



**THE OHIO STATE UNIVERSITY**

COLLEGE OF FOOD, AGRICULTURAL,  
AND ENVIRONMENTAL SCIENCES

# The Urban-Rural Continuum and Connections

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*Keynote presentation at the National Urban Extension Conference,  
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Are the following images urban  
or rural?





















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# Did you have difficulties deciding?

- Are cities devoid of open space and wildlife?
- Do all people in the countryside hunt, farm, fish and shoot?
- Is everyone living in towns and cities stressed and worried about crime?
- Can farming happen in the city?
- Is all rural land dedicated to agriculture or forests?
- Is all industry in the city?

***Increasingly difficult to distinguish between rural and urban, the transition is often gradual or hidden***

# Definitions of urban and rural

- **Physical:** population, density, land use
- **Legal:** government boundaries
- **Functional:** economic flows and interactions
- **Cultural:** ethnicity, diversity, degree of urbanity
- **Environmental:** impervious surface, industrial pollution, urban heat island
- **Belief:** subjective judgment (of individual or others)

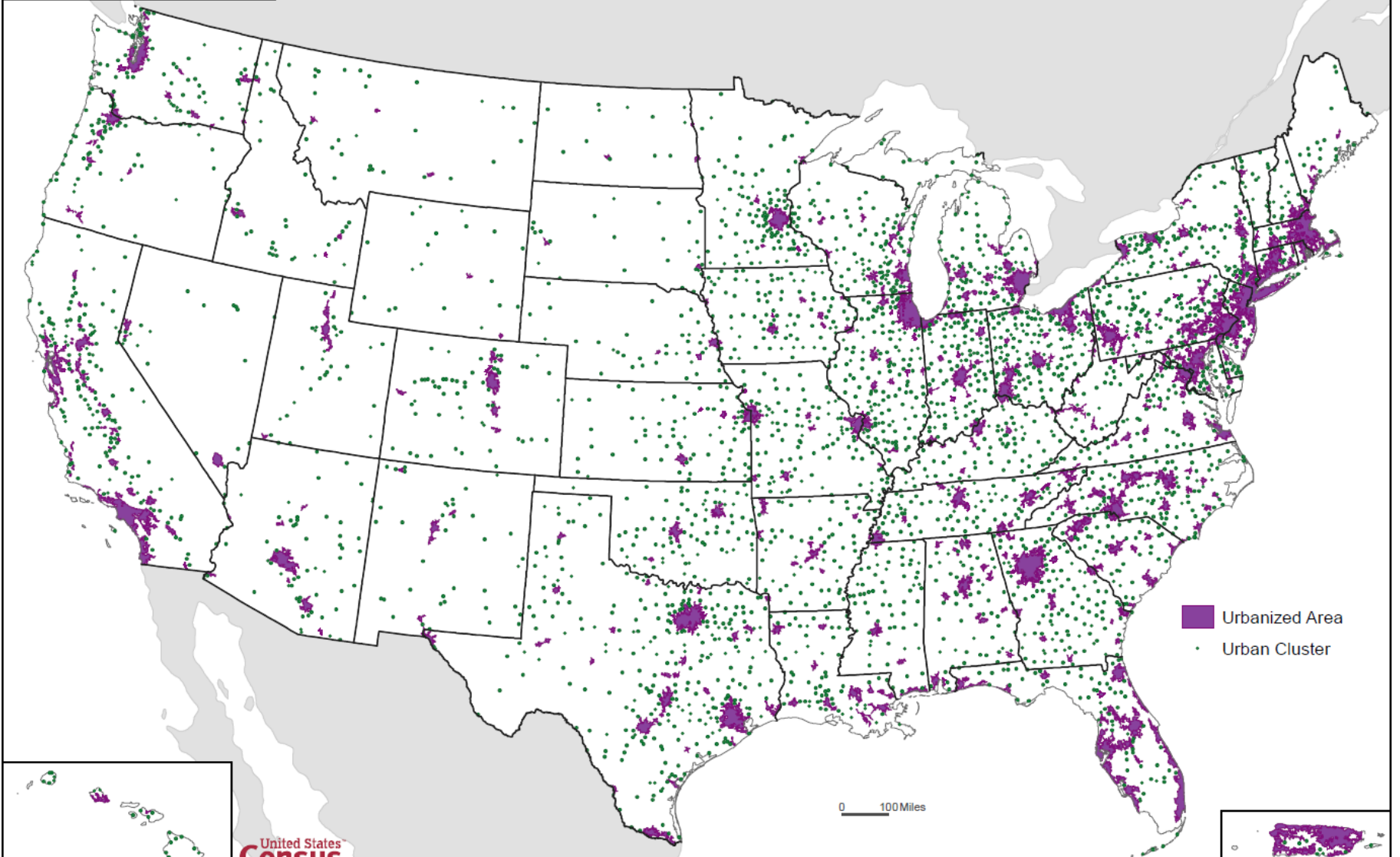
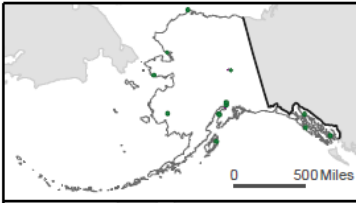
There is no absolute or right definition—depends on your question and the purpose!

# Urban Areas

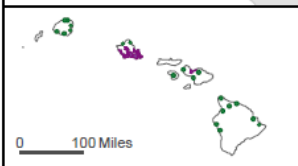
(Population-based definition of urban and rural)

- The Census Bureau's urban areas represent densely developed territory, and encompass residential, commercial, and other non-residential urban land uses.
- The Census Bureau identifies two types of urban areas:
  - **Urbanized Areas (UAs)** of 50,000 or more people
  - **Urban Clusters (UCs)** of at least 2,500 and less than 50,000 people
- "Rural" encompasses all population, housing, and territory not included within an urban area

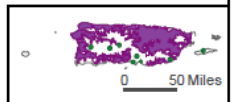
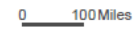
# Urbanized Areas and Urban Clusters: 2010



Urbanized Area  
Urban Cluster

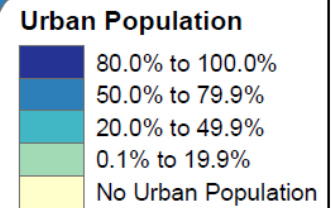
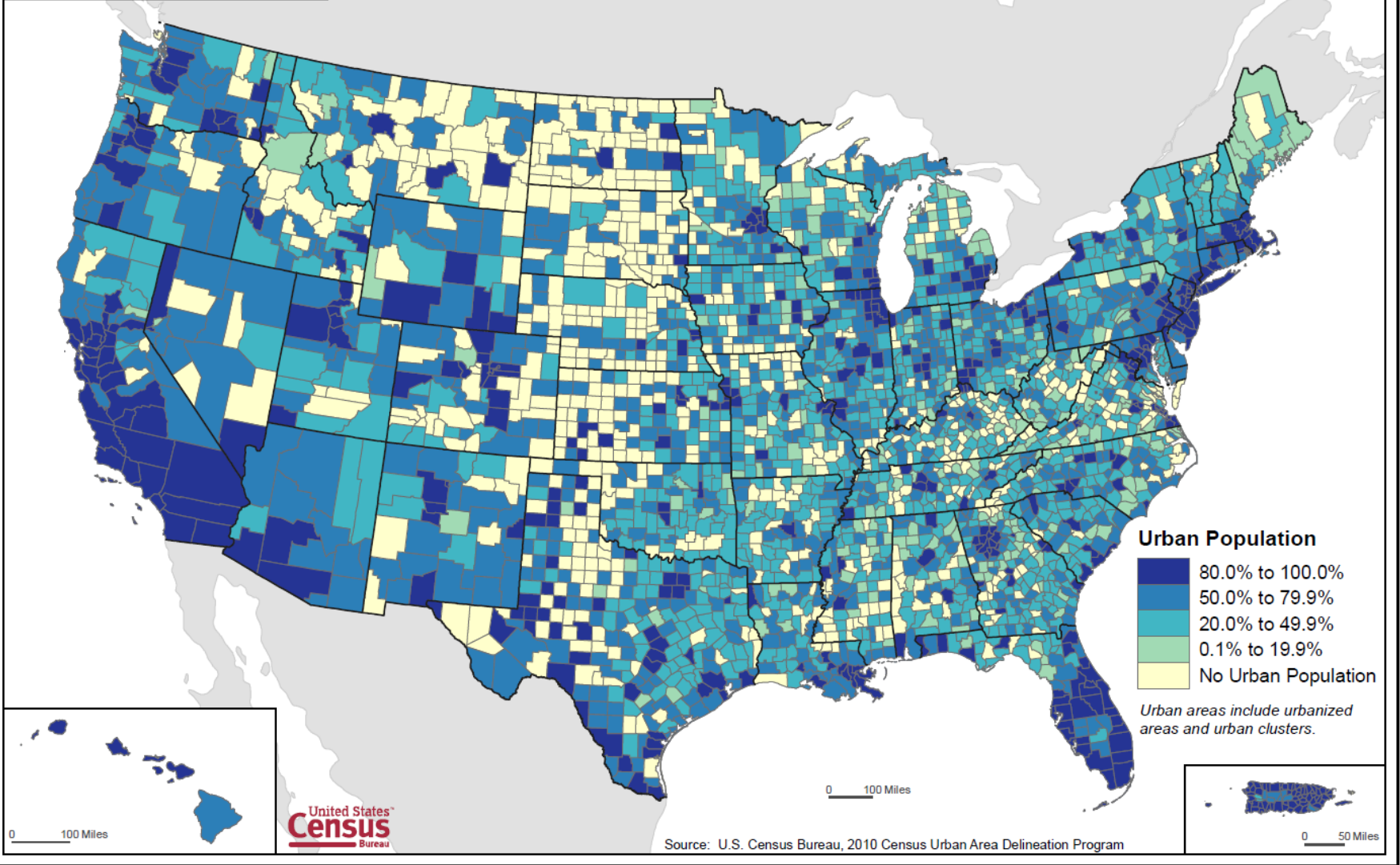
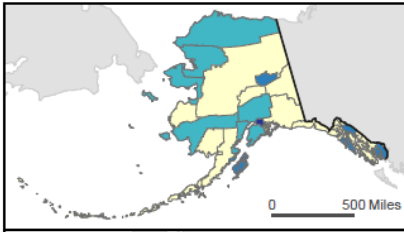


United States  
**Census**  
Bureau

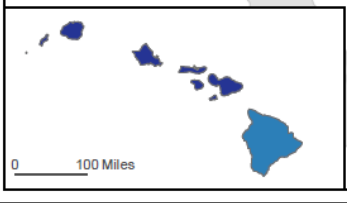


Source: U.S. Census Bureau, 2010 Census Urban Area Delineation Program

# Percent Population Residing in Urban Areas by County: 2010



*Urban areas include urbanized areas and urban clusters.*



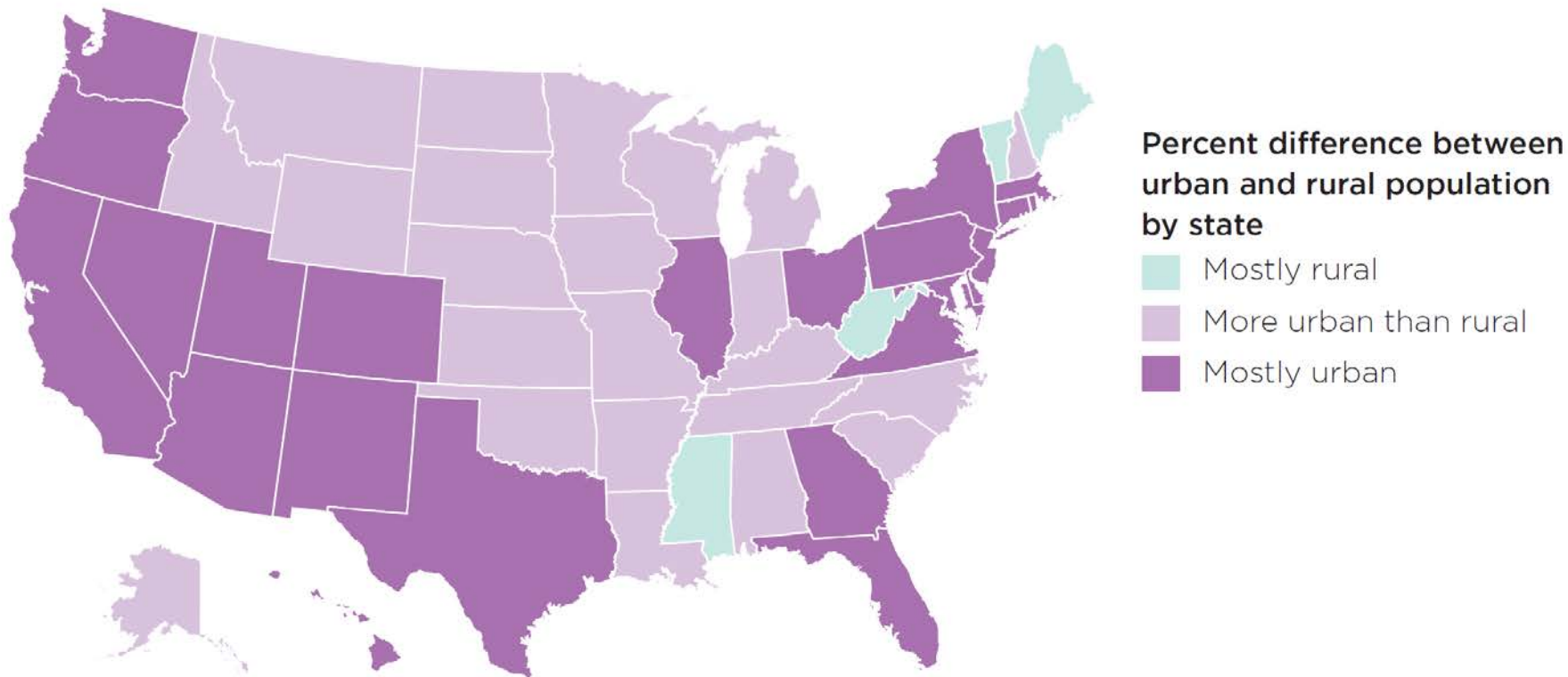
**United States**  
**Census**  
Bureau

Source: U.S. Census Bureau, 2010 Census Urban Area Delineation Program



## Map 1: Urban-Rural Population Divide

Only four states have greater rural than urban populations.

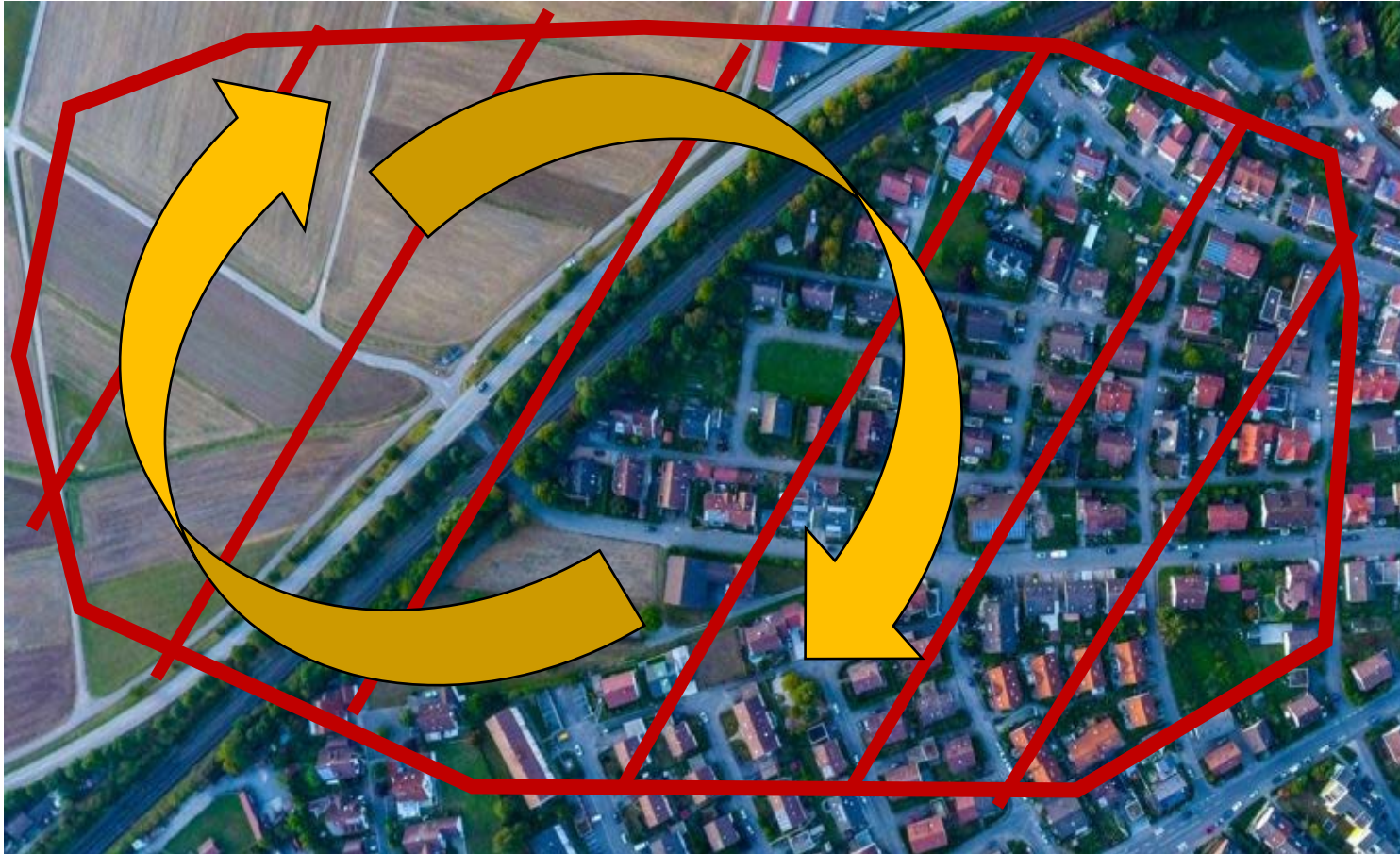


Source: U.S. Census Bureau, 2015

Source: "Bridging the Urban-Rural Economic Divide,"  
National League of Cities (2018)



Is the urban-rural divide a real chasm or a false dichotomy?



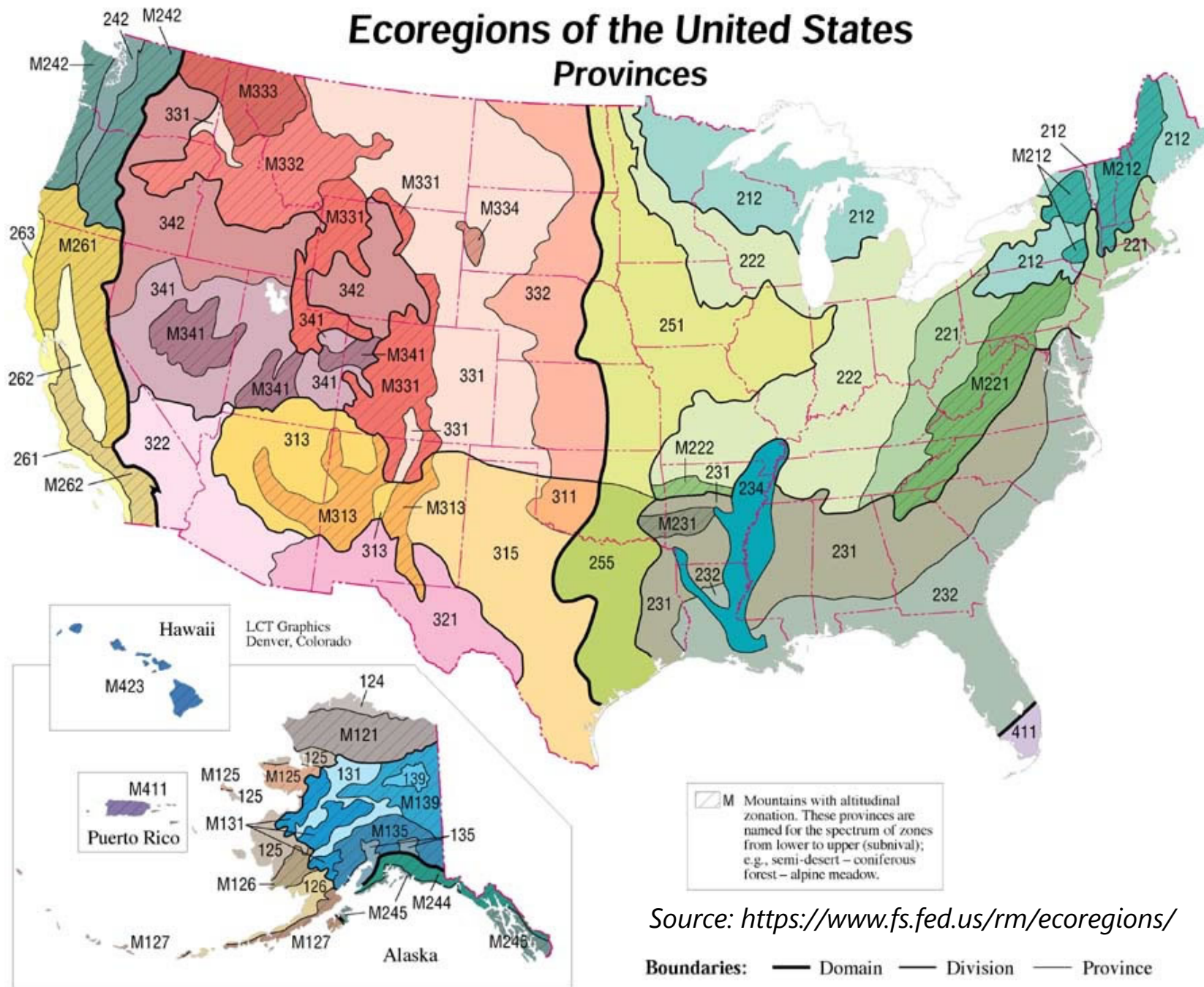
# Watershed boundaries





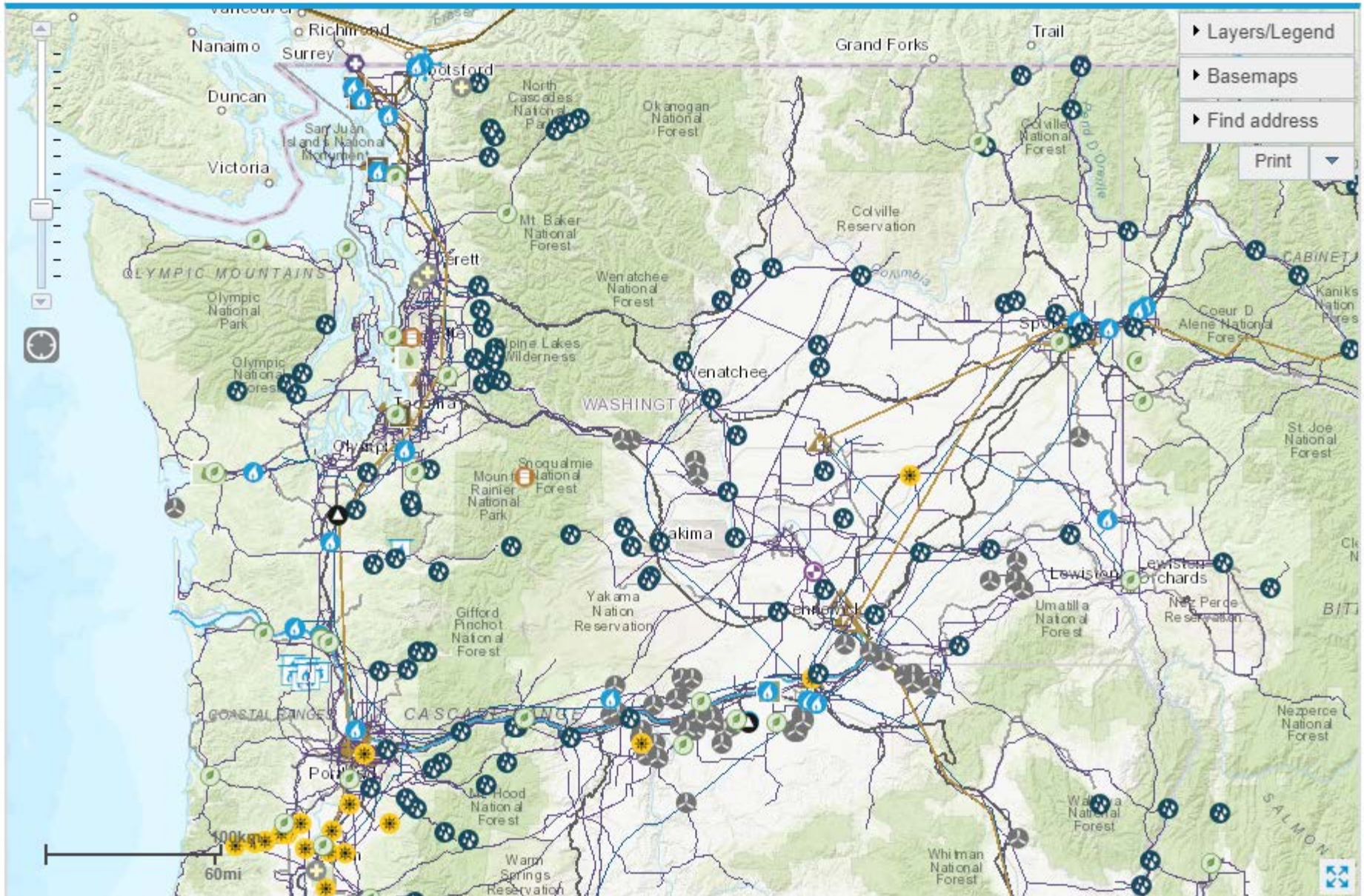
# Ecoregions of the United States

## Provinces





# Energy infrastructure





# Regional climate change vulnerabilities

Projected Climate Impacts on the U.S. Energy Sector by Region

Source: "Climate Change and the U.S. Energy Sector: Regional Vulnerabilities and Resilience Solutions" Dept of Energy (2015)

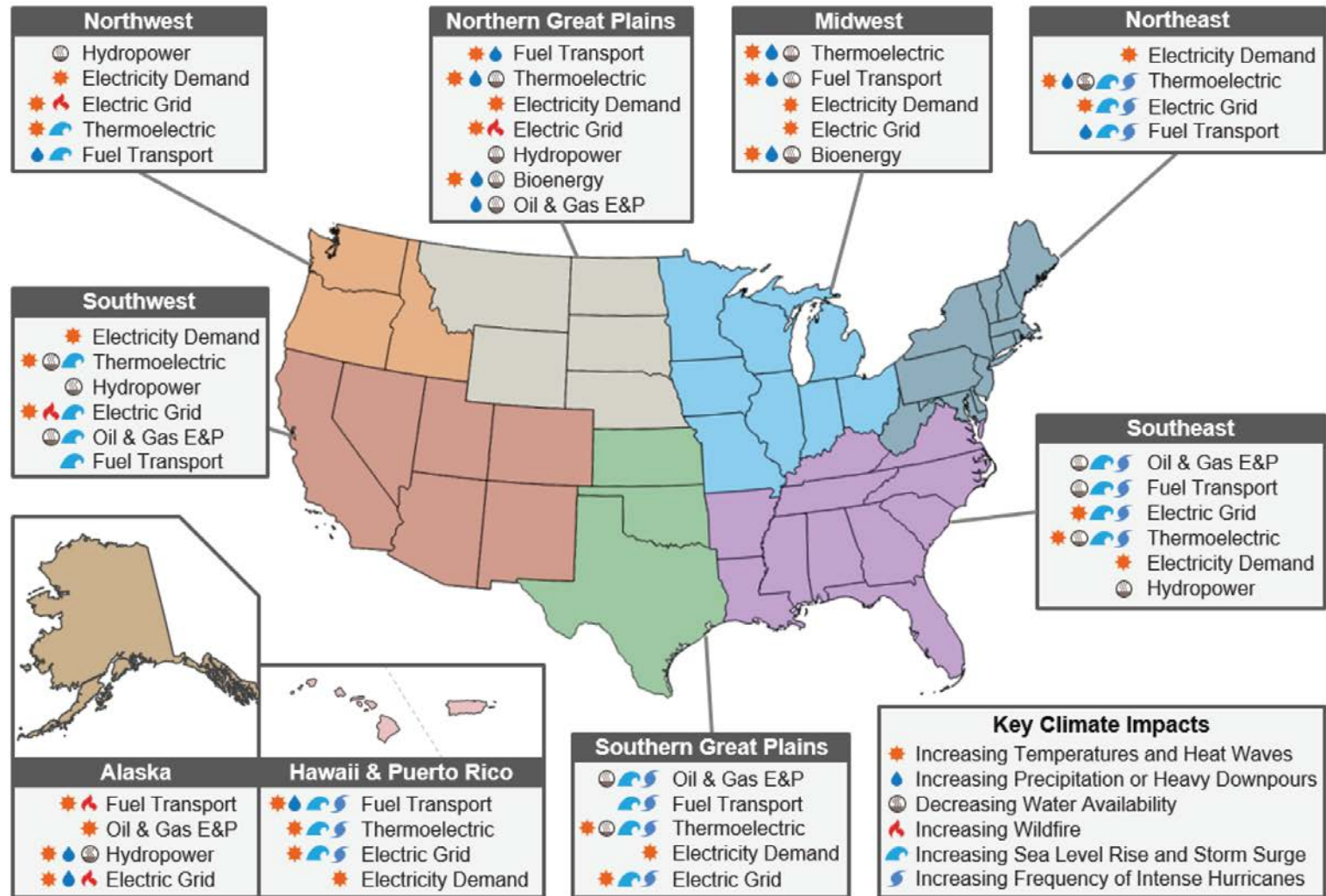
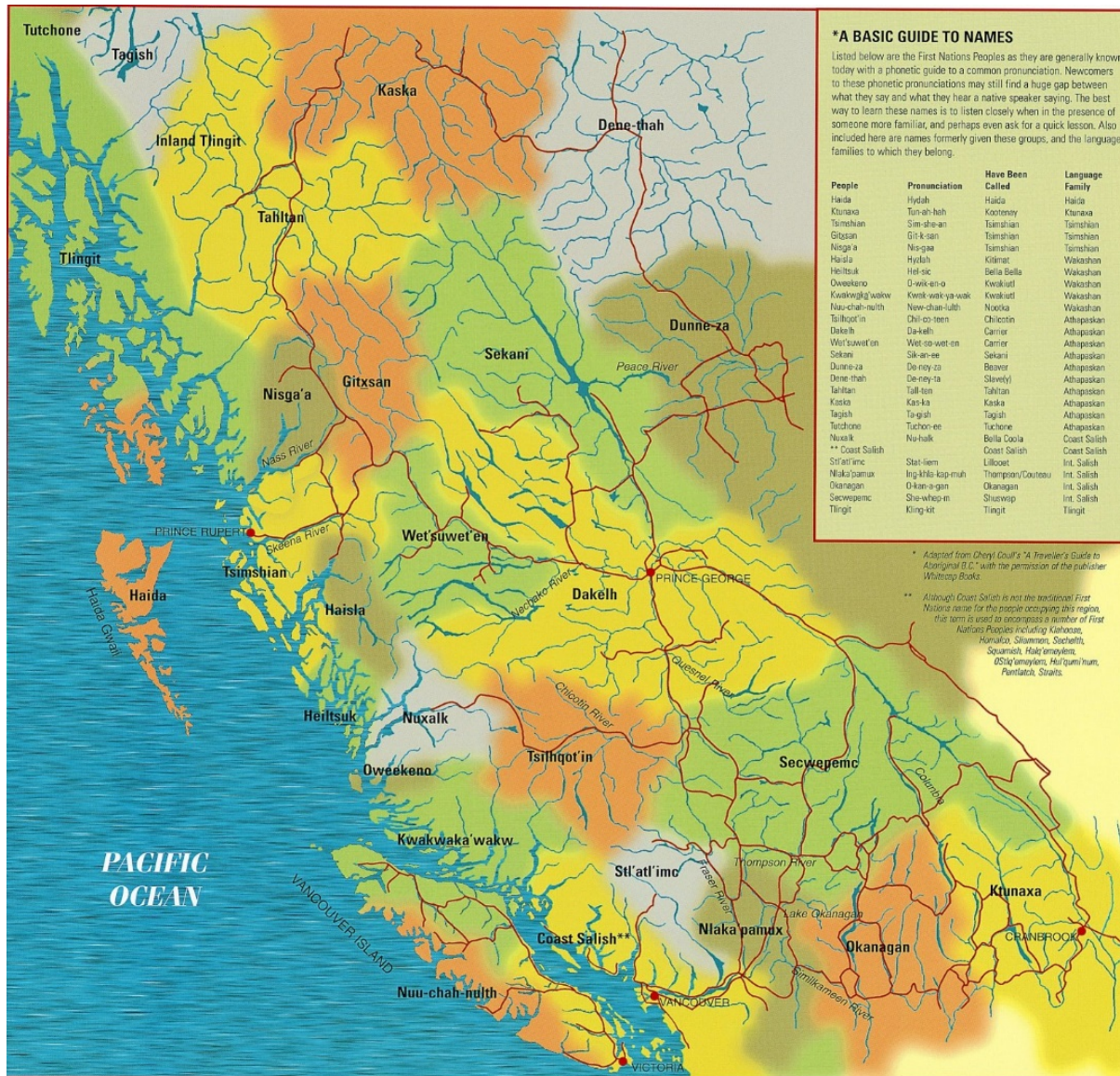


Figure ES-1. Potential climate change impacts on the U.S. energy infrastructure vary by region. Energy subsectors considered most vulnerable to projected climate impacts are listed first for each region.<sup>1</sup>

# Cultural heritage

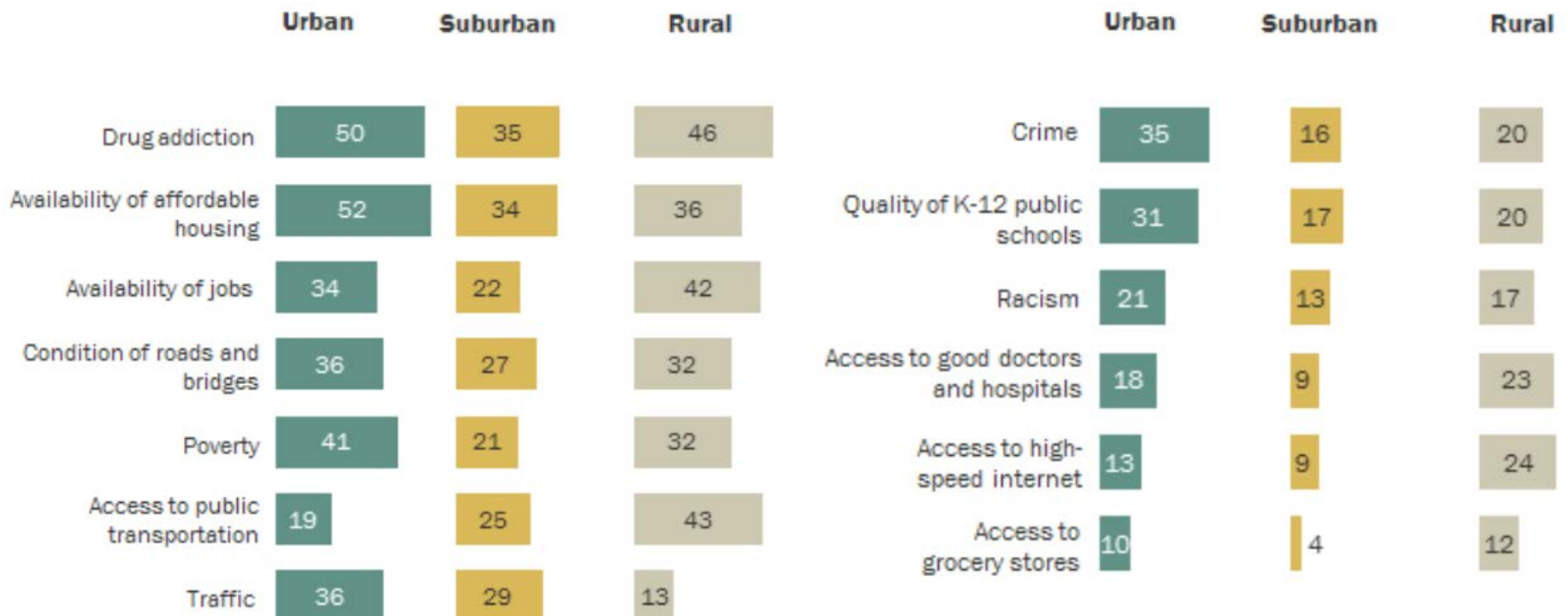




# Perceptions, values and beliefs

## Drug addiction is seen as a pressing problem in urban and rural communities

*% saying each is a major problem in their local community, by type*

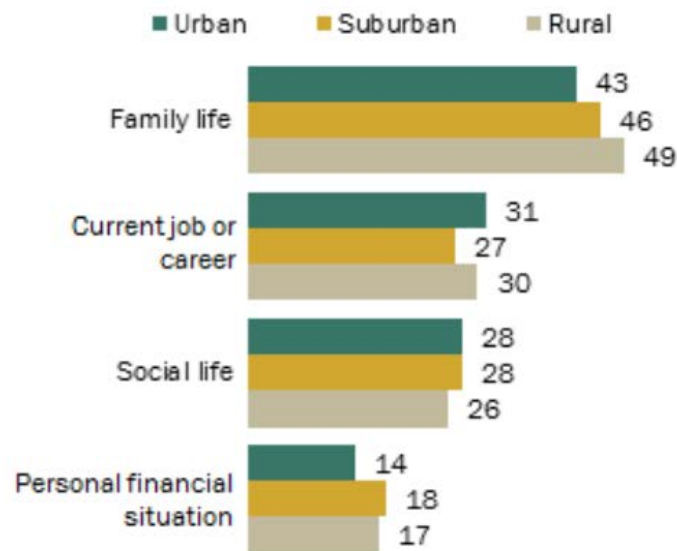


Source: "What Unites and Divides Urban, Suburban and Rural Communities" Pew Research Center (2018)

# Happiness & life satisfaction

## Life satisfaction varies little by community type

*% saying they are very satisfied with each aspect of their lives*



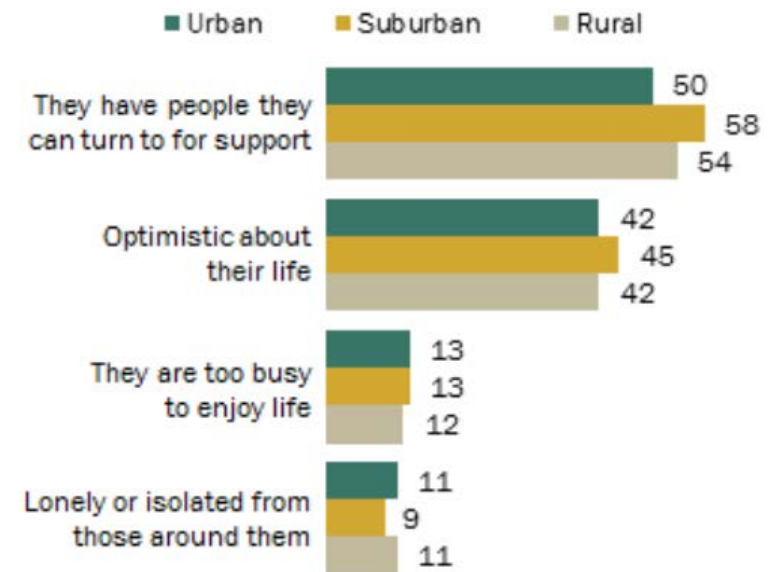
Note: "Current job or career" was asked only of those who work full or part time.

Source: Survey of U.S. adults conducted Feb. 26-March 11, 2018. "What Unites and Divides Urban, Suburban and Rural Communities"

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## No major differences in feelings of support, optimism, being too busy or isolation across community types

*% saying they feel \_\_\_ all or most of the time*



Source: Survey of U.S. adults conducted Feb. 26-March 11, 2018.

"What Unites and Divides Urban, Suburban and Rural Communities"

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# What differentiates urban and rural areas?



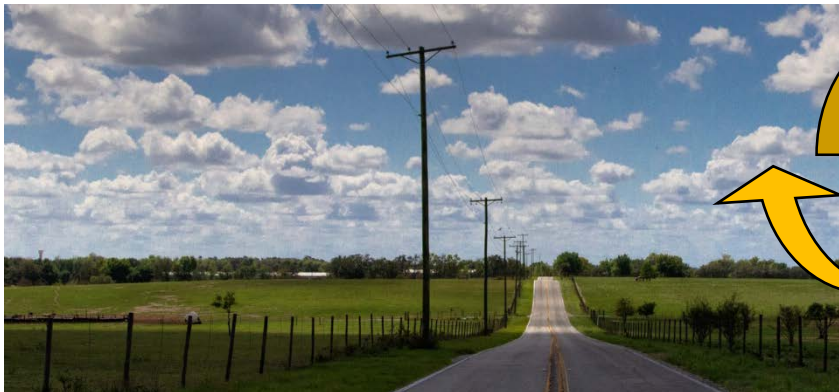
Agglomeration economies



Congestion



Urban amenities, disamenities, public goods/bads

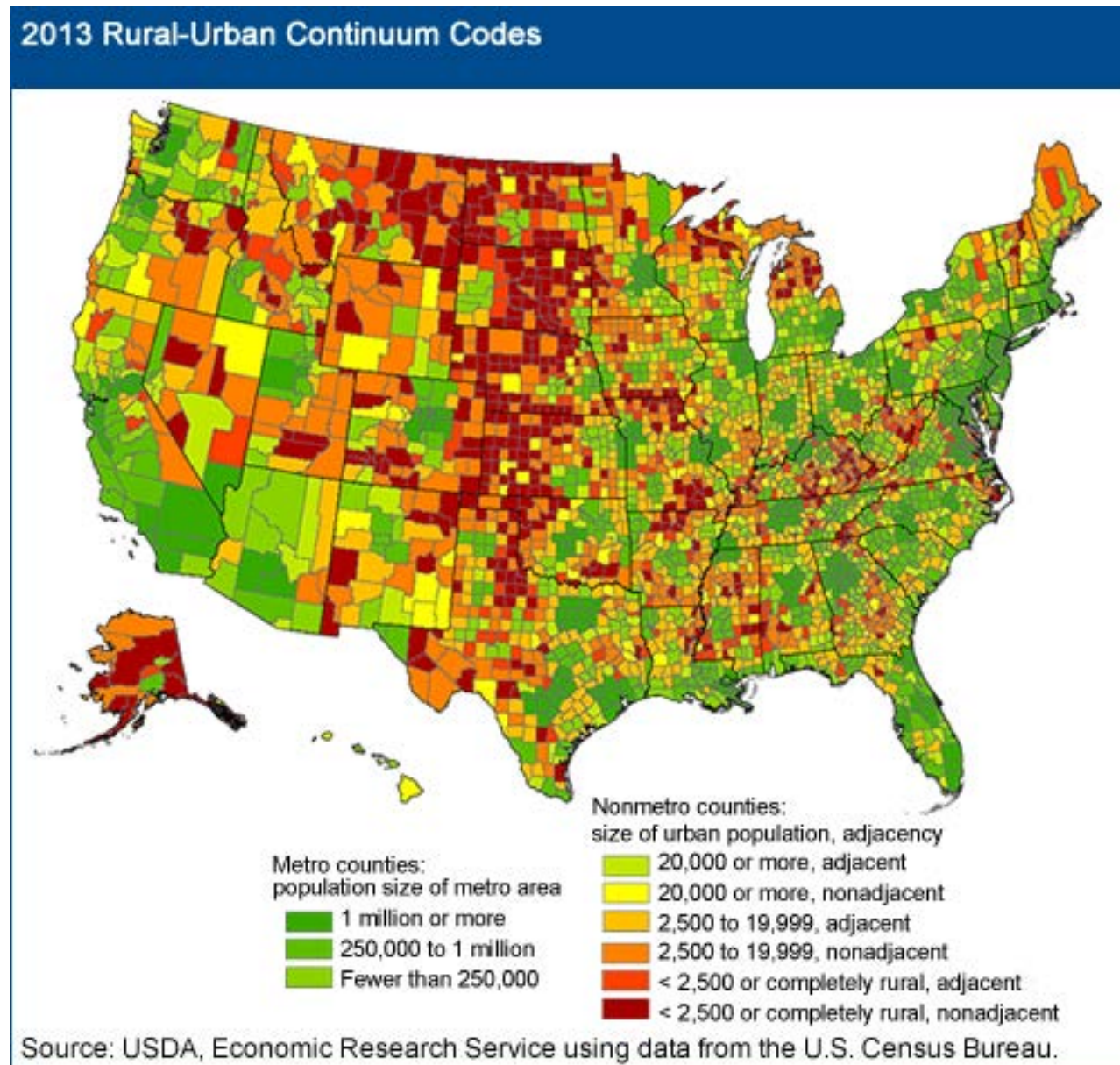


Natural resources & land, natural amenities



Transportation costs

# Urban-suburban-exurban-rural continuum



# U.S. Distribution of Population and Counties by Rural-Urban Continuum Code

County type	Population (% of total)	Number of counties (% of total)
Metro: 1 million or more	55%	15%
Metro: 250k - 1 million	21%	12%
Metro: less than 250k	9%	11%
Non-metro: 20k+ adjacent to metro	4%	7%
Non-metro: 20k+ non-adjacent	2%	3%
Non-metro: 2.5k-20k adjacent	5%	19%
Non-metro: 2.5k-20k non-adjacent	3%	13%
Non-metro: less than 2.5k adjacent	1%	7%
Non-metro: less than 2.5k non-adjacent	1%	13%

95% of U.S. population lives in metro or non-metro adjacent county

# Types of urban-rural linkages

- Globalized (non-local) linkages between cities and many rural areas

*“Mobile phones manufactured in the city of Shenzhen, China (...) will be shipped and used to facilitate trade and social relations in hundreds or thousands of villages in Africa and Asia. The food consumed in Lagos or in Abuja (...), or the immigrants flowing into them, come from all over Nigeria, the region and the world, and not just from the proximate rural areas” (Berdegué et al. 2014).*

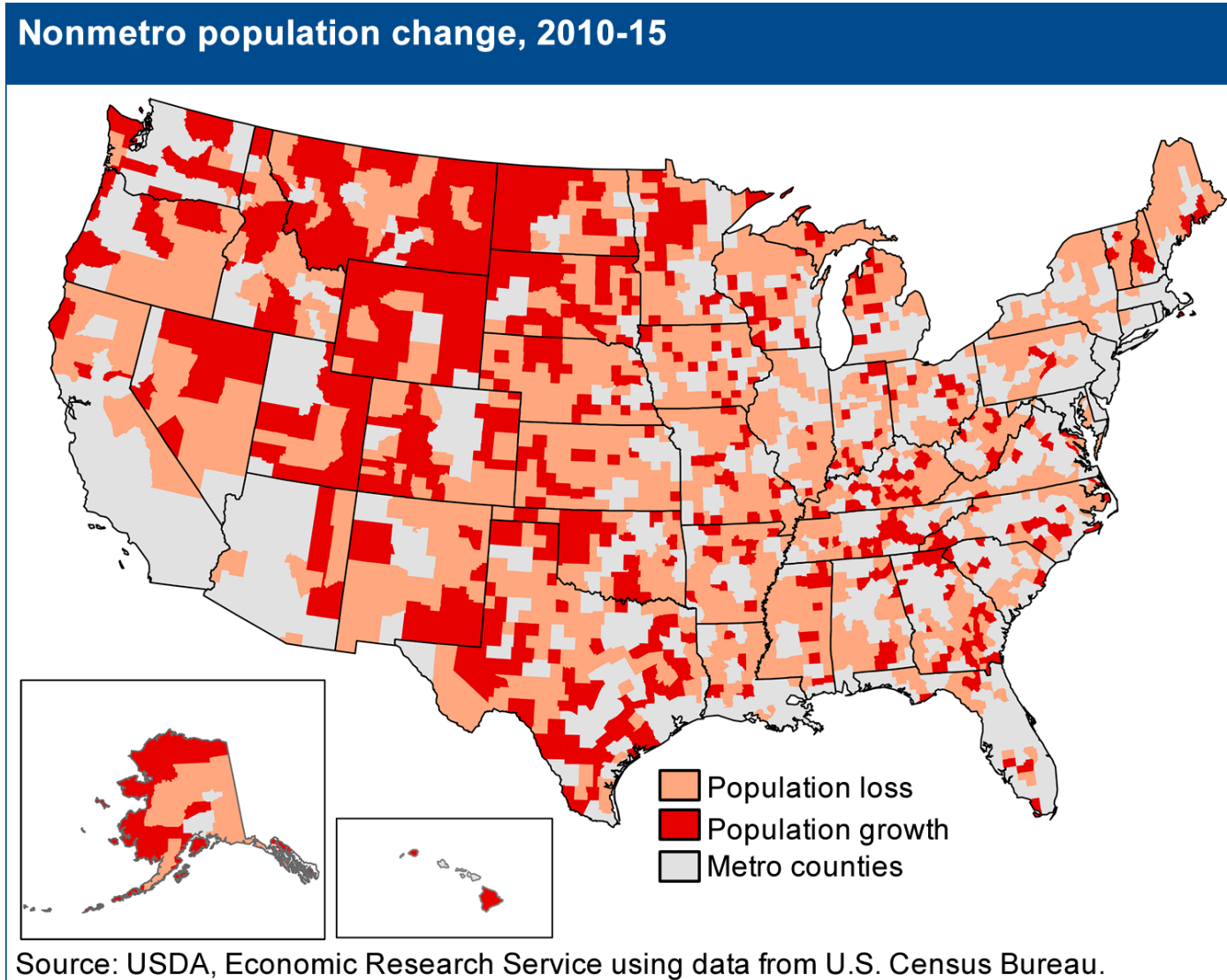
- Local linkages between urban (city, suburbs) and the surrounding exurban-rural area



# 1. Urban Spillovers: Good or Bad for Rural Areas?

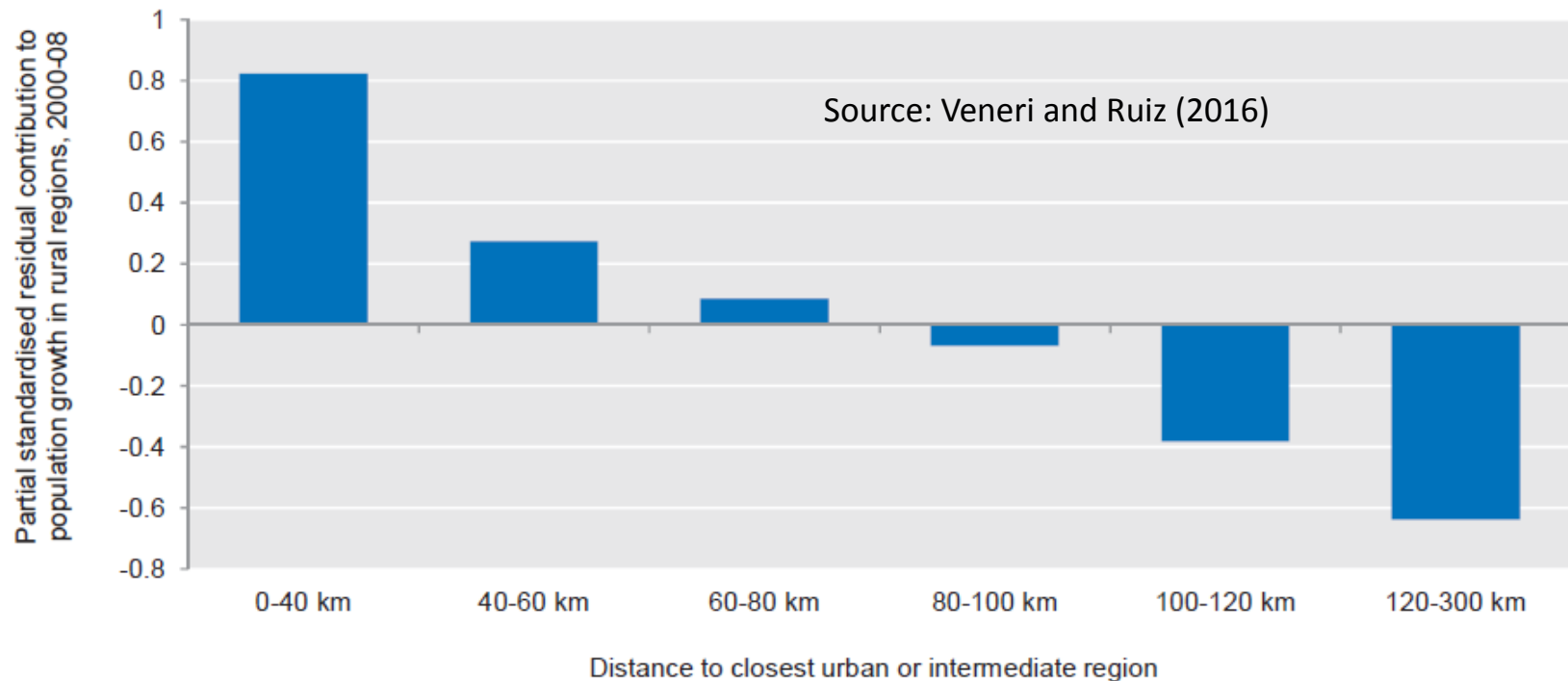
- **Urban spread** (positive spillovers for rural areas)
  - Attract businesses and people to nearby exurban/rural areas; urban residents or businesses that like rural amenities
- **Urban backwash** (negative spillovers for rural areas)
  - Cities act as vacuums for one-way flows of human capital and resources (“rural flight”)
- Research hypotheses
  - “Spread effect” dominates up to a certain distance at which people can easily commute in and out of the city
  - “Backwash effect” dominates as distance increases, which increases the probability that individuals relocate to the city instead of commuting

# Rural Population Trends (Non-Metro Areas)



# Rural Population Growth and Proximity to Urban/Suburban Regions

- Partridge et al. (2007): Find that spread effect dominates up to 100 miles based on population growth study of Canadian regions
- Veneri and Ruiz (2016) find similar results for EU and US regions

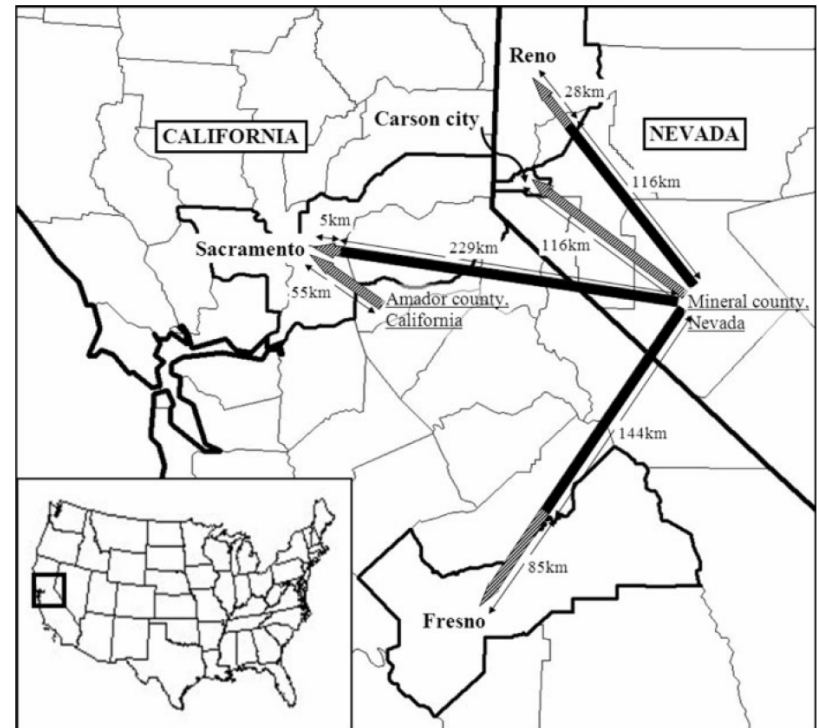


# Proximity to Large versus Small Cities

Partridge et al. (2008)

Do larger cities have a greater spillovers than smaller cities—due to greater diversity of retail and commercial services, urban amenities?

- Proximity to city of any size has positive effect on population growth of rural area
- Proximity to larger cities has a greater effect on population growth rates (compared to smaller cities)
- Further evidence of urban spread effects
- Also supports idea that larger urban areas offer “higher order” services that people desire to be near

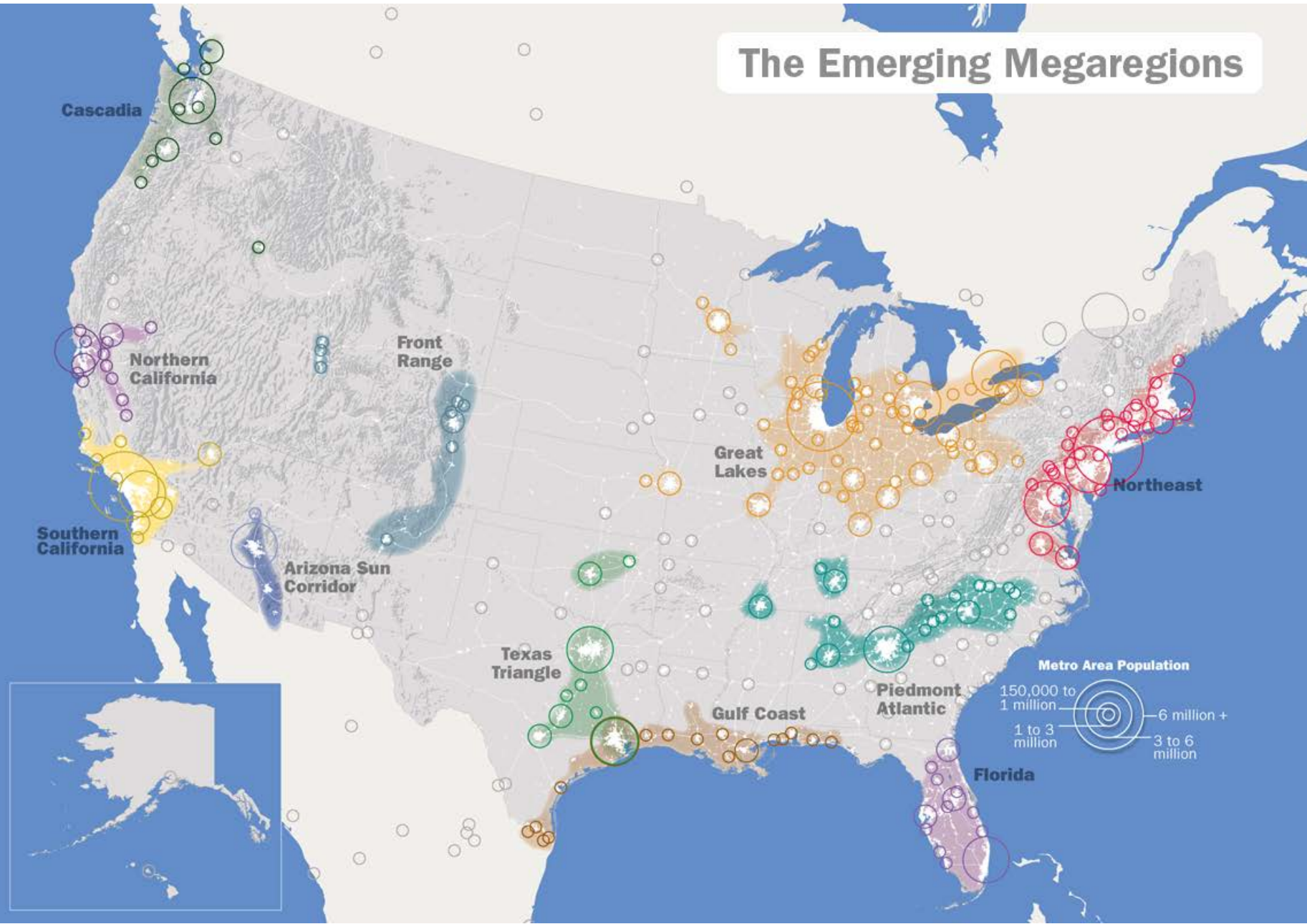




## 2. Rural cluster spillovers to urban areas



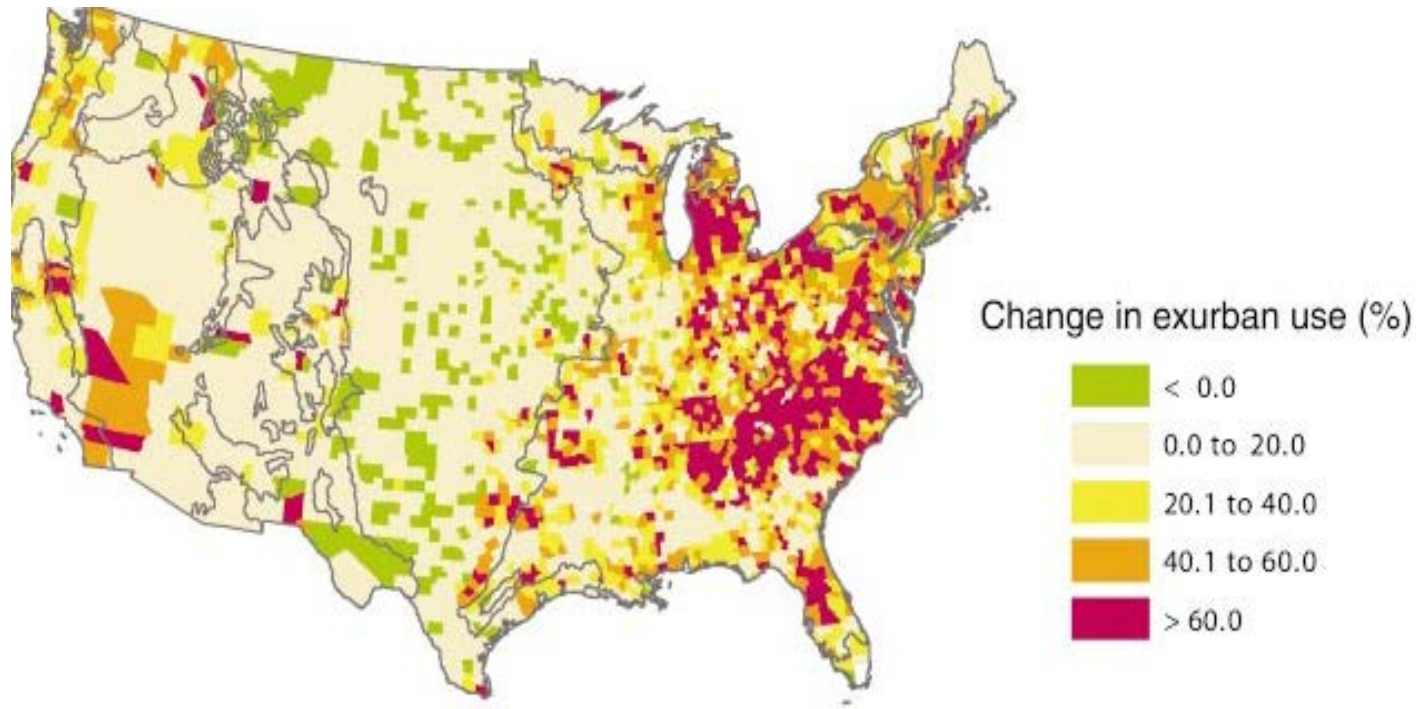
# The Emerging Megaregions



Source: Regional Plan Association <http://www.america2050.org/megaregions.html>



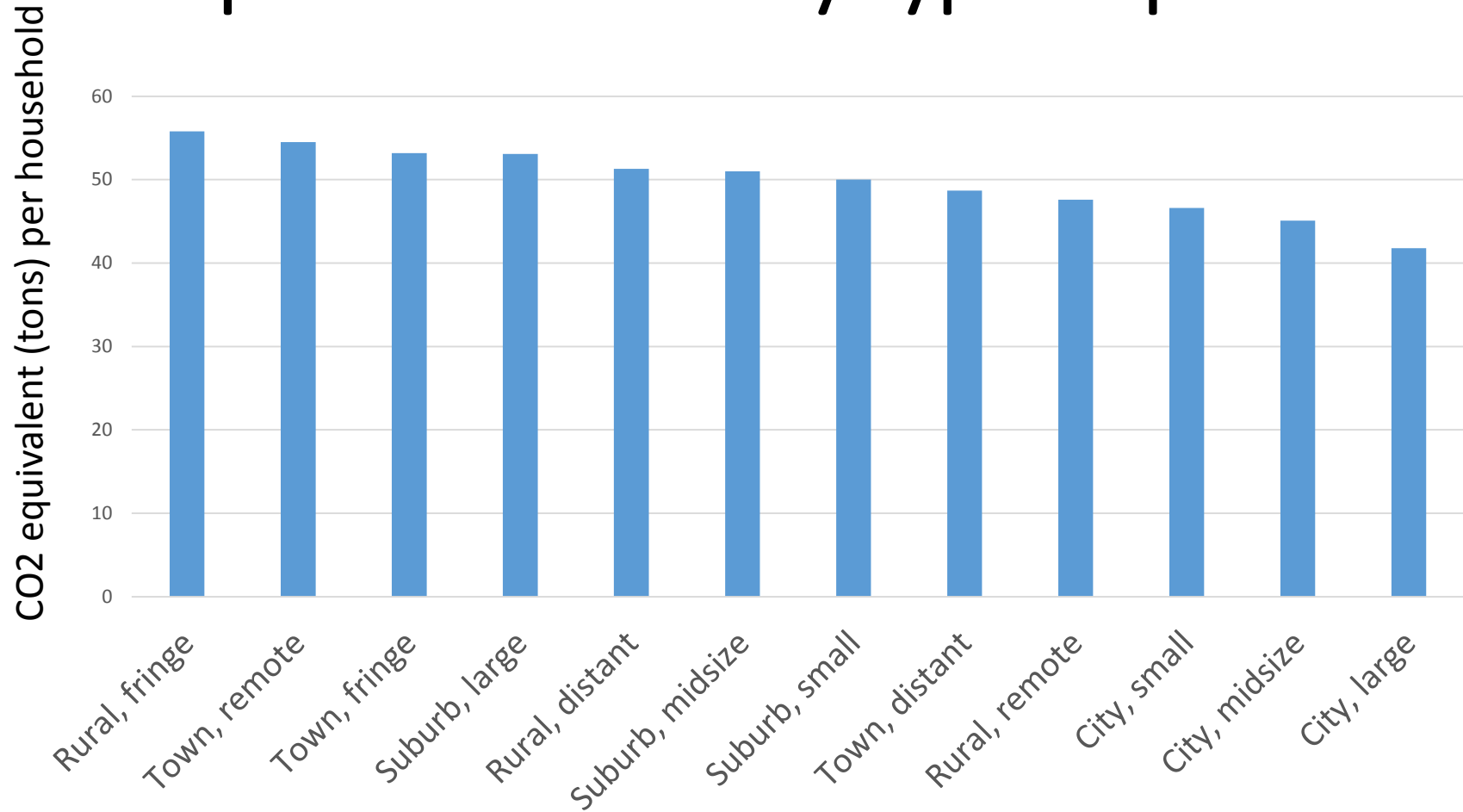
### 3. Urban expansion and sprawl



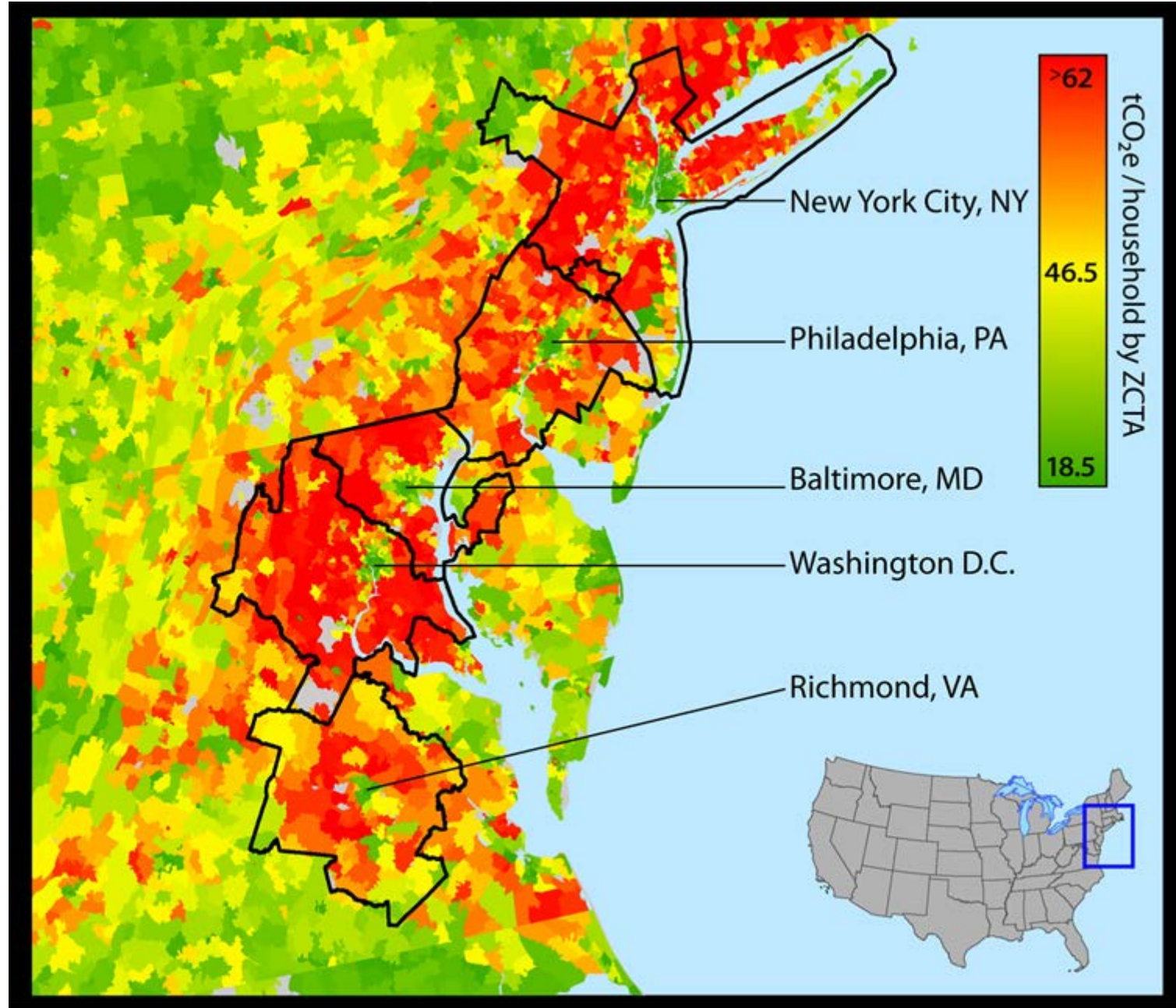
*Figure 2b from Brown et al. (2005): Change in exurban density (defined as 1 house per 1-40 acres)*

Between 1950-2000: The amount of land at urban densities (more than one house per acre) increased from less than 1% to nearly 2% whereas the amount of exurban land (between 1 and 40 acres per house) increased from about 5% to 25%.

# U.S. average carbon footprint (tons) per household by type of place



Source: Jones and Kammen (2014) *Environmental Science and Technology*



Source: Jones and Kammen (2013), Cool Climate at UC Berkeley



## 4. Amenities and Economic Development: The Urban Greening Paradox

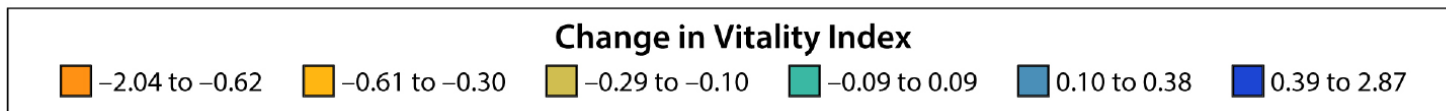
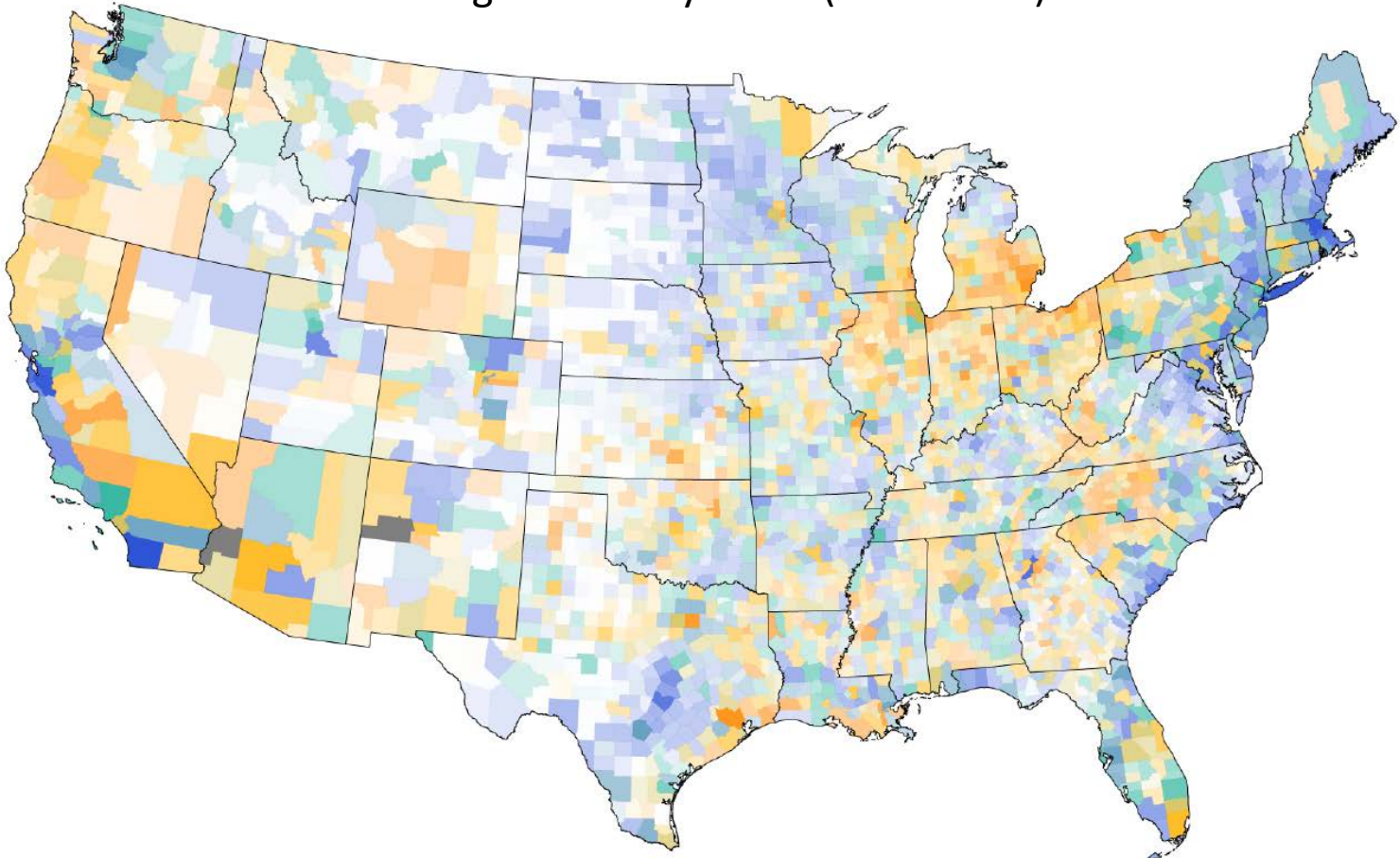
- Investing in urban green space as an economic development strategy in poorer areas, e.g., urban parks, greening vacant lots, community gardens
  - Demolition of vacant properties and greening lots spurs market activity in target neighborhood and surrounding neighborhoods (Irwin et al. 2018)



However, there is a delicate balance between urban green space as a community-enhancing amenity and as an element of displacement (Wolch, Byrne, and Newell 2014)

# 5. Natural resources: Land for energy

Change in Vitality Index (1980-2016)



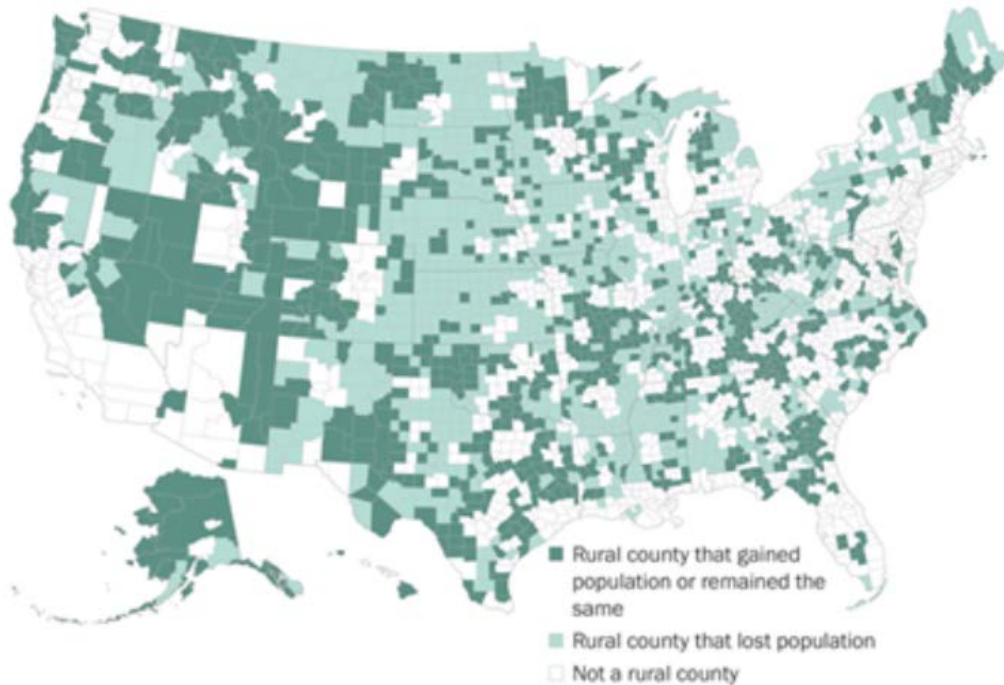
Source: *The Hamilton Project, Brookings Institute & George Washington U*

[http://www.hamiltonproject.org/papers/place\\_based\\_policies\\_for\\_shared\\_economic\\_growth](http://www.hamiltonproject.org/papers/place_based_policies_for_shared_economic_growth)

# 6. Transportation costs

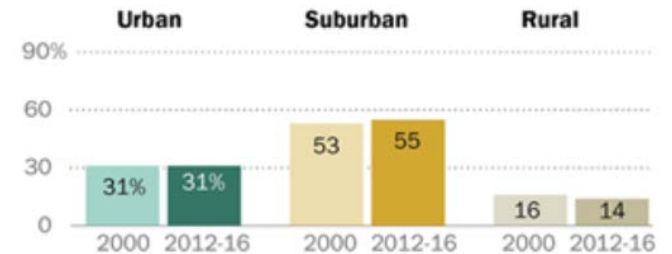
## Most rural counties in the Midwest have lost population

Population gain or loss since 2000 among rural U.S. counties



## Shrinking share of Americans in rural counties

% of total U.S. population living in each county type



Note: County categories based on the National Center for Health Statistics Urban-Rural Classification Scheme for Counties.

Source: Pew Research Center analysis of 2000 decennial census SF3 data and 2012-2016 American Community Survey data.

"What Unites and Divides Urban, Suburban and Rural Communities"

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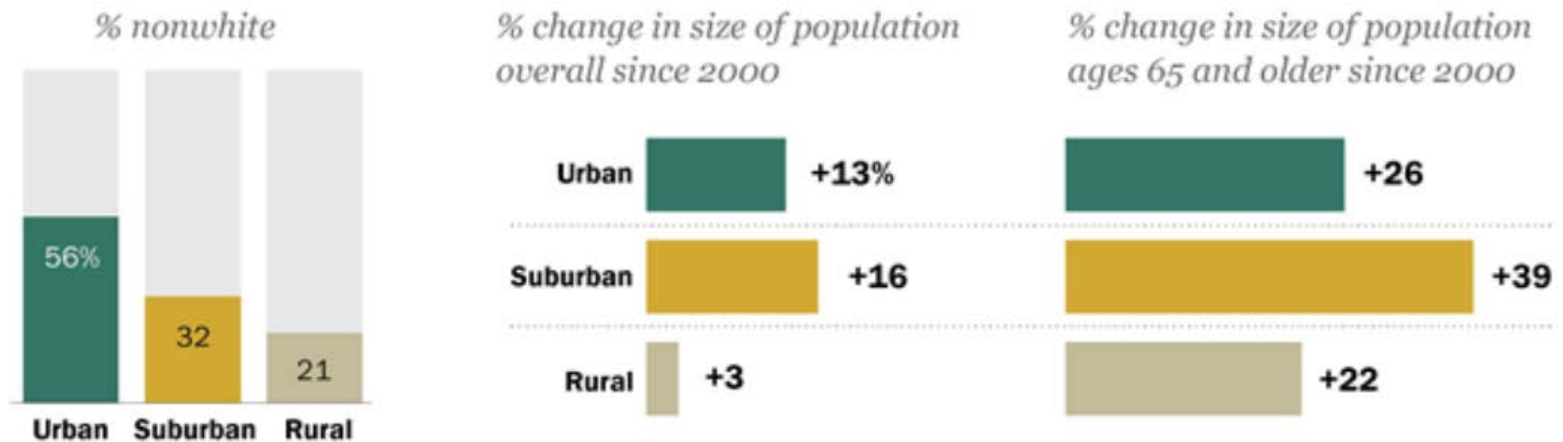


# What are the current and future trends influencing urban-rural connections?

1. Demographic changes
2. Technological changes
3. Market changes
4. Policy changes

# Key demographic trends

## Key demographic trends are playing out differently across urban, suburban and rural counties



Note: Nonwhites include blacks, Hispanics, Asians, Pacific Islanders, other races and people who identify as more than one race. County categories based on the National Center for Health Statistics Urban-Rural Classification Scheme for Counties.

Source: Pew Research Center analysis of 2000 decennial census SF3 data and 2012-2016 American Community Survey data.

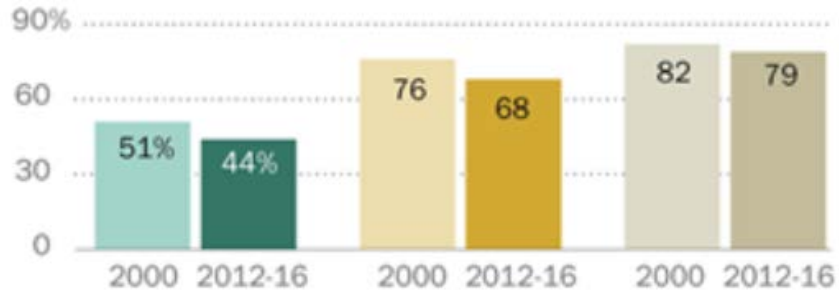
"What Unites and Divides Urban, Suburban and Rural Communities"

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# Race, ethnicity, immigration

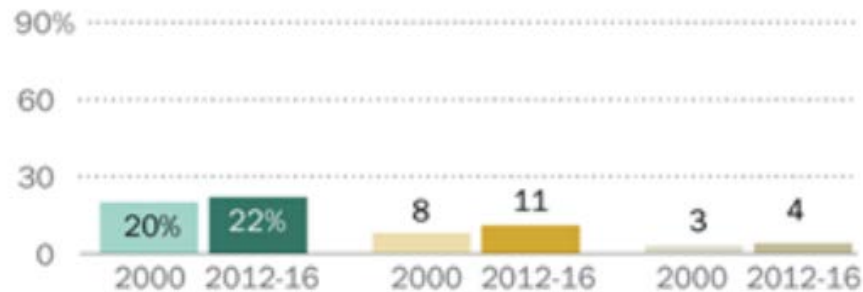
## Urban counties no longer majority white

*% of population who are non-Hispanic white*



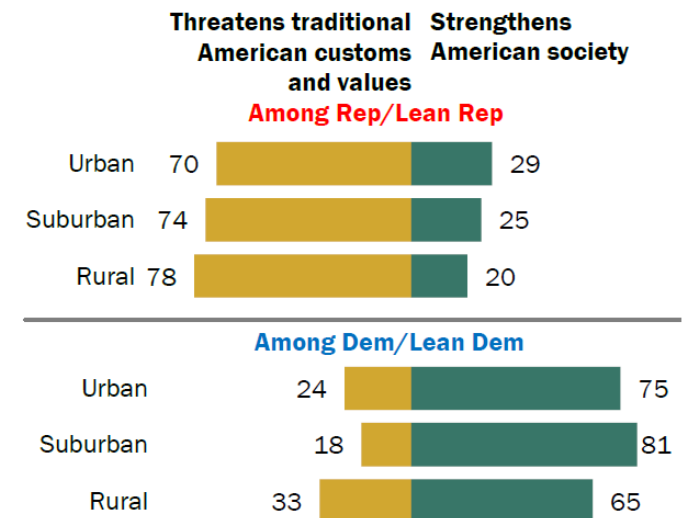
## Smallest immigrant share in rural counties

*% of population who are foreign born*



## Views on immigrants differ by party and community type

*% saying the growing number of newcomers from other countries ...*



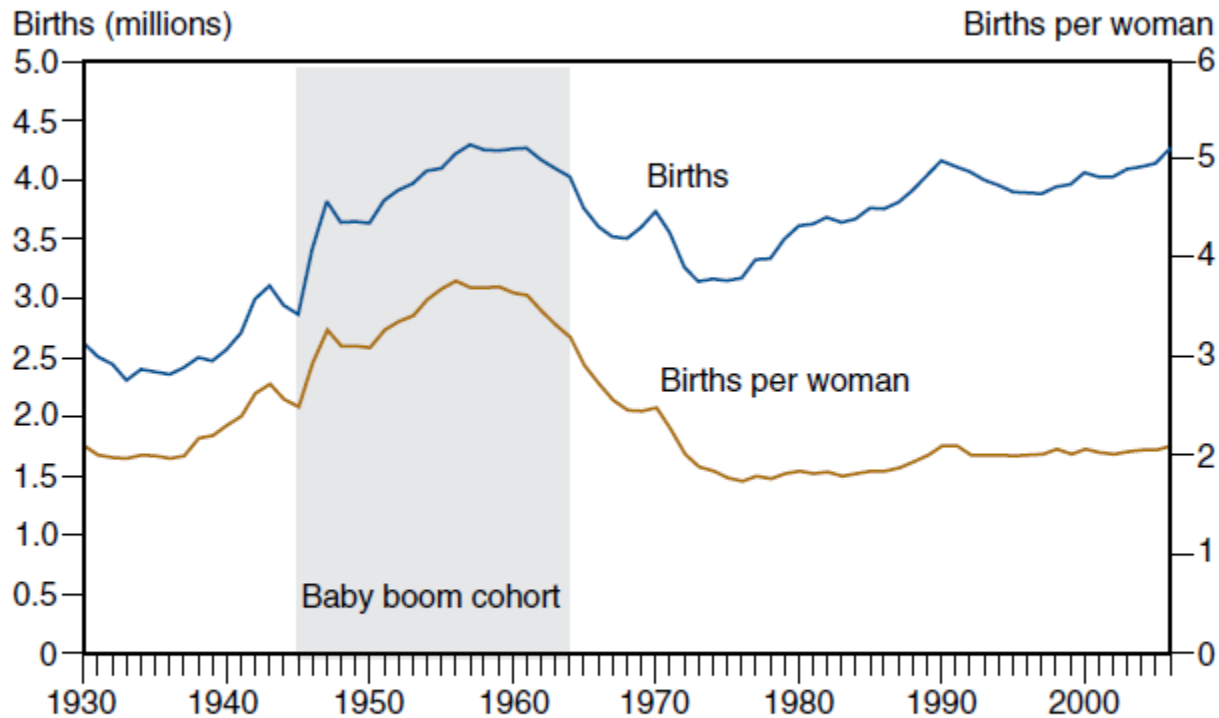
*% of those saying there are at least a few immigrants in their community saying the immigrants who live there have a \_\_\_ impact on their local community*

Source: "What Unites and Divides Urban, Suburban and Rural Communities" Pew Research Center (2018)



# Aging baby boomers

Figure 1  
U.S. live births and total fertility rate



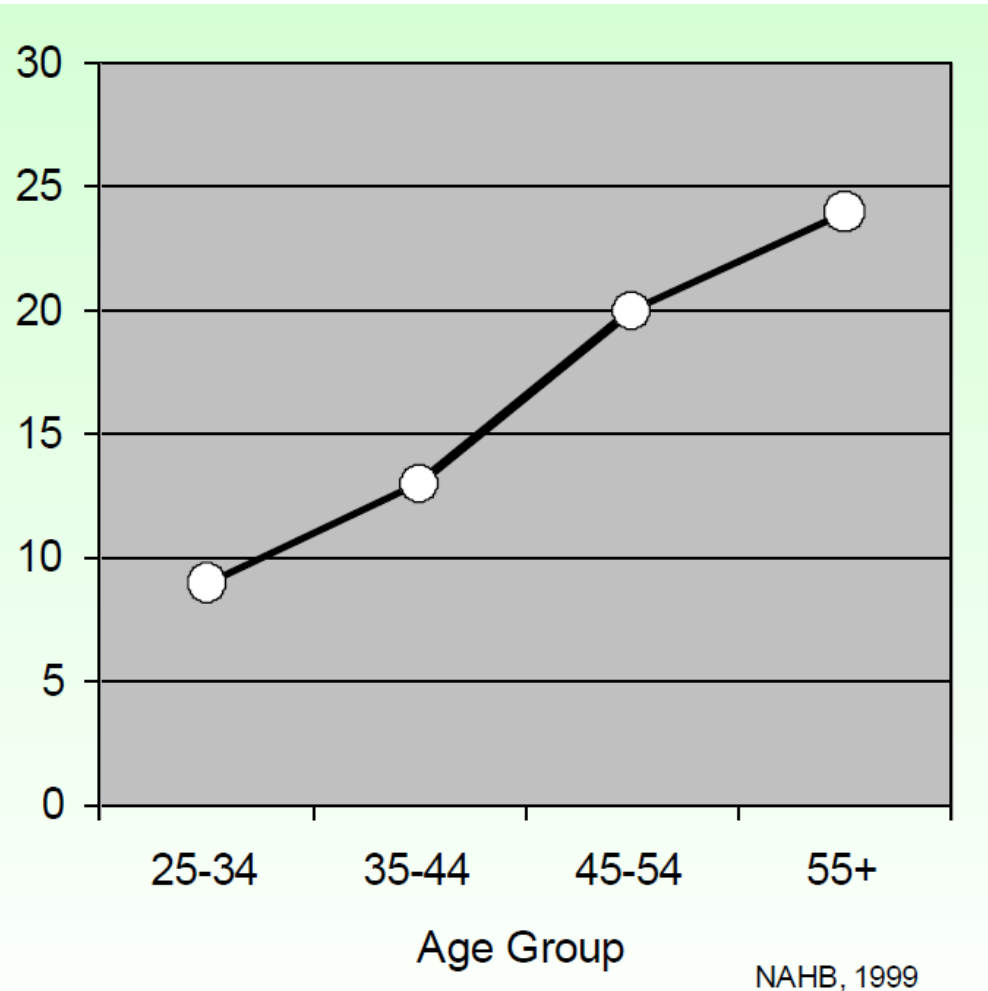
Note: Total fertility rate (births per woman) is the sum of age-specific birth rates for women ages 15-44.

Source: USDA, Economic Research Service, using data from the National Center for Health Statistics.

Source: Cromartie and Nelson (2009) USDA ERS report 79

# Some aging baby boomers prefer urban living...

**Percent preferring a town house in the city**

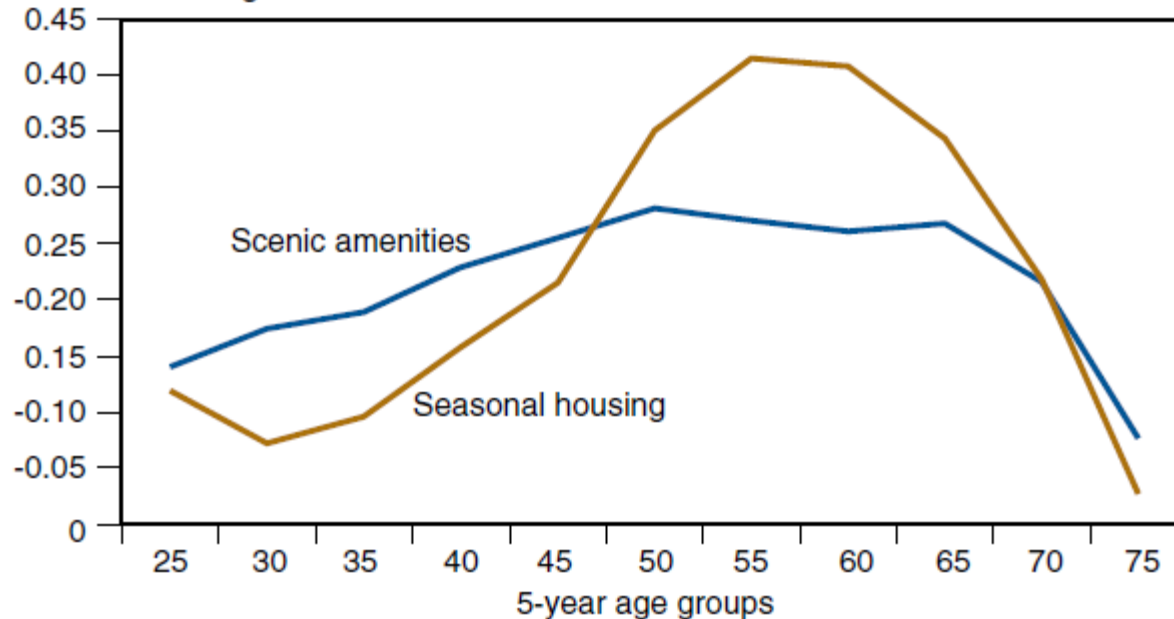


...but others attracted to high-amenity rural areas

Figure 5

**Effects of recreation (as measured by seasonal housing) and scenic amenity factors on net migration by age, 1990-2000**

Standardized regression coefficients



Source: USDA, Economic Research Service, using data from the U.S. Census Bureau.

“Baby boomer migration into rural America driven by natural amenities...”  
From Cromartie and Nelson (2009) USDA ERS report 79



# What are the current and future trends influencing urban-rural connections?

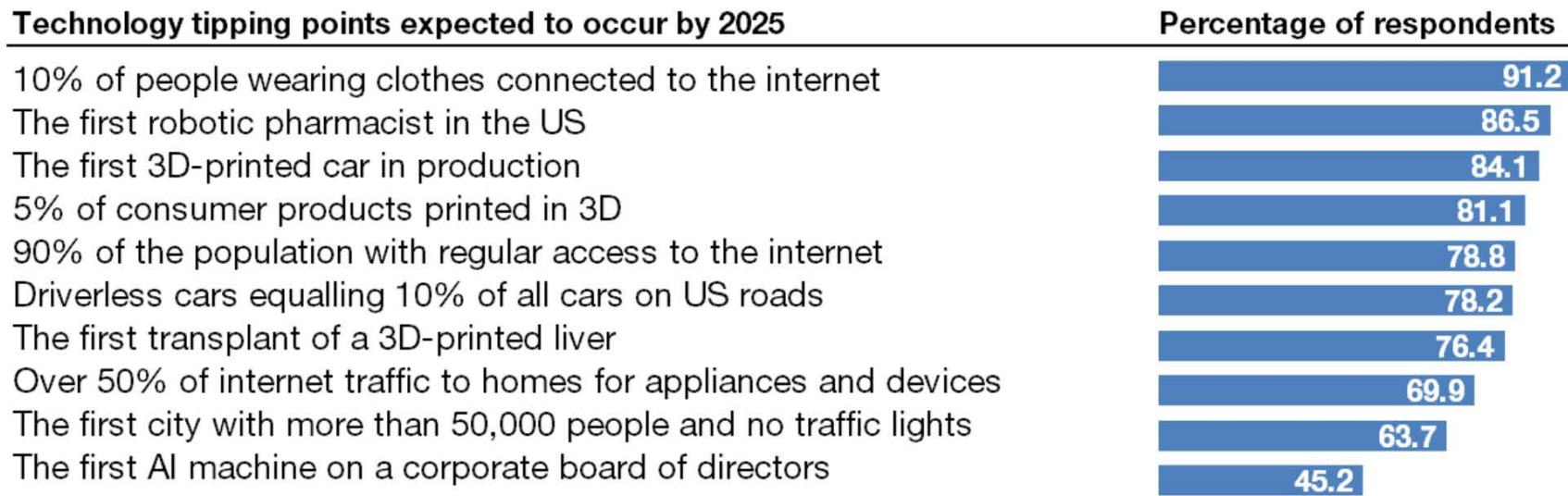
1. Demographic changes
- 2. Technological changes**
3. Market changes
4. Policy changes

# When will the future arrive?

800 technology executives and experts from the information and communications technology sector were surveyed as part of our *Technology Tipping Points and Societal Impact* report



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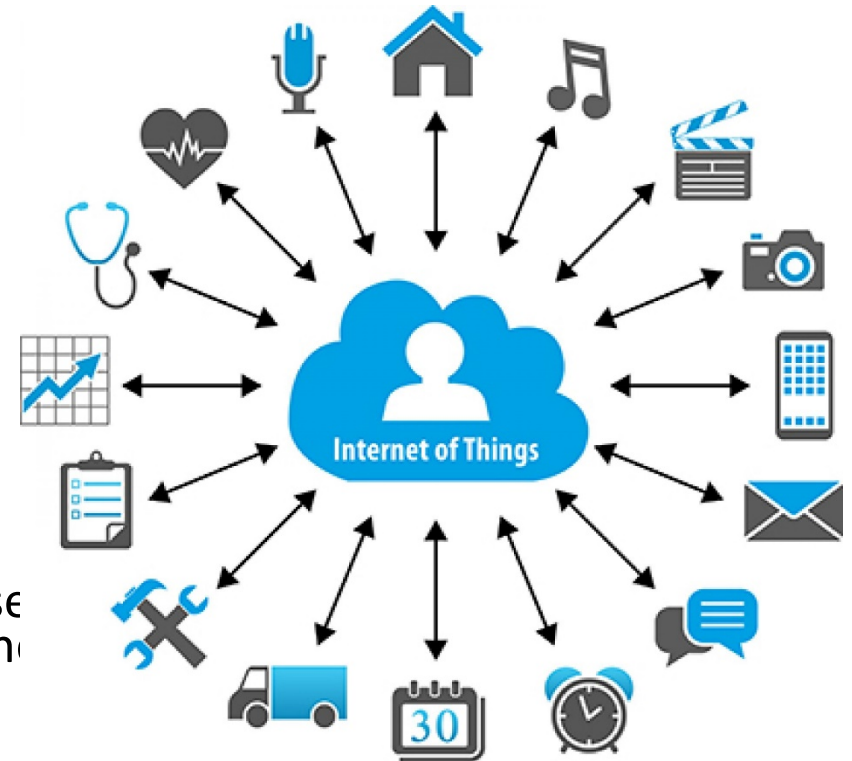


Source: World Economic Forum, *Technology Tipping Points and Societal Impact* report, 2015

Source: <https://www.weforum.org/agenda/2016/03/how-will-the-digital-revolution-transform-the-energy-sector/>

# Digitization is driving fundamental changes in energy systems

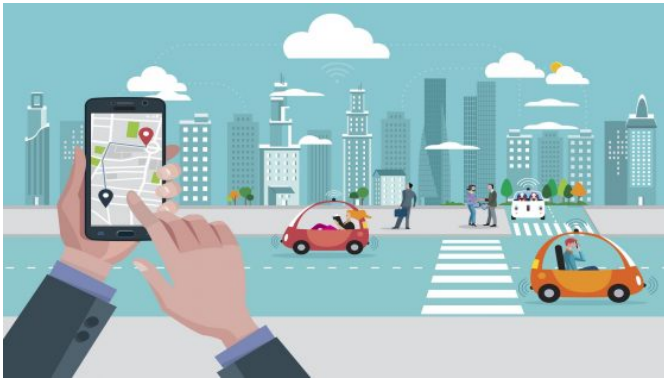
- Changing patterns of consumption
  - Rapid increase in ride hailing and shared mobility → less car ownership and more pay-by-use
- Internet of Things: connected devices that can provide information in real time
  - Smarter cars, smarter homes, smarter appliances → greater energy efficiency
  - Autonomous vehicles → a promise of less congestion, greater efficiency
- Decentralization of energy systems
  - Smaller and more distributed energy facilities, including more renewables integrated with the electricity grid





# Implications of digitalization revolution for urban-rural changes?

These changes in energy production, consumption and mobility will have fundamental implications for urban and rural economies and land use patterns



- Shared mobility networks rely on minimum level of density → could increase transportation divide between urban and rural areas



- More distributed energy systems will put pressure on land as an input into energy (versus being used for food production or housing)

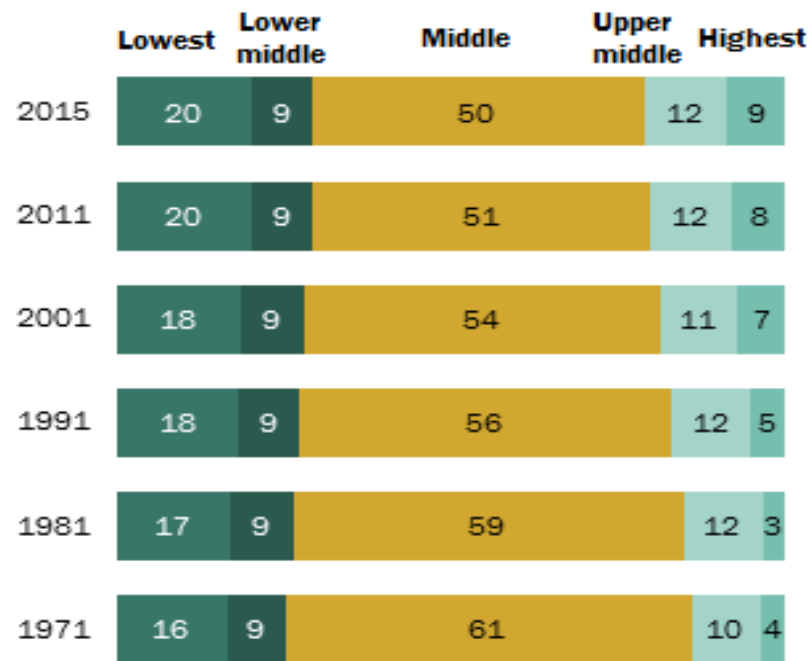
# What are the current and future trends influencing urban-rural connections?

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# A shrinking middle class

## Share of adults living in middle-income households is falling

*% of adults in each income tier*



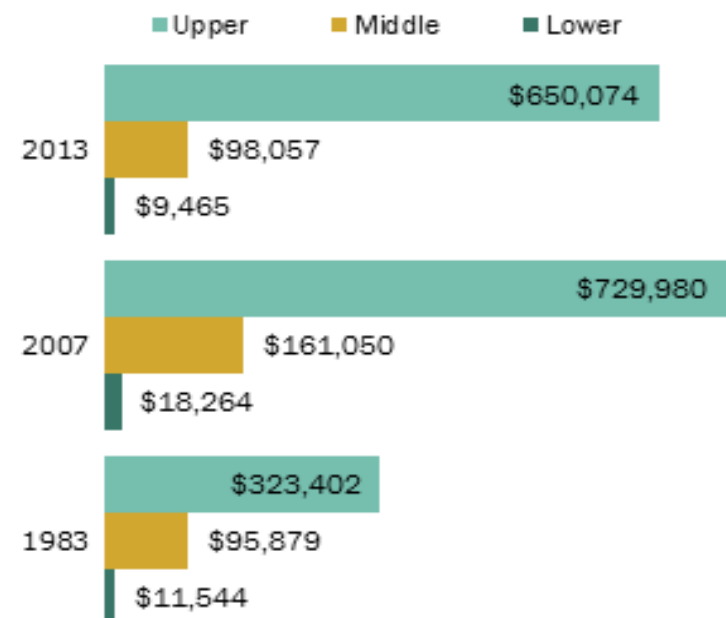
Note: Adults are assigned to income tiers based on their size-adjusted household income in the calendar year prior to the survey year. Figures may not add to 100% due to rounding.

Source: Pew Research Center analysis of the Current Population Survey, Annual Social and Economic Supplements

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## The wealth gap between upper- and middle-income families is growing

*Median net worth of families, in 2014 dollars*



Note: Net worth is the difference between the value of assets owned by a family and the liabilities it holds. Families are assigned to income tiers based on their size-adjusted income. Net worth is not adjusted for family size.

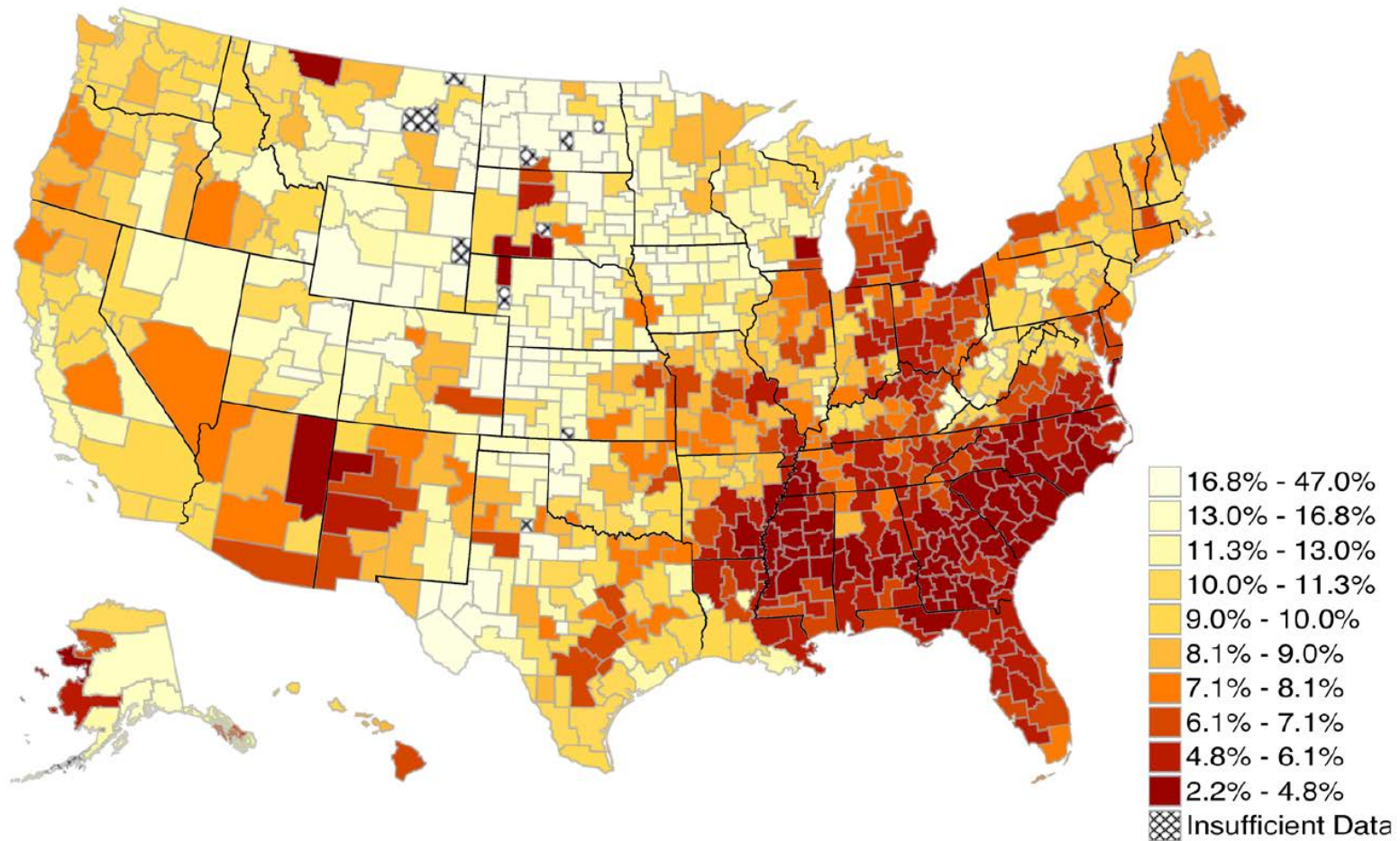
Source: Pew Research Center analysis of Survey of Consumer Finances public-use data

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# Probability of children born into bottom income quintile reaching the top income quintile

(Chetty et al. (2014))



# (De)globalization trends

The New York Times | <https://nyti.ms/2uDS14f>

ASIA PACIFIC

## China Slaps Tariffs on 128 U.S. Products, Including Wine, Pork and Pipes



[peaceproject.com](http://peaceproject.com)



# A strengthening of regional economic and social ties?

## **Example: Food systems**

- Good Natured Family Farms Alliance is a coalition of 150 independent family farms in the Kansas City region working together under a single marketing umbrella



- Urban partnership: Ball's Central Warehouse is key to solving the logistical problems of moving a large volume of local food from the family farms to the urban consumers



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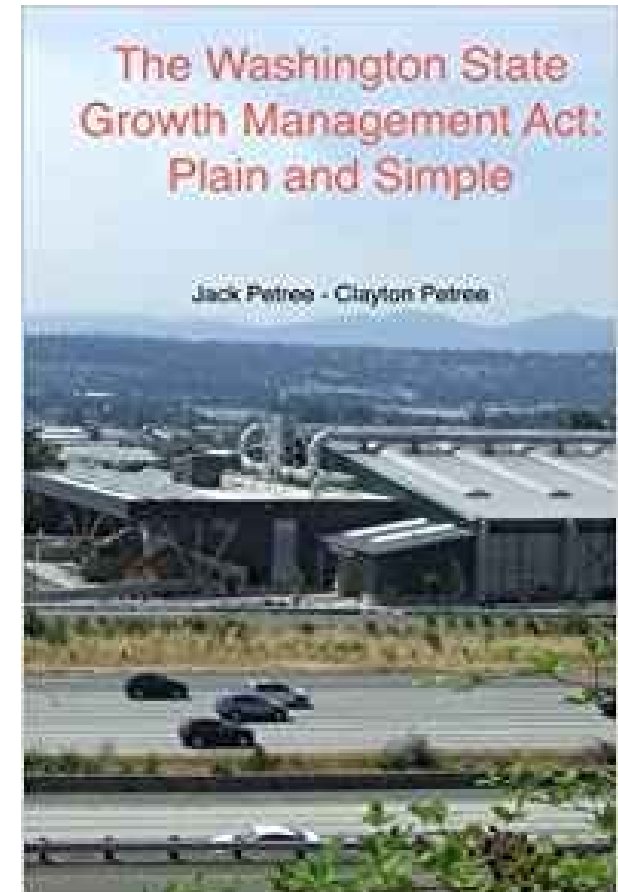
# State and Federal: Energy policies

- Renewable energy policies
  - Renewable portfolio standards: creating markets for clean energy
  - Energy STAR program: Energy efficient products in homes and buildings
  - Federal rebate for electric vehicles
- National fuel efficiency policy
  - Under Obama (2009): agreement to increase fuel economy to 54.5 miles per gallon for cars and light trucks by 2025
  - Proposed under Trump: 43.7 miles per gallon required of cars, 31.3 miles per gallon for light trucks by 2025
- Crude oil export ban lifted (2015)
  - In 2005, before the shale revolution, U.S. had net imports of 12.5 million barrels per day (bpd)
  - In 2018, U.S. had net imports of 4 million bpd & exported 1.5-2 million bpd, which is projected to grow to 4 million bpd by 2022



# Local and Regional: Sustainable communities and balanced growth policies

- Example: Washington State's Growth Management Act of 1990 (GMA)
  - Requires cities and counties to create long term plans for population and job growth (i.e. how to accommodate population growth while meeting stated goals)
  - Entities must designate/preserve critical natural resource lands and limit urban sprawl
  - Encourages infill development; complementary to sustainability goals
    - Mass regional transit
    - Densification
    - Forest preservation

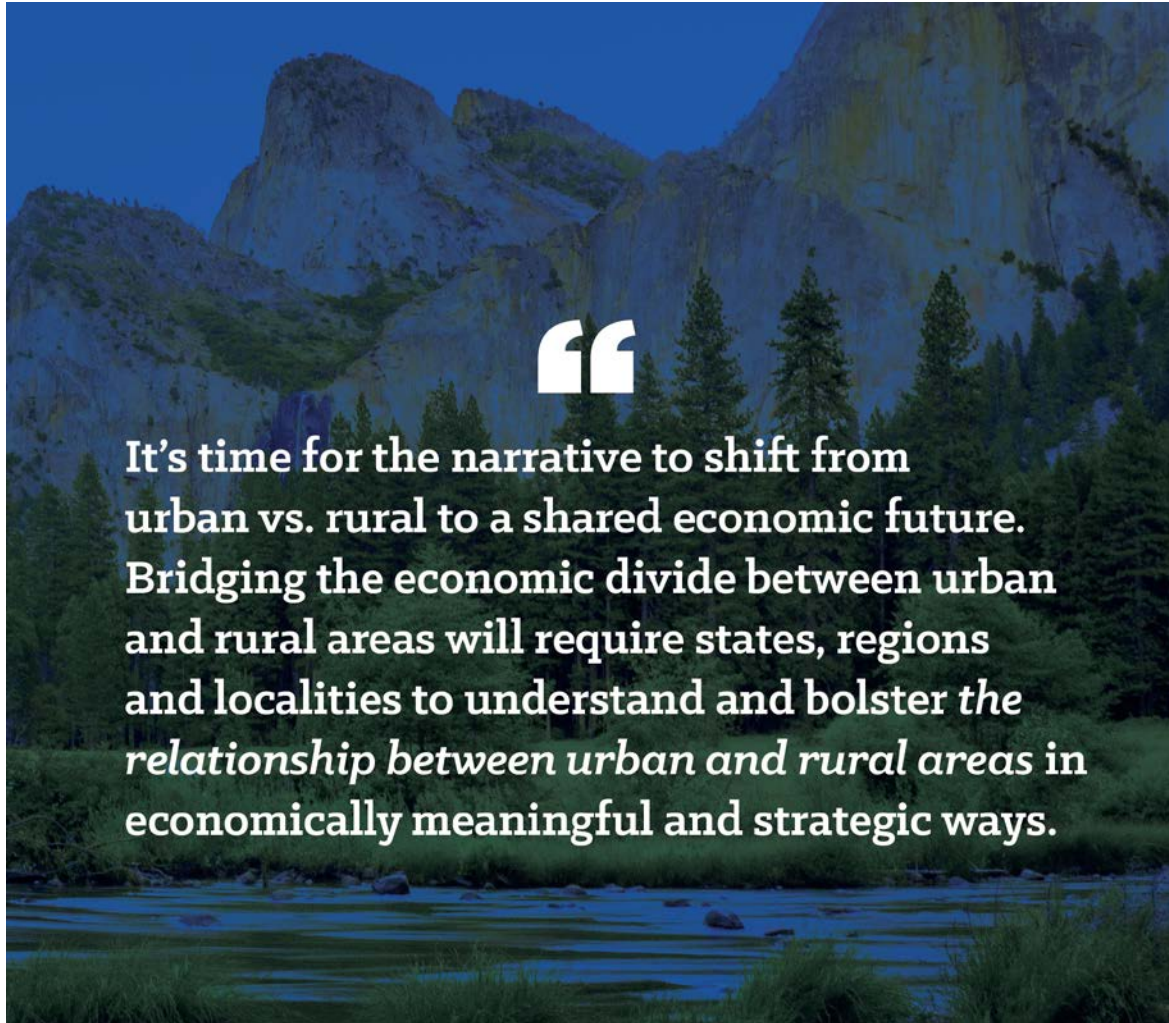




# How will energy and land use policies impact urban-rural continuum?

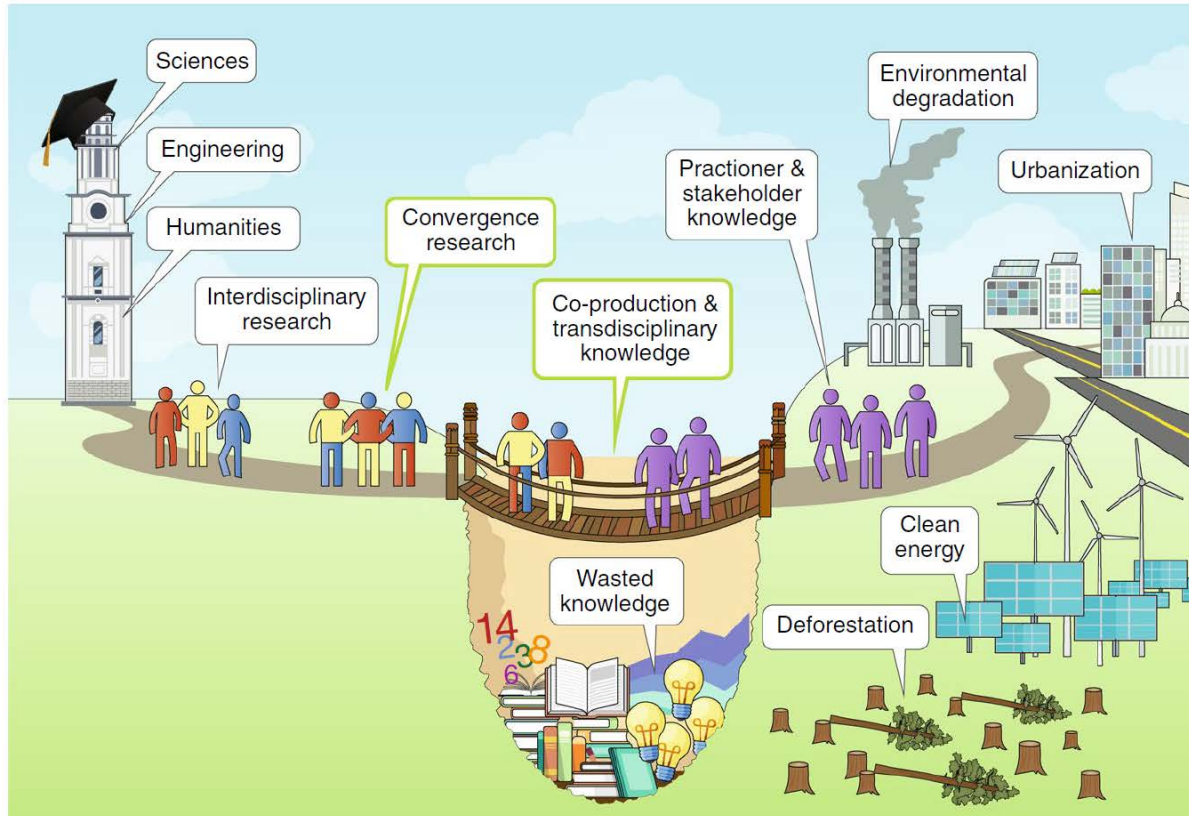
- Fuel efficiency standards and gas prices will have a direct effects on urban development and patterns of urban sprawl
  - Low gas prices + greater fuel efficiency → more sprawl
- Many alternative energy sources (biofuels, solar, wind) use land as a production input → depends on incentives for farmers and land owners
- This will increase demand for undeveloped land and increase the opportunity cost of developing land → “energy sprawl”
  - Increase density of development in urban areas?
  - Shift energy production to more decentralized local and regional systems?
  - Increase costs of agricultural land and food production?
- Places with land availability will be able to accommodate both more urban development and renewable energy production → winners?

# In Conclusion...



Source: "Bridging the Urban-Rural Economic Divide," National League of Cities (2018)

# Urban Extension Educators are the Connecting Bridge



**Fig. 1 |** Bridging barriers to advance global sustainability.

Source: Irwin, EG, PJ Culligan, M Fischer-Kowalski, K Lavender Law, R Murtugudde, S Pfirman. 2018. Bridging barriers to advance global sustainability. *Nature Sustainability*. 1(7): 324-326.

Video: [Advance Global Sustainability](https://youtu.be/OrlWEyadz4I)” by S Pfirman, PJ Culligan and EG Irwin <https://youtu.be/OrlWEyadz4I>

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# Thank you!

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