Understanding and Facilitating Sustainability in Urban Ecosystems

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Cary Institute of Ecosystem Studies

BES LTER

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- Mary Power
- Terry Chapin
- Steward Pickett
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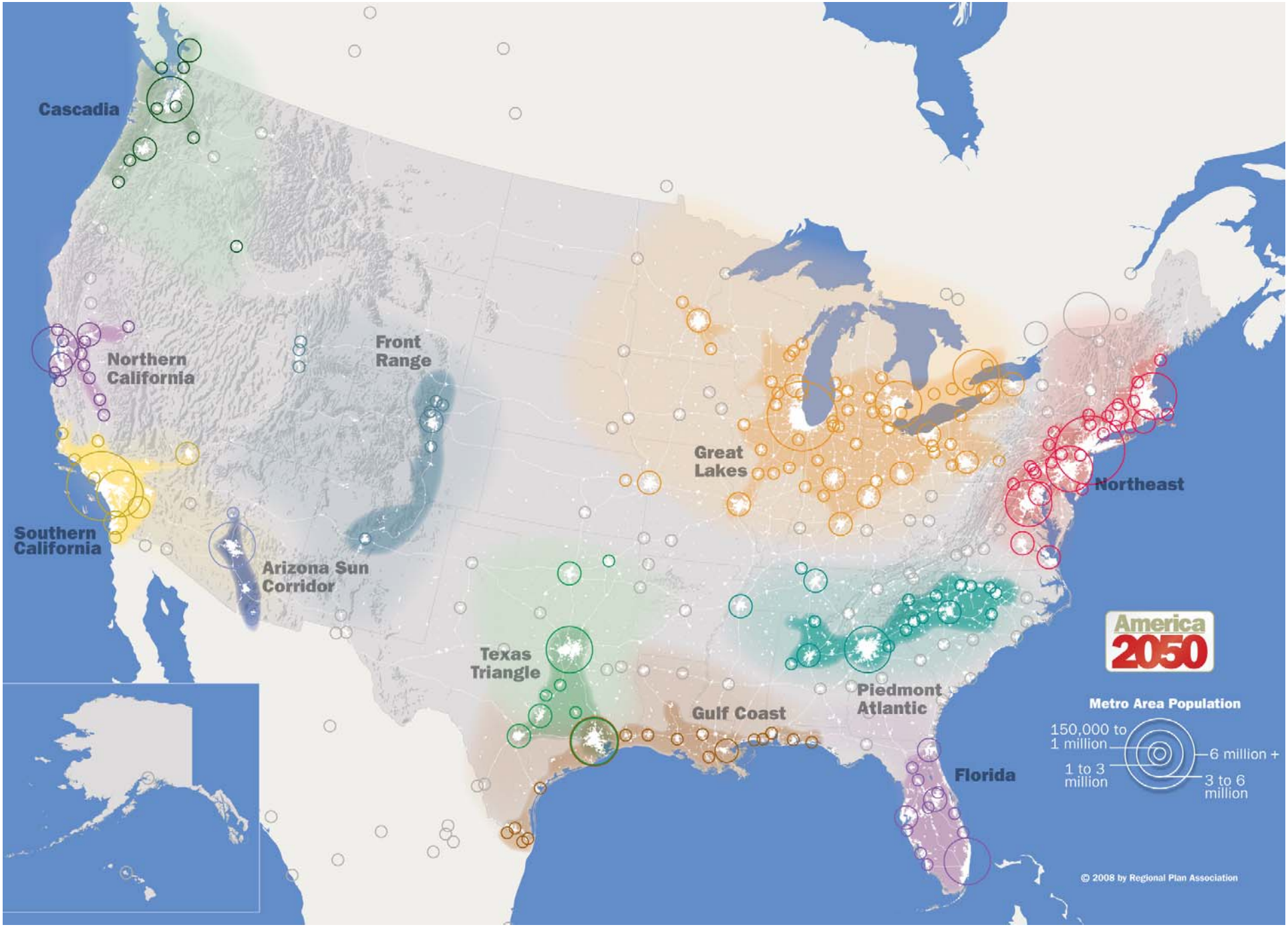
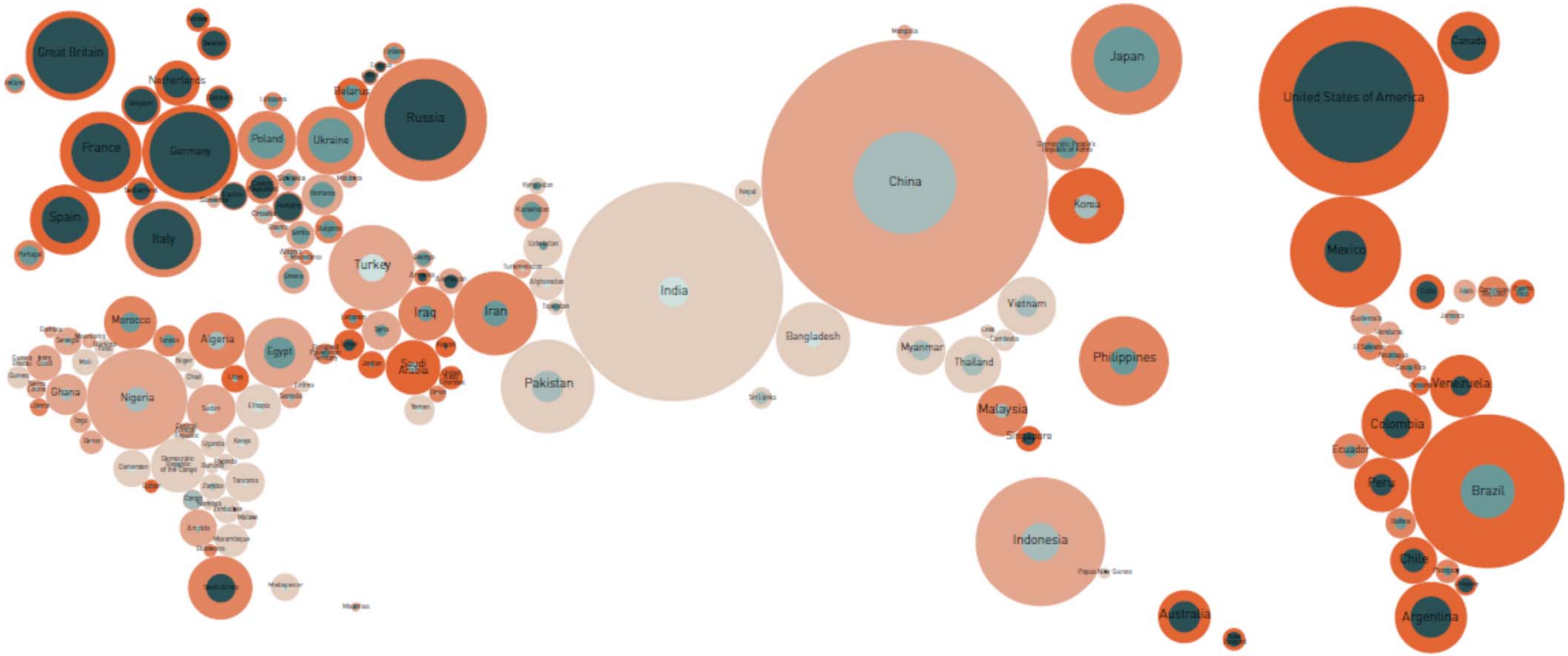
Can cities be sustainable?

- Defining sustainability
  - Three pillars
- Urban as inclusive
- Urban as changing
- Heterotrophy
- Trajectory – not state.


Cascadia
Northern California
Front Range
Great Lakes
Northeast
Southern California
Arizona Sun Corridor
Texas Triangle
Gulf Coast
Piedmont Atlantic
Florida
America 2050
Metro Area Population
150,000 to 1 million
1 to 3 million
3 to 6 million
6 million +
© 2008 by Regional Plan Association

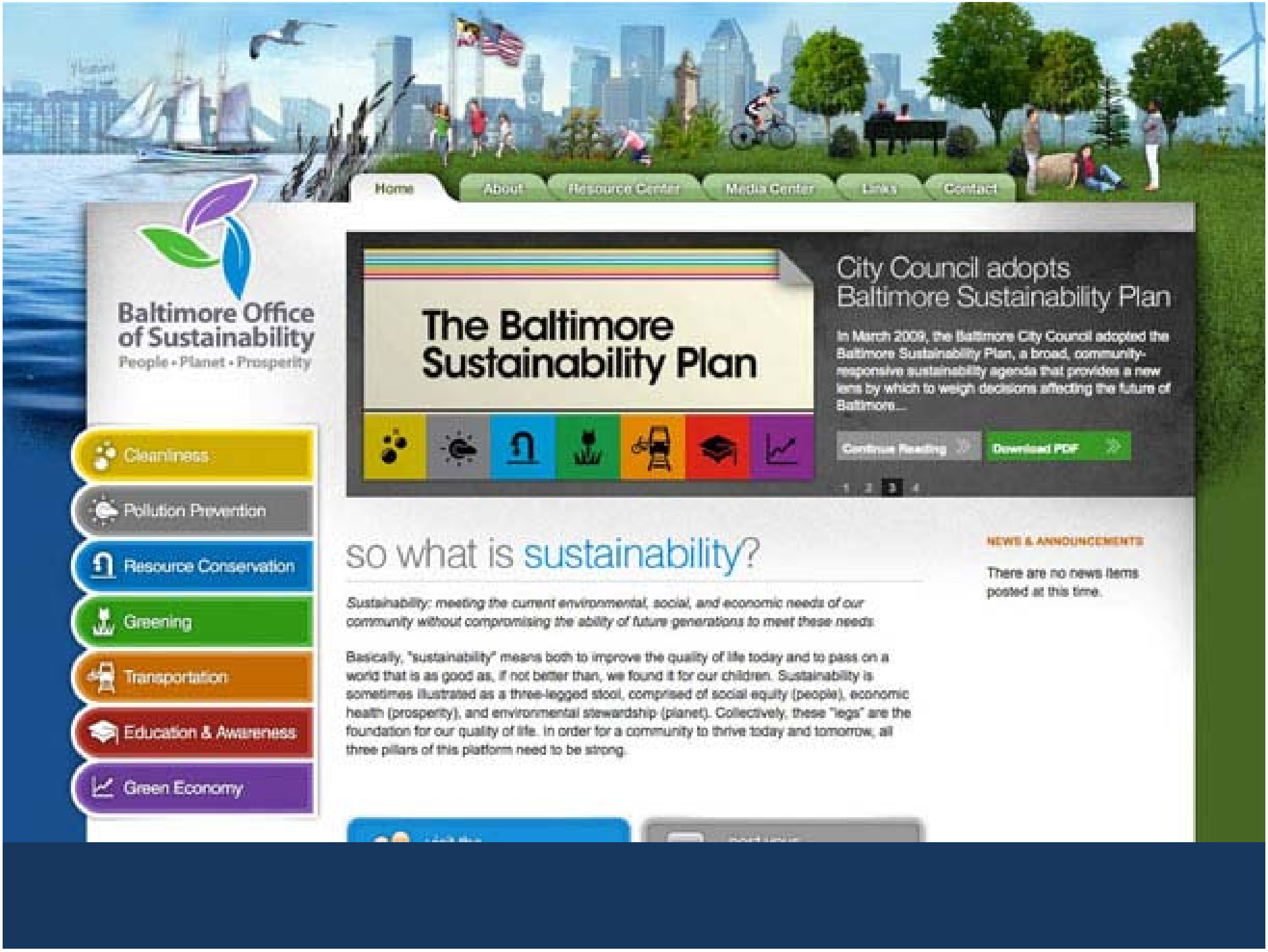


The map shows the total urban population of countries in 1950 (inner circle) and 2010 (outer circle). The visible area of the outer circle shows the total increase in urban population during this period. Intensity of color shows the proportion of each nation's population living in cities: the most urbanized countries have the darkest colors.

Data from the World Population Database 2006. Copyright United Nations 2007. Source http://esa.un.org/unpp. Map by Frank Hebbert, fkh@alum.mit.edu

Sustainability: A Social Construction

- Stakeholders
- Civic process
- Role of scientific knowledge
- Risk of ideology
  - Greenwashing
  - Ecocities
- Example of plan.


Home
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Baltimore Office of Sustainability
People • Planet • Prosperity
The Baltimore Sustainability Plan
City Council adopts Baltimore Sustainability Plan
In March 2009, the Baltimore City Council adopted the Baltimore Sustainability Plan, a broad, community-responsive sustainability agenda that provides a new lens by which to weigh decisions affecting the future of Baltimore...
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1 2 3 4
Cleanliness
Pollution Prevention
Resource Conservation
Greening
Transportation
Education & Awareness
Green Economy
so what is sustainability?
Sustainability: meeting the current environmental, social, and economic needs of our community without compromising the ability of future generations to meet these needs.
Basically, "sustainability" means both to improve the quality of life today and to pass on a world that is as good as, if not better than, we found it for our children. Sustainability is sometimes illustrated as a three-legged stool, comprised of social equity (people), economic health (prosperity), and environmental stewardship (planet). Collectively, these "legs" are the foundation for our quality of life. In order for a community to thrive today and tomorrow, all three pillars of this platform need to be strong.
NEWS & ANNOUNCEMENTS
There are no news items posted at this time.

Plan Components

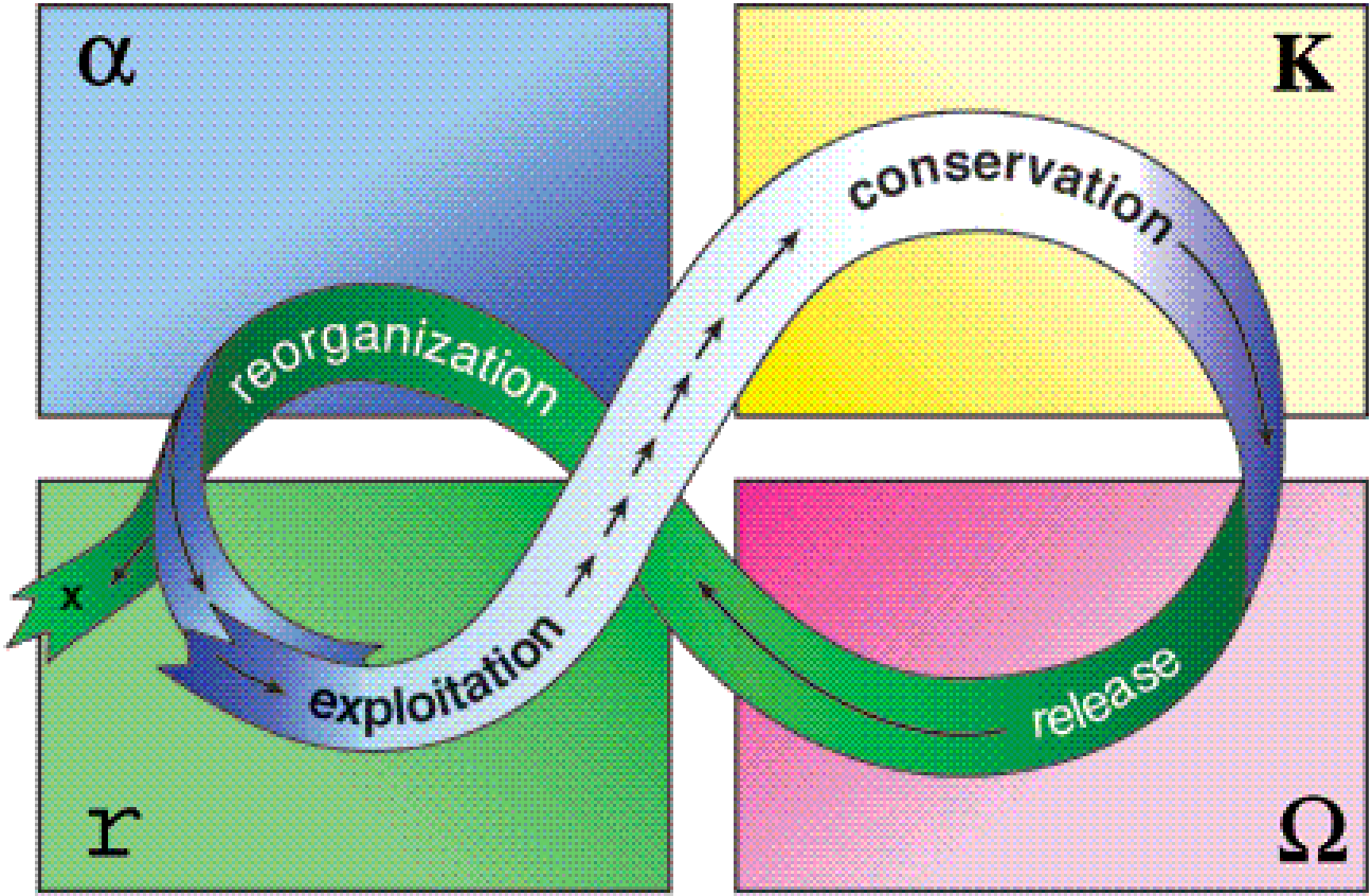
- Cleanliness
- Pollution prevention
- Resource conservation
- Greening
- Transportation
- Education and awareness
- Green economy.

Melbourne Principles (ICLEI)

- Provide long-term vision for cities
- Achieve long-term economic and social security
- Recognize intrinsic value of nature
- Minimize ecological footprint
- Model cities on ecosystems
- Recognize and build sense of place
- Empower people and foster participation
- Expand and enable partnerships
- Promote sustainable production and consumption
- Enable good governance

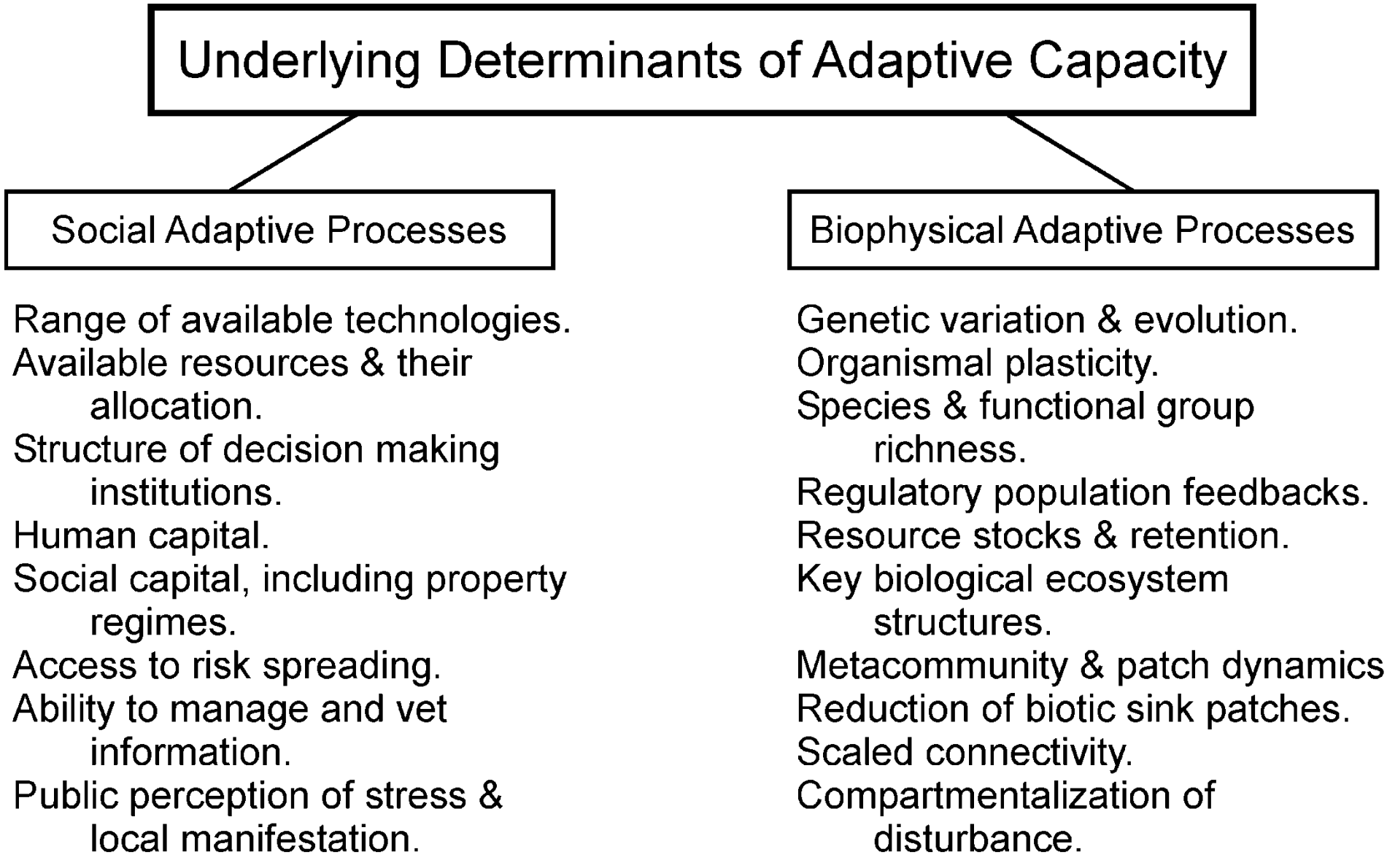
Resilience as Mechanism

- System dynamics
- Undergirds sustainability
- Adaptive cycle
- Adaptive capacity.

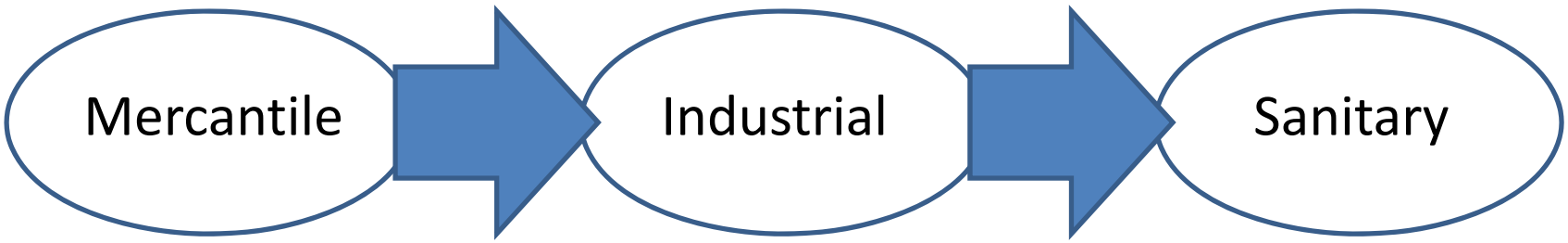

α
K
r
Ω
reorganization
conservation
exploitation
release
x

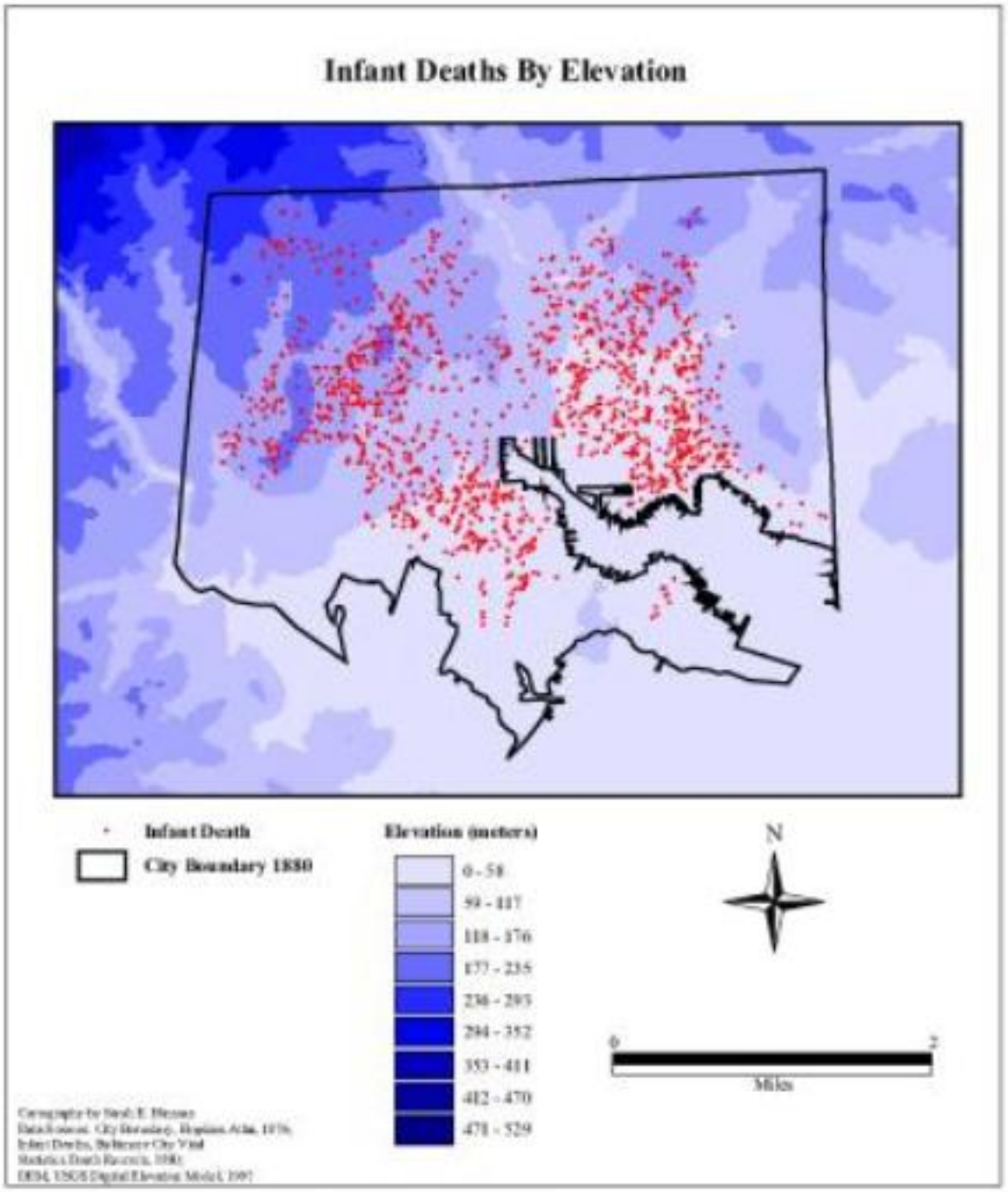
Adaptive Processes

- Socio-cultural
- Biogeophysical
  - Ecosystem phenomena
- Ecosystem services

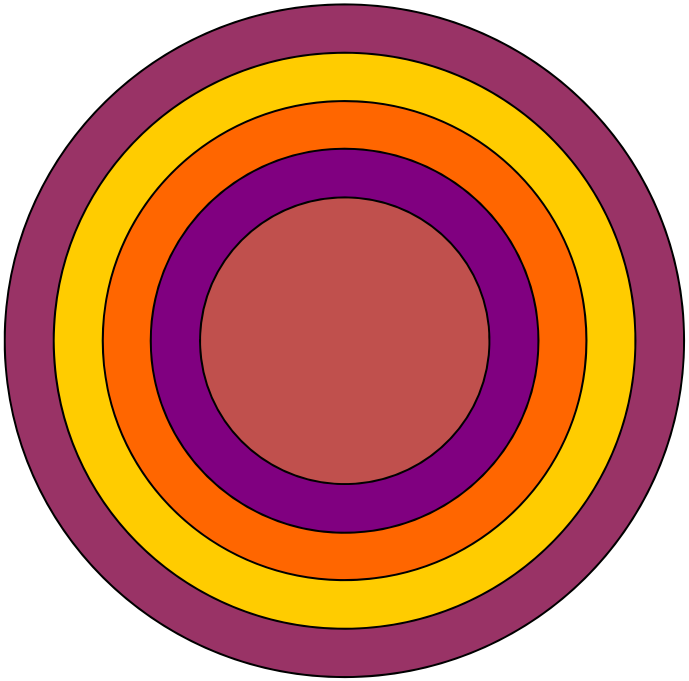

Underlying Determinants of Adaptive Capacity
Social Adaptive Processes
Range of available technologies.
Available resources & their allocation.
Structure of decision making institutions.
Human capital.
Social capital, including property regimes.
Access to risk spreading.
Ability to manage and vet information.
Public perception of stress & local manifestation.
Biophysical Adaptive Processes
Genetic variation & evolution.
Organismal plasticity.
Species & functional group richness.
Regulatory population feedbacks.
Resource stocks & retention.
Key biological ecosystem structures.
Metacommunity & patch dynamics.
Reduction of biotic sink patches.
Scaled connectivity.
Compartmentalization of disturbance.

Baltimore Example



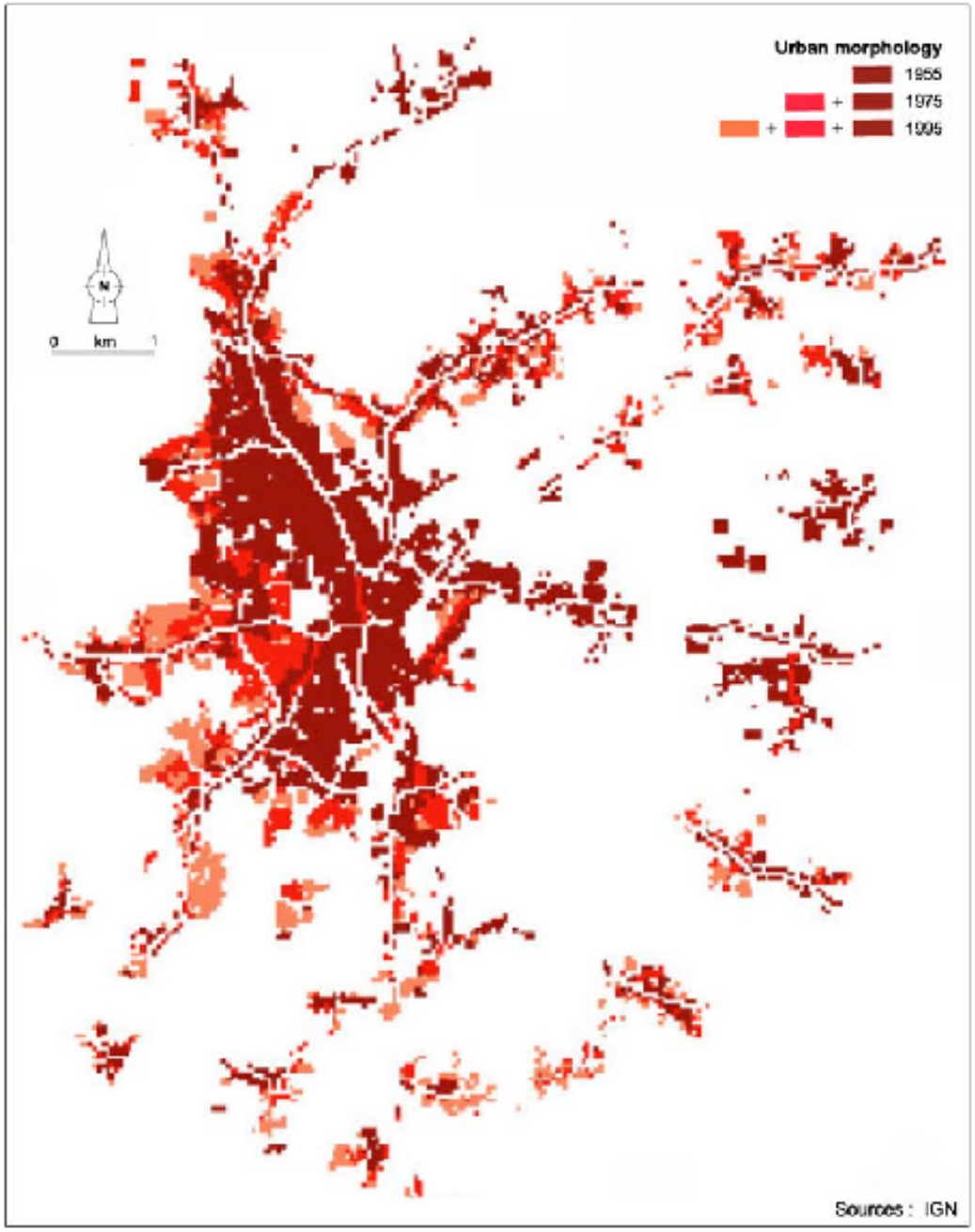

Infant Deaths By Elevation
Infant Death
City Boundary 1880
Elevation (meters)
0 - 58
59 - 117
118 - 176
177 - 235
236 - 293
294 - 352
353 - 411
412 - 470
471 - 529
N
0
2
Miles

Boone



Burgess Model

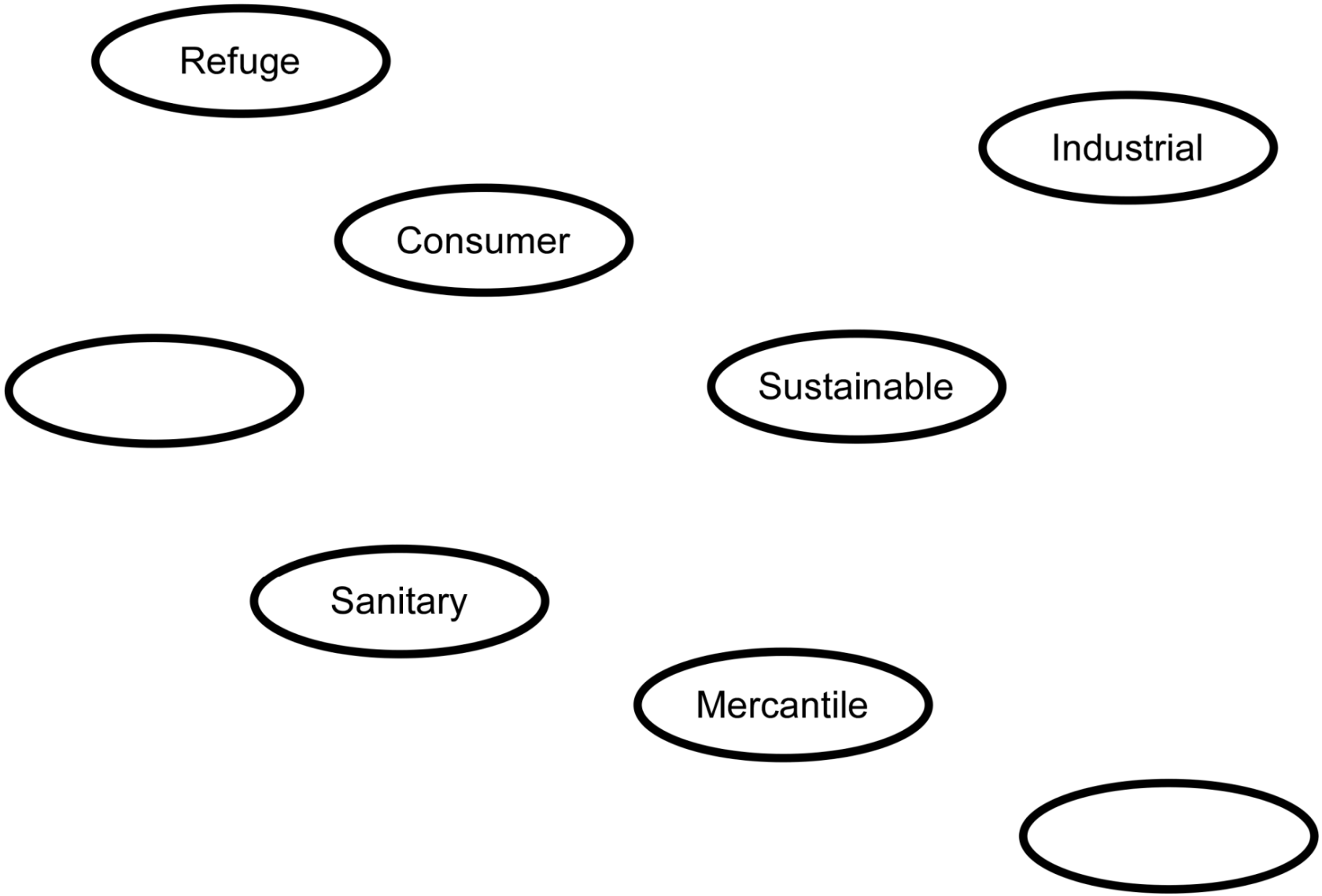
- Central Business District
- Transitional zone: recent immigrants, deteriorating housing, factories, abandonment
- Working class zone: single family tenements
- Residential zone: single family homes with yards and garages
- Commuter zone: suburbs



Antoni 2001

City Modes

- What are cities for?
- City-Suburban-Exurban systems.


Refuge
Industrial
Consumer
Sustainable
Sanitary
Mercantile

The Sanitary City

- Lynch (1960): City as Machine
- Melosi (2000): The Sanitary City
- Gandy (2003): Concrete and Clay
- Modernism

Features of Sanitary City

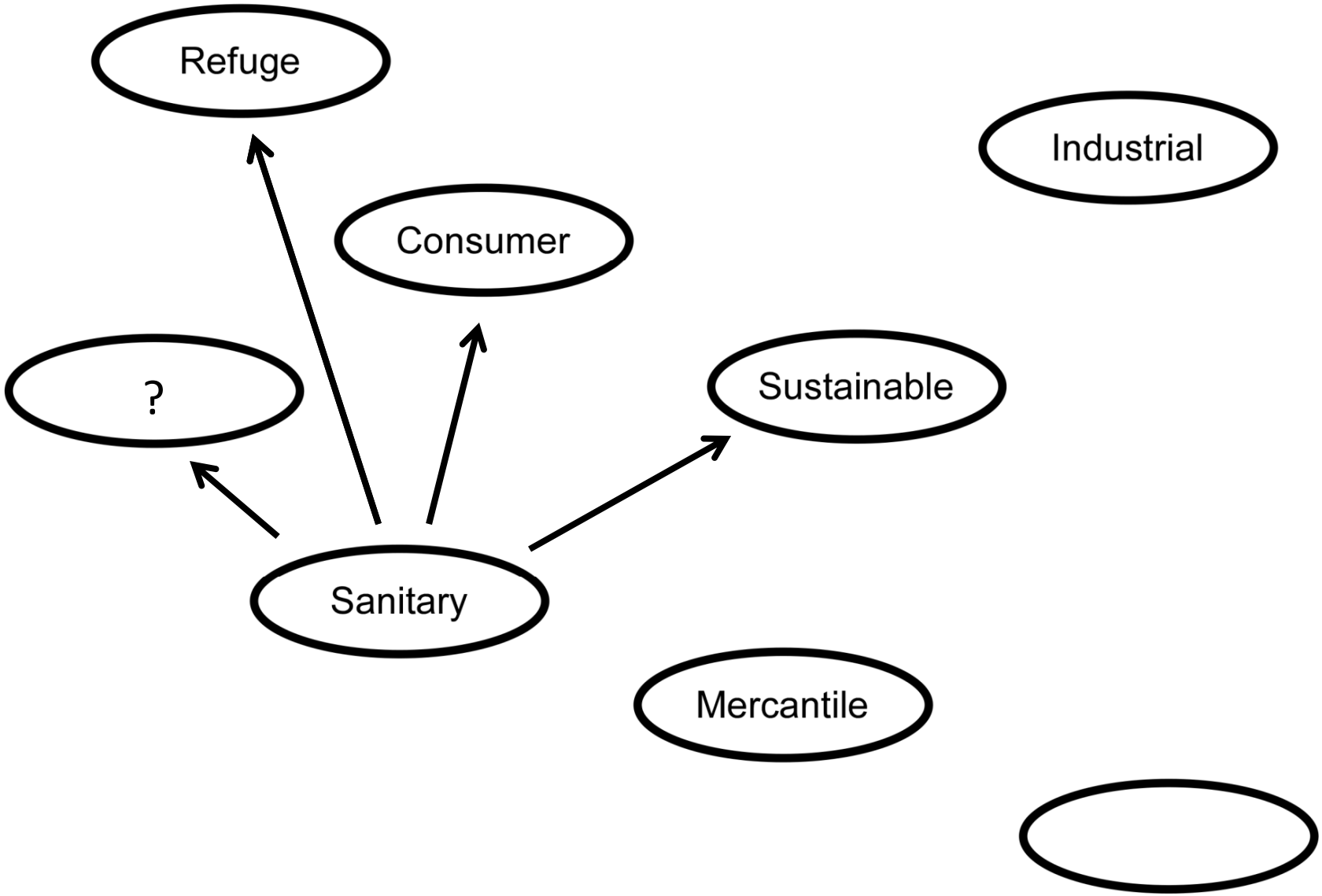
- Engineering solutions
- Segregation of hazards
- Removal of waste
- Management/planning silos
- Management by experts
- Public resources
- Government control
- Demographic transition benefits.

Sanitary City: A Mode in Crisis

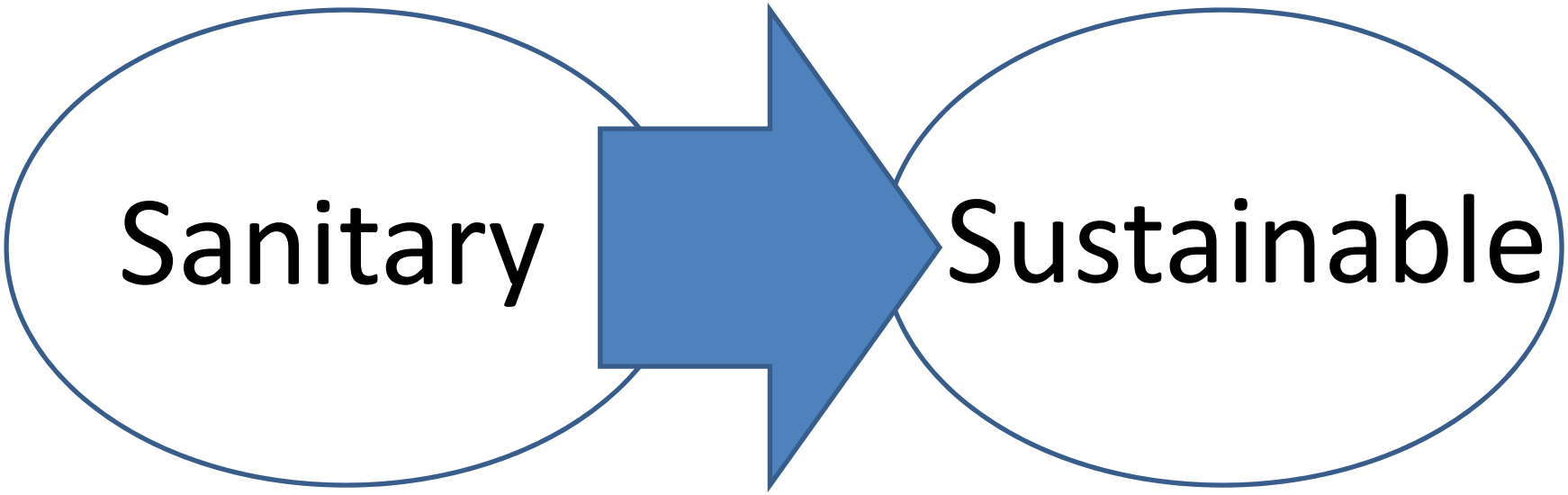
- Assumptions violated
- Assumptions irrelevant.


Nokulunga
Cash Store

Transformations among Modes


Refuge
Industrial
Consumer
?
Sustainable
Sanitary
Mercantile

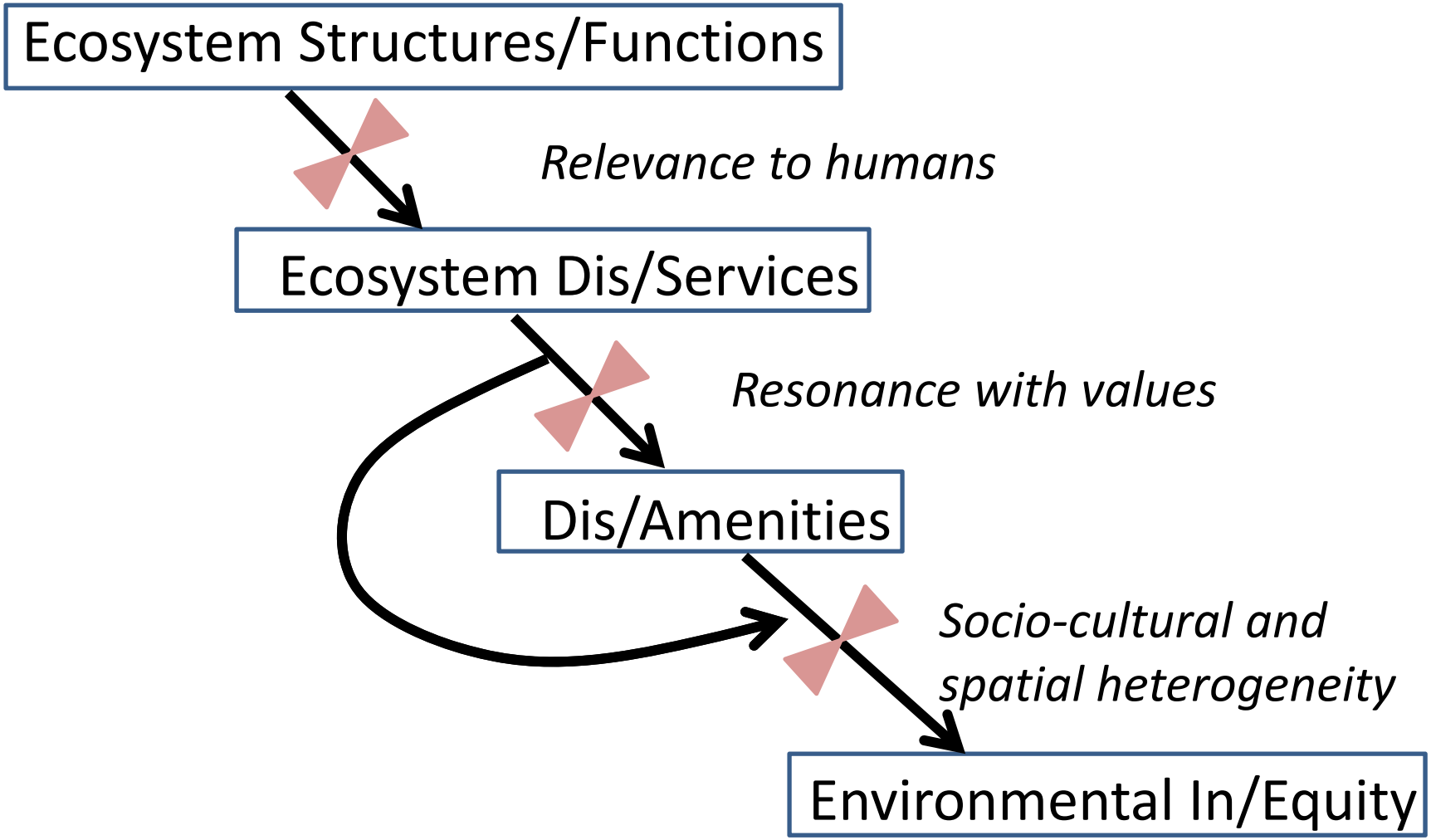
How to Facilitate This One?



Nature of the Sustainable City

- Sustainability: A goal
- Socially constructed
- Normative
- Three components
  - Economy
  - Ecology
  - Society

From Ecology to Equity



Features of the Sustainable City

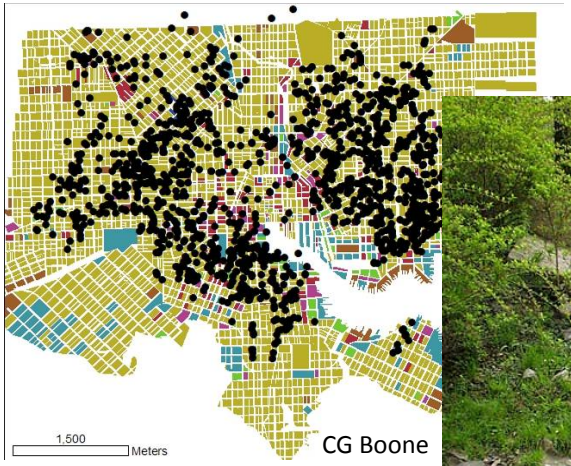
- Polycentric governance
- Integrated management
- Exploitation of bio-ecosystem services
- Rethink waste-resource dichotomy.

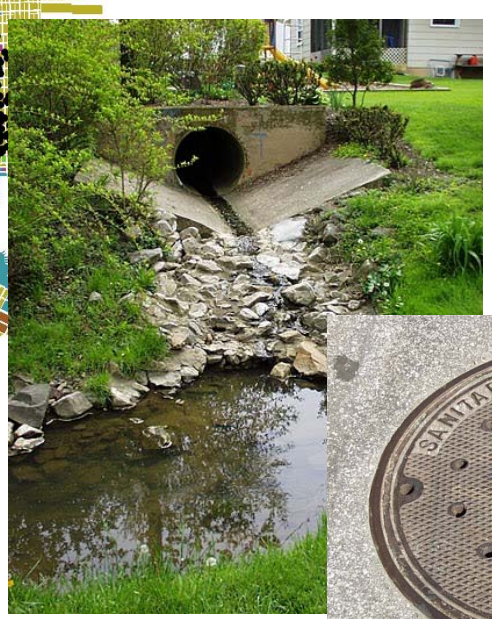
Sustainable Solutions

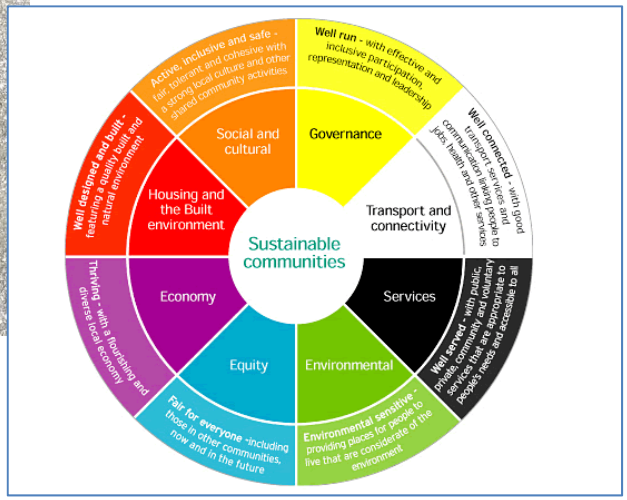
- Ecological and engineered
- Hazards addressed
- Wastes reduced
- Integrated management
- Management involves stakeholders
- Public-private partnerships
- Transitions not deterministic.

BES III Evolution

- Sanitary City to Sustainable City



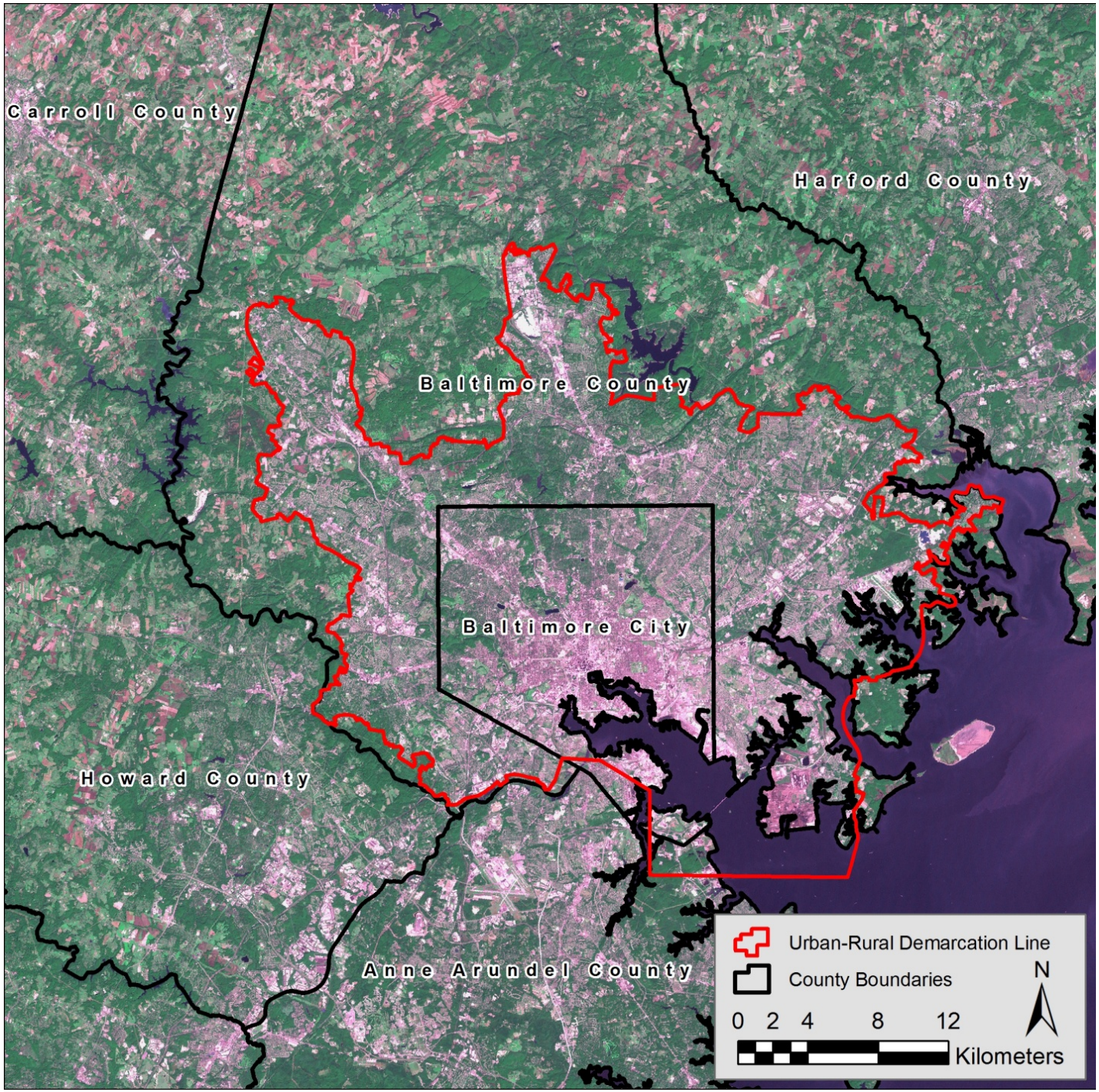


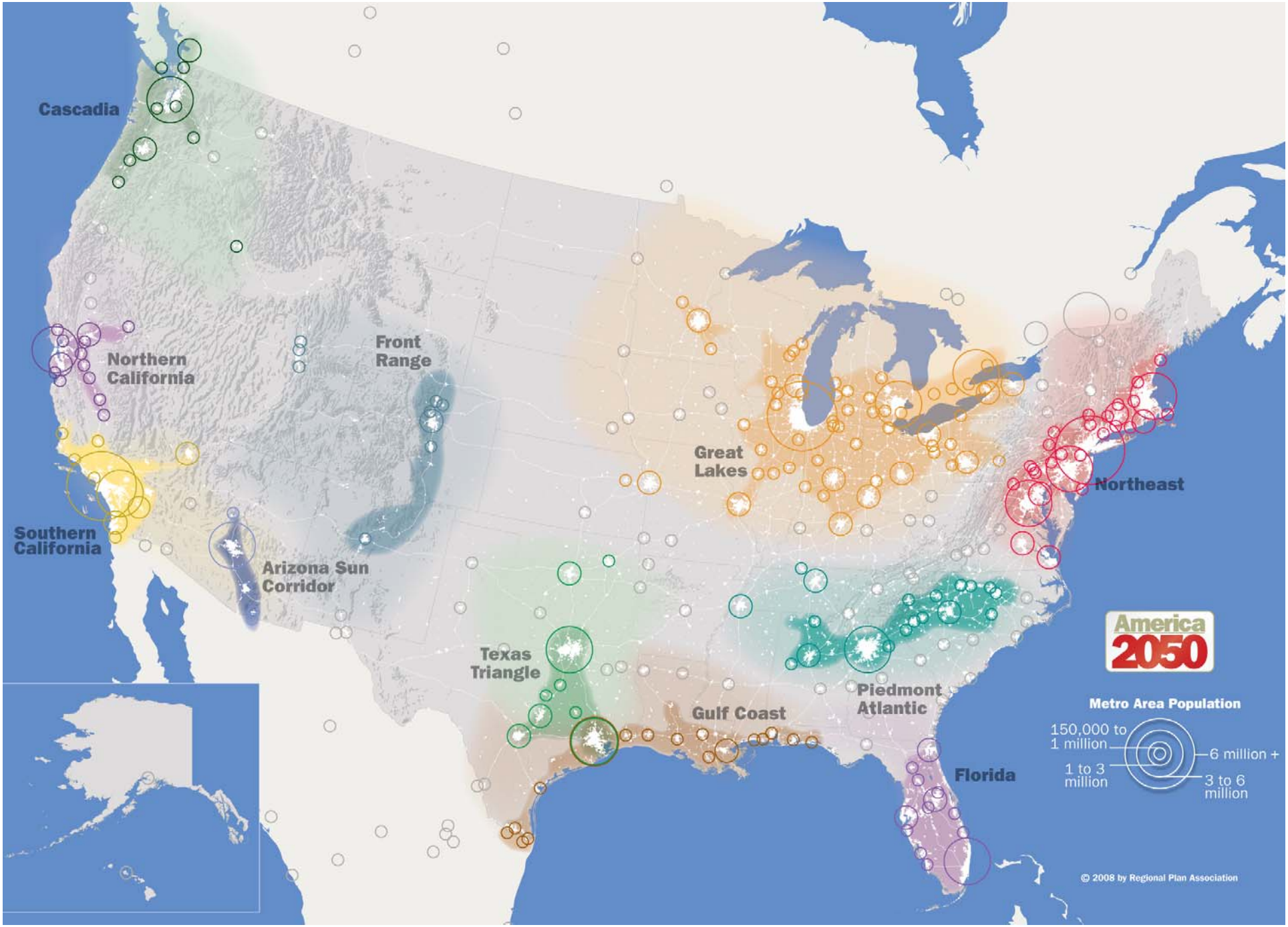


Sustainable Cities, East UK

Growing the Partnership

- National: Research Collaboration Network on Urban Sustainability
- Regional: Baltimore Regional Academy of Sustainab
- City: Exte
- Sharing e
- Sharing t
- Collabora
- Leverage capital.


Carroll County
Harford County
Baltimore County
Baltimore City
Howard County
Anne Arundel County
Urban-Rural Demarcation Line
County Boundaries
N
0 2 4 8 12
Kilometers


Cascadia
Northern California
Front Range
Great Lakes
Northeast
Southern California
Arizona Sun Corridor
Texas Triangle
Gulf Coast
Piedmont Atlantic
Florida
America 2050
Metro Area Population
150,000 to 1 million
1 to 3 million
3 to 6 million
6 million +
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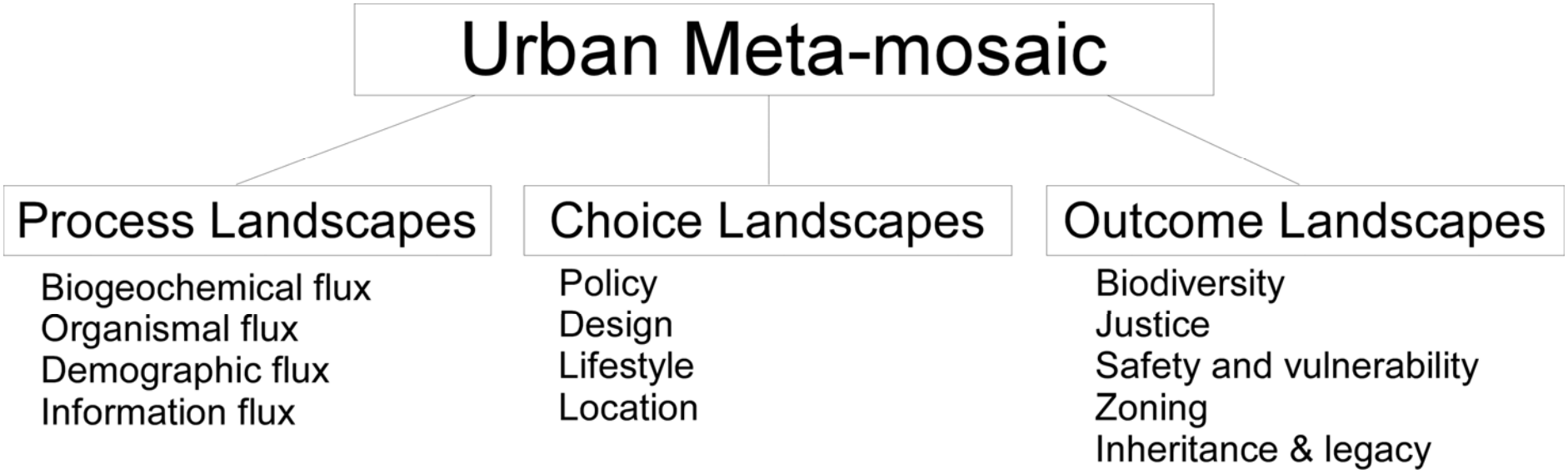
LAFAYETTE AVE.
EDMONDSON AVE.
N. GILMOR ST.
vacant houses
institutions
vacant lots
FRANKLIN ST.
N. CALHOUN ST.
area samples


new train infrastructure
water pockets
open spaces
urban farming
new typologies


Urban Meta-mosaic
Process Landscapes
Biogeochemical flux
Organismal flux
Demographic flux
Information flux
Choice Landscapes
Policy
Design
Lifestyle
Location
Outcome Landscapes
Biodiversity
Justice
Safety and vulnerability
Zoning
Inheritance & legacy

Tradeoffs

- Services
- Amenities
- Values
- Costs
- Engineering/ecology

Seeyalaterbye, Hon!

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