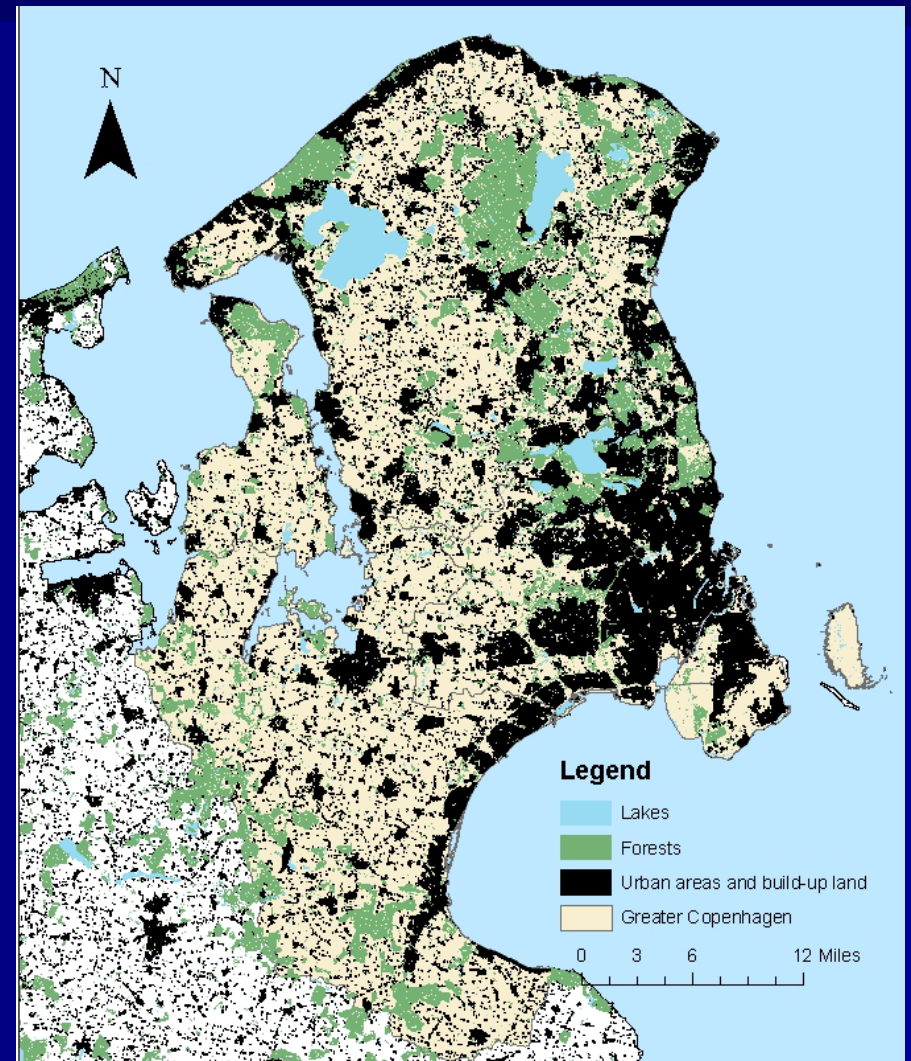


The 'Finger-city' 2001

Urban Areas in Greater Copenhagen in 2002

Most new built-up land has been developed within existing urban designations as gap-filling or extension of existing urban areas

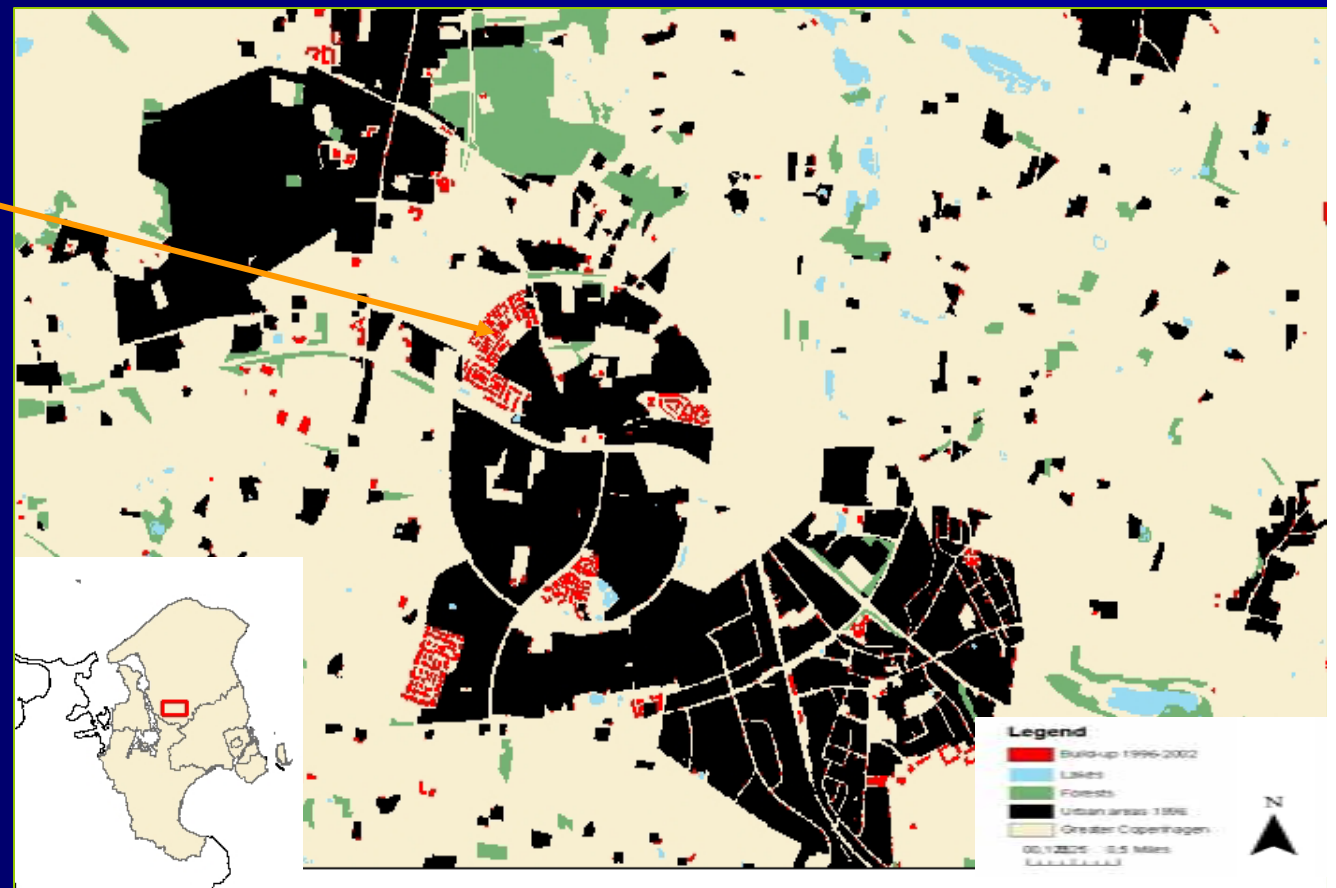
- Urban areas => 63 - 66%
- Farm land area => 42-45%
- Forest area/nature => 21%
(*meadows, bogs, lakes*)



Urban Growth Example (1996 – 2002)

Indications of some
Level of cluster sprawl

However many urban
functions have been
introduced in left-over
farm buildings & hence
some sprawl of urban
functions is occurring



Occupational Status of Farm Owners (%) in Greater Copenhagen Area

	1984	1994	2004
Full-time	26	15	8
Part-time	54	55	67
Retired	20	30	25
Total	147	138	123

Source: Busck et al 2006

Agriculture and Land Use in Greater Copenhagen Area (1982-2002)

	1987	1992	1997	2002
Number of farms	4.27	3.61	3.25	3.05
Farm land area (ha)	125	121	115	118
Avg. Farm size (ha)	29	34	36	39
Urban (% of GC)	66	65	63	64
Farm land (% of GC)	45	44	42	43
Nature (% of GC)	9	9	9	9
Forest (% of GC)	12	12	12	12

Source: Statistics Denmark

Landscape Activities Undertaken by Land Owners in Greater Copenhagen Area

	1984-94		1994-04	
	Amount	No. of Owners	Amount	No. of Owners
Hedgerow planted (m)	444	38	584	39
Hedgerow removed (m)	33	9	54	4
Forest planted (ha)	0.2	28	0.7	17
Forest removed (ha)	0.1	7	0.0	0
Greenery planted (ha)	1.0	16	0.7	11
Greenery removed (ha)	n.a.	n.a.	0.1	3
Small woodlands planted (ha)	n.a.	n.a.	n.a.	n.a.
Small ponds created (no.)	0.8	20	0.8	11
Small ponds removed (no.)	0.13	4	0.0	0

Landscape Activities Undertaken by Land Owners in Greater Copenhagen Area

- Net effect of landscape activities on environment include more nature elements such as trees
- Cumulative effect of numerous small patches of landscaped activities result in diverse and greener environment
- Increased citizen driven nature conservation initiatives
- Public support for is available for improving small woodlands and ponds
 - Greenery activities not supported because they are mostly income generating ventures

Motives for Farm Property Purchase

(1: strongly disagree to 5: strongly agree)

	Amenity residents	Indifferent farmers	Local farmers	Diversifiers	Nature-farming	Mean value, all
Nature	5.0	1.8	4.2	4.4	4.8	4.3
Beautiful view	4.5	2.5	4.2	4.3	4.5	4.2
Fresh air	4.5	1.5	3.3	4.2	4.5	3.8
Legal status as a farm	1.0	3.3	4.5	3.3	4.1	3.7
Suitability for farming	2.0	2.8	4.0	2.7	3.6	3.3
Located near job	2.5	1.3	3.3	3.7	3.5	3.1
Local community qualities	1.3	1.3	2.9	3.9	3.5	3.0
Near service. schools etc.	1.5	1.5	2.7	3.2	3.2	2.7
Space for other business	3.0	1.3	3.0	3.3	1.7	2.5
Bond to the property	1.0	2.8	4.5	2.0	1.2	2.5
Cheaper than other dwelling	2.0	1.3	2.4	3.2	2.2	2.4
Number of landowners	4	4	12	9	12	41

Issues Influencing Nature of Urban Growth (Constrained Growth vs. Sprawl)

- Land Availability in St. Louis Metropolitan Area (USA):
 - Midwestern states in the US are characterized by “wide open spaces”
 - Available land parcels are generally not a problem in many counties, including the St. Louis Metropolitan Area

Issues Influencing Nature of Urban Growth (Constrained Growth vs. Sprawl)

- The land use planning process is usually open to driven urban growth that is driven primarily by economic development
- Periodic public input on the direction of urban growth somehow reaffirms the open consideration of sprawl

**** Limited Government Intervention ****

Issues Influencing Nature of Urban Growth (Constrained Growth vs. Sprawl)

Attitudes towards Urban Sprawl in St. Louis Metropolitan Area (USA):

For example, in St. Louis county:

- 47.3% of residents favor placing limits on growth to stop sprawl
- 49.1% of residents prefer to be allowed to live wherever they want, without government interference

(Source: St. Louis County 2000 – 2004 strategic plan)

Issues Influencing Nature of Urban Growth (Constrained Growth vs. Sprawl)

- Cultural and Economic Importance of Agriculture in Denmark (Greater Copenhagen)
 - Tradition of reserving areas for agricultural production
 - Important argument for keeping a strict divide between urban and rural zones
 - In general, only building permits for agricultural buildings are granted in rural zones

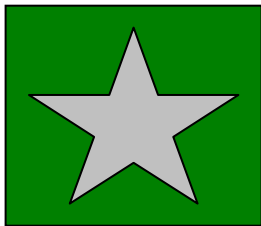
Issues Influencing Nature of Urban Growth (Constrained Growth vs. Sprawl)

- Tradition of accepting public intervention in Denmark (Greater Copenhagen)
 - An integrated part of the Scandinavian 'Welfare system'
 - Planning restrictions and public interventions are broadly accepted
 - Use of public funds for e.g. nature protection schemes are expected and accepted

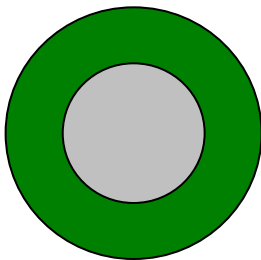
Issues Influencing Nature of Urban Growth (Constrained Growth vs. Sprawl)

- Long history of land use planning in Europe (Greater Copenhagen)
 - High population density of many European cities is an important driving force to mitigate urban sprawl
 - This contrast with the relatively “younger” cities in the USA where land availability is not limiting factor to urban growth

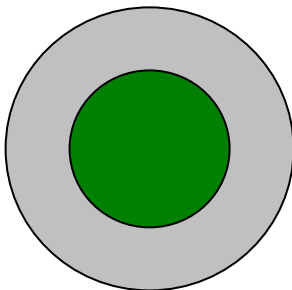
Some European Planning Concepts



Finger Plan
(e.g. Copenhagen, Denmark)



Green Belts
(e.g. London, UK)



Green Heart
(e.g., Randstad, Netherlands)

Green = rural/nature
Gray = urban areas

Overall idea:

- *To ensure easy access between rural and urban areas*
- *Maintain healthy natural environment*

Conclusions

- Structural components of land use and landscape elements appear relatively unchanged in the Greater Copenhagen
- Urban sprawl is prevalent in the St. Louis Metropolitan area
 - characterized by a disconnected patchwork of new subdivisions without well defined corridors and green spaces linking the suburbs to the city center

Conclusions

- Current urbanization trends in the Greater Copenhagen area are putting pressure on the rural functions and the extent and network of green spaces
- There is need for an in-depth assessment of the synergy between land availability and land use policies and how this affect urban sprawl in Europe and the United States