# Bioregional Urbanism:
## Connecting Scientific Metrics to Design

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# The BACKGROUND we bring to BIOREGIONALISM…

**Sarah Howard**

- Urban & Regional Planning
- Policy Design
- Educational Theory
- Social Justice Studies
- …

**Phil Loheed**

- Cultural Evolution Studies
- Terrain Analysis
- Urban and Land Planning
- Architecture
- …

**Other BIOREGIONAL Creators:**

- Community Partnerships
- Entrepreneurship
- Land Use Law
- Environmental Science
- Anthropology / Archeology
- Landscape Architecture
- …

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SCIENCE

DESIGN

## PROCESS OF BIOREGIONAL URBANISM

| | | |
|---|---|---|
| 1 | **DEFINE THE BIOREGION** | A distinct human population in the territory it occupies. (Boundaries adjusted to ecoregional realities.) |
| 2 | **MAP PRIMARY RESOURCES** | Key Resources: Renewable Fresh **Water**; **Energy** Potentials; **Food** Production; Demographics of **People**; **Waste** Management; **Land** Morphology; and **Biodiversity** |
| 3 | **EVALUATE AND MAP HAZARD RISKS** | Establish Risk Levels and Locations: Climate Change; Rising Sea Level; Flood; Earthquake; Wildfire; Severe Storms; War; and so on. |
| 4 | **EVALUATE INDEX OF SELF SUFFICIENCY** | Percentage of Locally Mobilized: **Water**; **Energy**; **Food**; **People**; **Waste Management**; **Land**; and **Biodiversity** |
| 5 | **ESTABLISH BUDGETS AND DESIGN GOALS** | Establish Targets for: Local Comsumption of Resources; Trade Relationships; Biodiversity and Habitats; Social Equity; Waste Management; and Innovation. |
| 6 | **DESIGN URBAN AND HABITAT PATTERNS** | Establish Precise relationships between Design Solutions, Resource Availability, and Habitat Restoration. |
| 7 | **IMPLEMENT REVISED PATTERNS** | Physical Action to: Balance Consumption; Limit Imports; Restore Habitats; Increase Social Empowerment; Eliminate Pollution; Innovate to improve performance. |
| 8 | **IMPLEMENT FEEDBACK SYSTEMS** | Evaluate Progress in Self Sufficiency, and other metrics of the Budgeted Consumption Economy; and in effectiveness of Bioremediation projects. |

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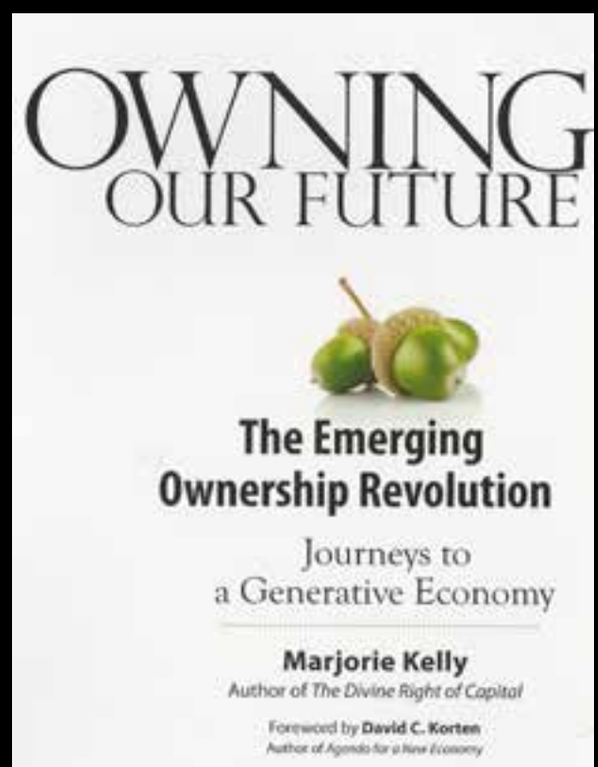
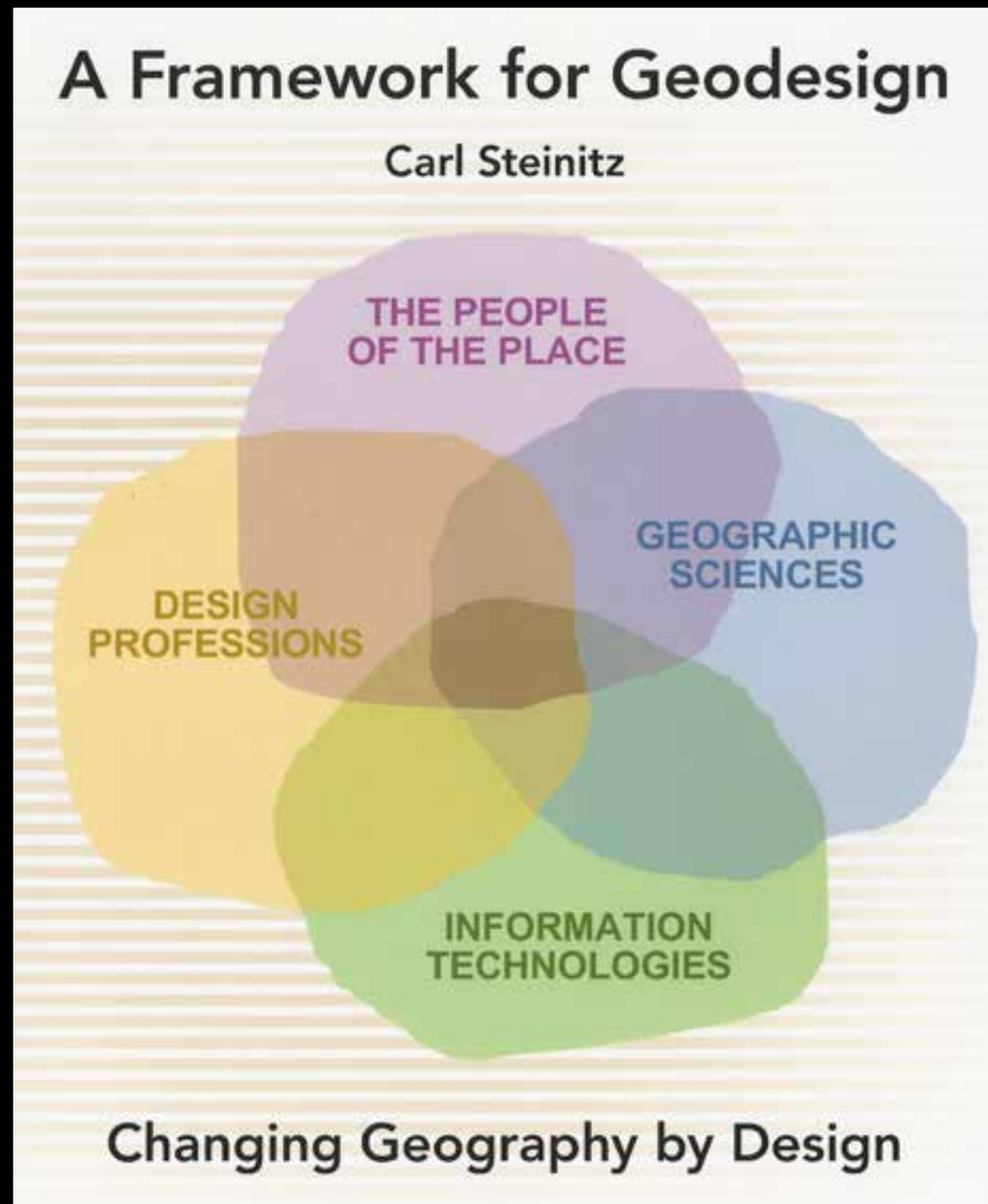
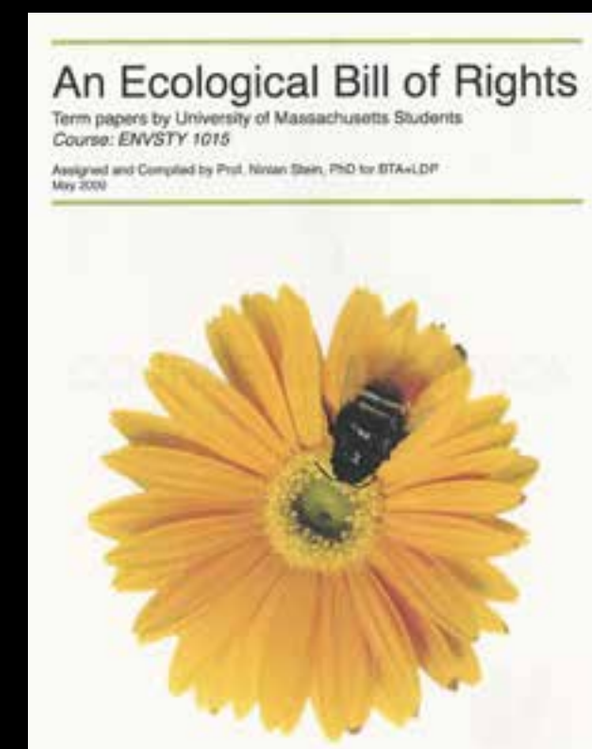
# I. The Process of BIOREGIONAL URBANISM

# Other Related Efforts

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# The System of BIOREGIONAL URBANISM includes ITERATIONS of…

## ANALYSIS…

1. Define Bioregions
2. Map Resources
3. Map Constraints and Opportunities
4. Evaluate Index of Self-Sufficiency

## APPLIED TO DESIGN…

5. Establish Budgets and Design Goals
6. Design Urban and Habitat Patterns
7. Implement Revised Patterns
8. Implement Feedback Systems

* Repeat Systemic Cycles

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OUR HUMAN CHALLENGE:
LIVING ON A FINITE PLANET
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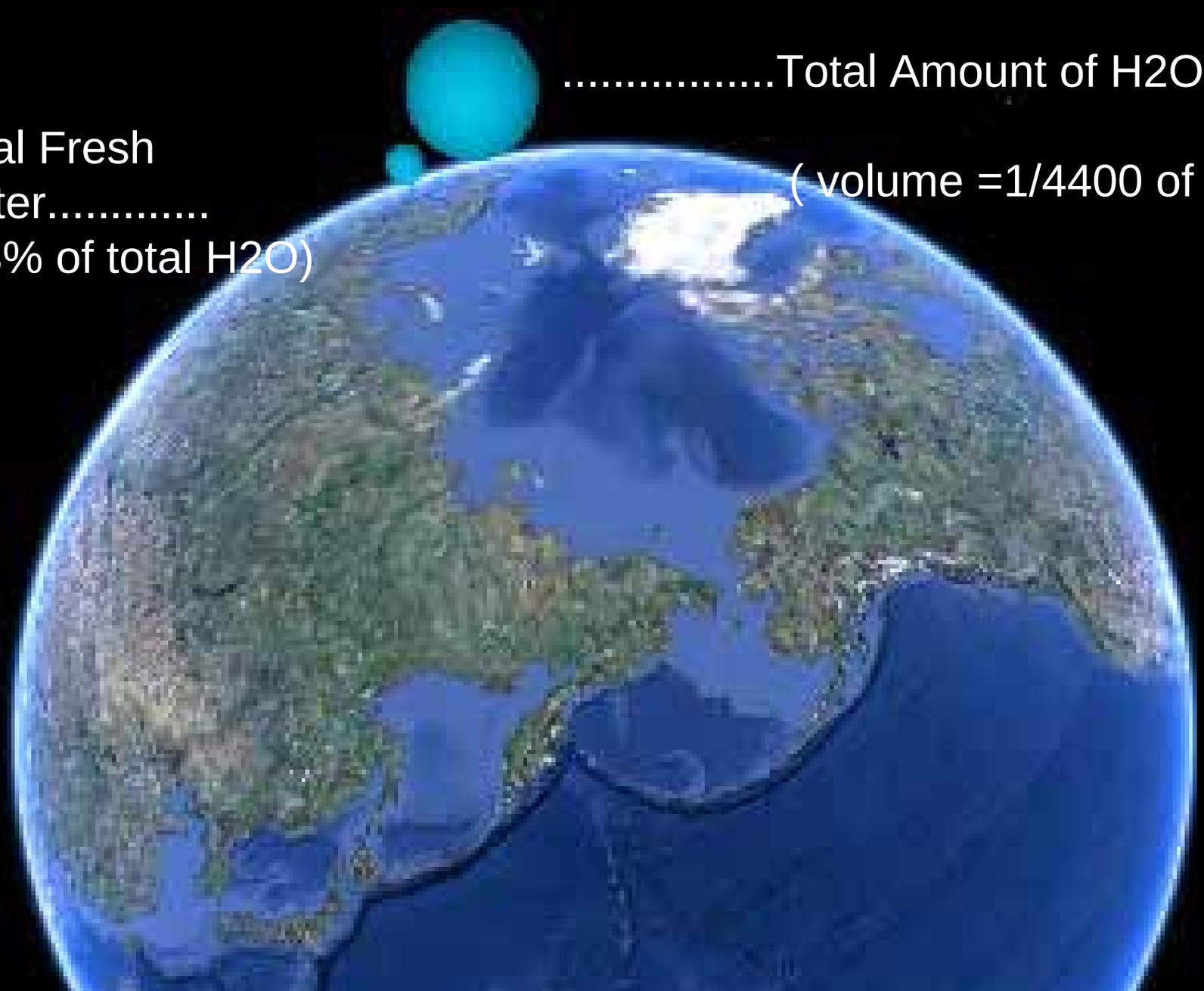
# Total WATER on Earth
# (a Limited Resource)

.....Total Amount of H2O on the Planet
( volume =1/4400 of Earth )

Total Fresh Water.....
( ±3% of total H2O)



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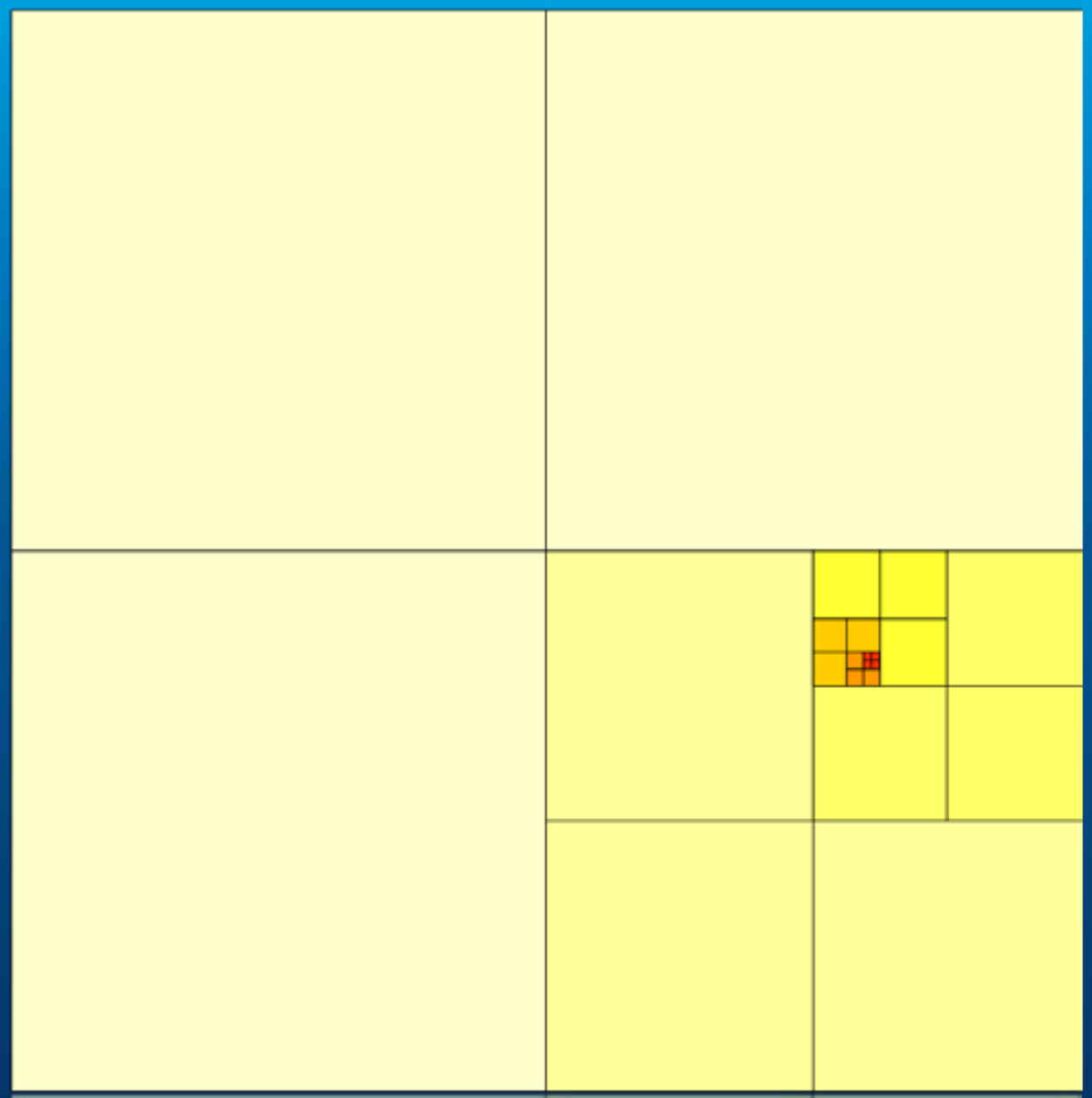

# The Nested Scales of Nature:
# The Basic Math of Bioregional Urbanism:

the sum of all tiled components equals one world—and not more.

The Planet is composed of INHABITED BIOREGIONS supporting COMMUNITIES

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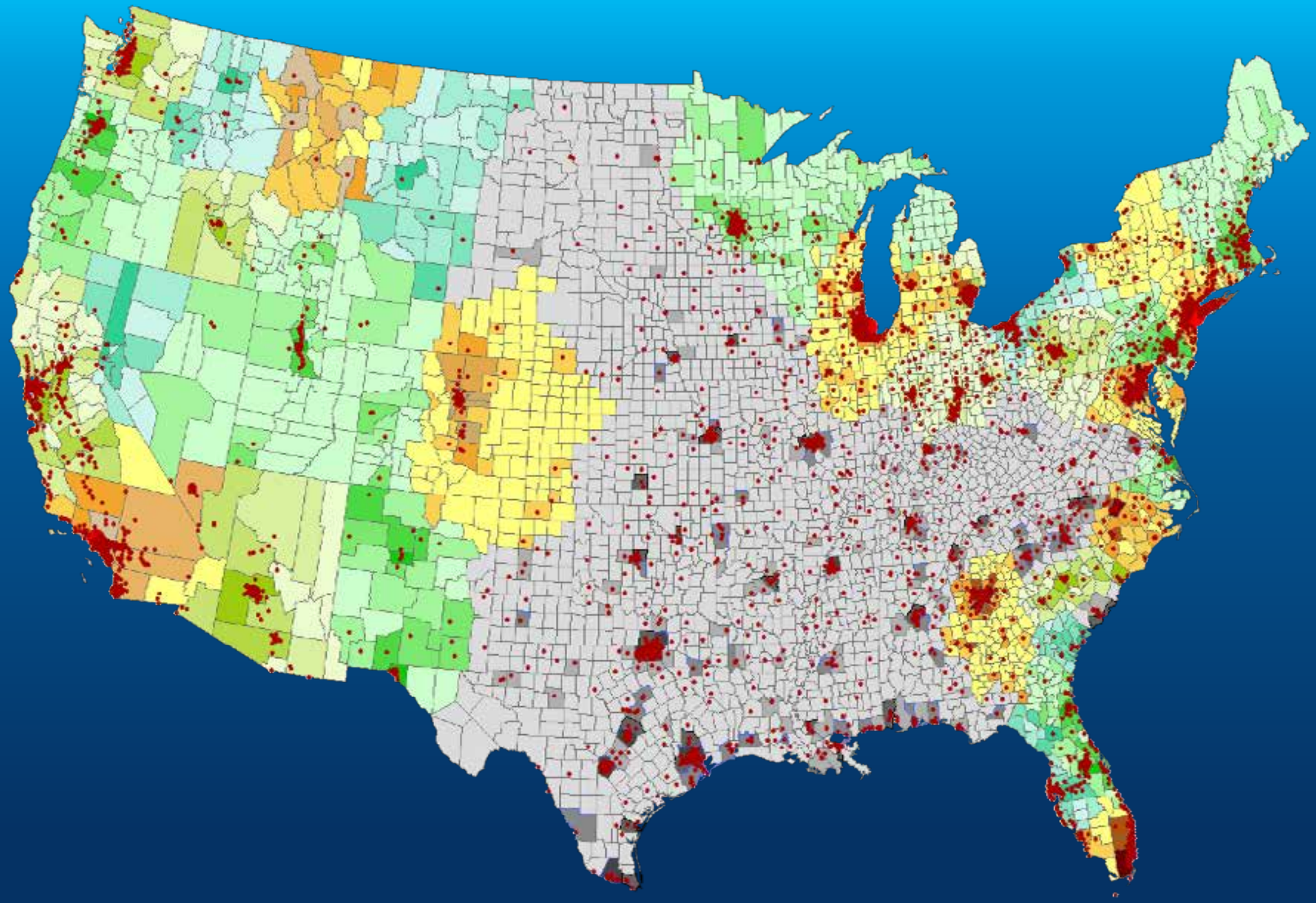

# Defining BIOREGIONS: Analytical Tiles of Populations in Resource Zones

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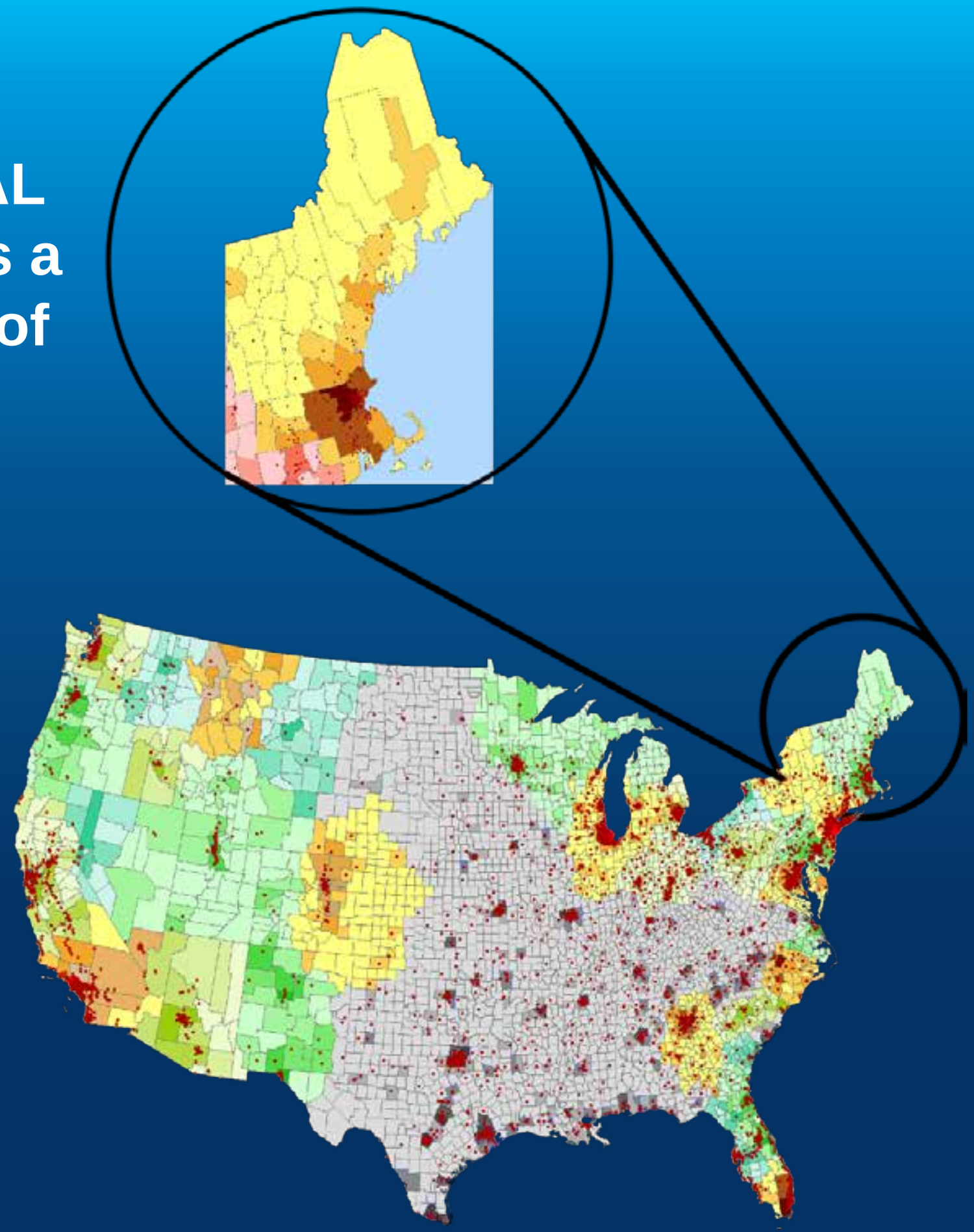
**BIOREGIONAL URBANISM is a special form of GeoDesign…**



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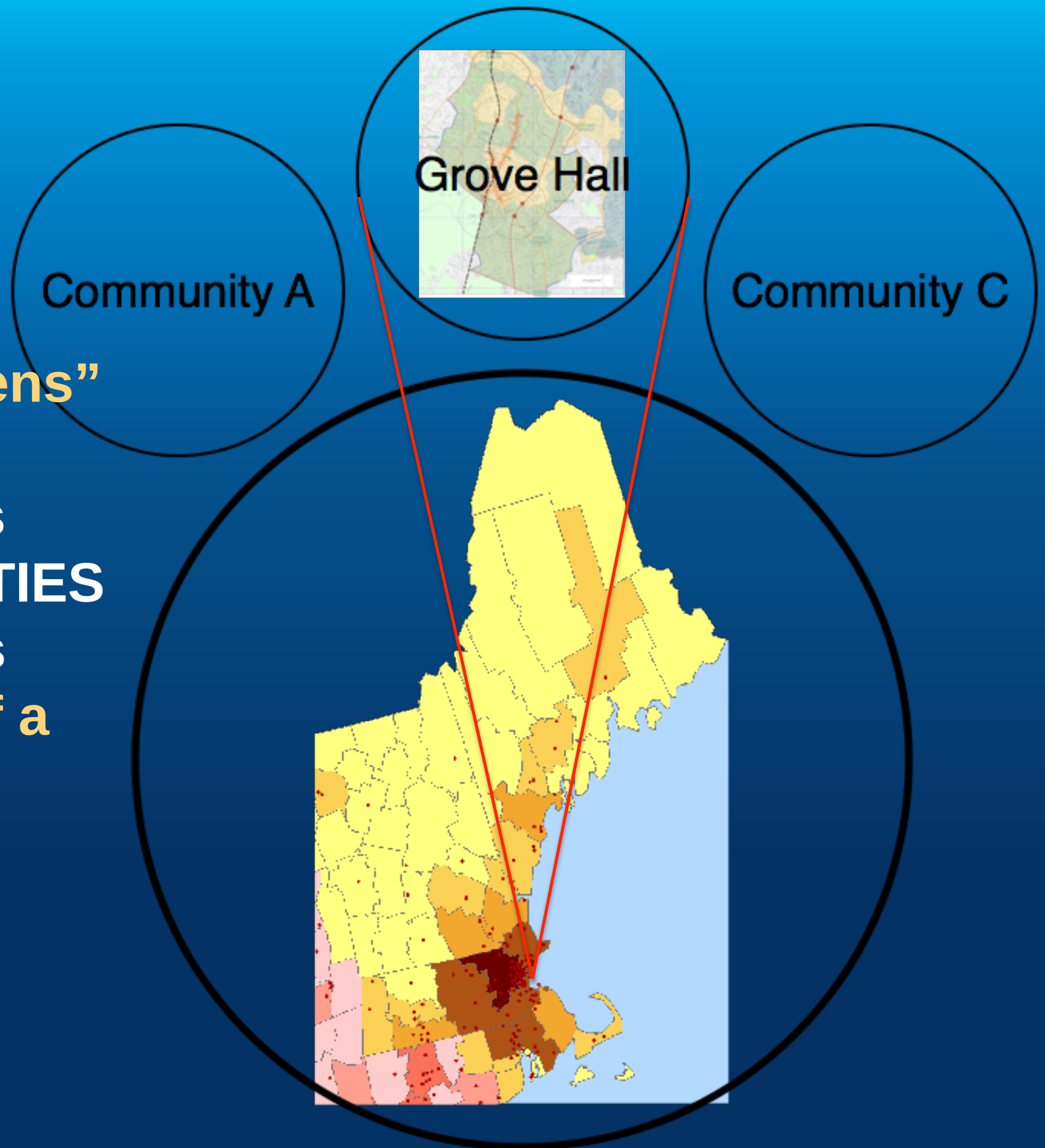
**The**
**“Bioregional Lens”**

**Neighborhoods and COMMUNITIES are analyzed as Components of a BIOREGION**

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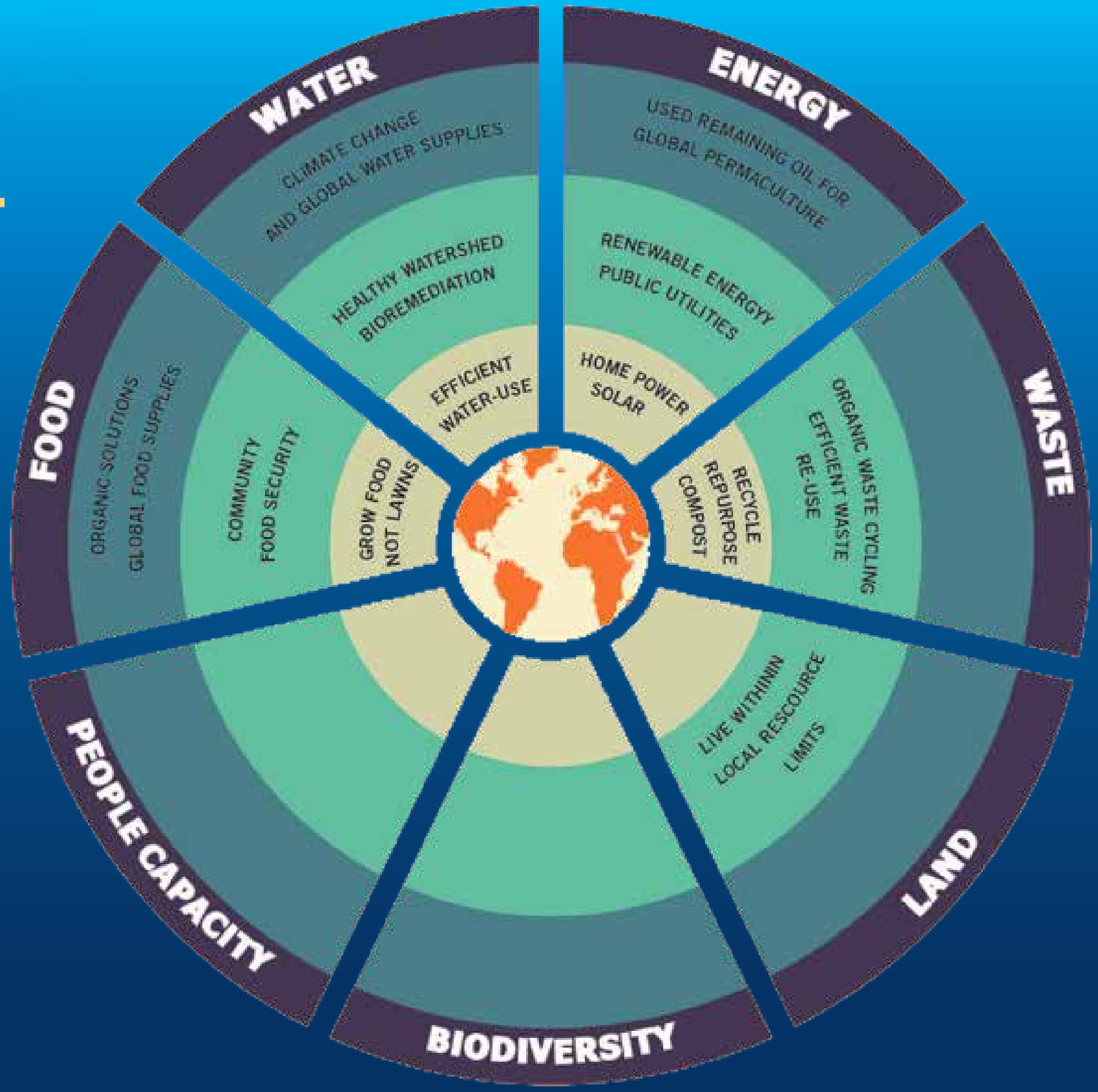
# A special form of GeoDesign…

**Components of the SELF SUFFICIENCY INDEX create a "Snapshot"**

**The ratio of LOCAL RESOURCES divided by IMPORTS**

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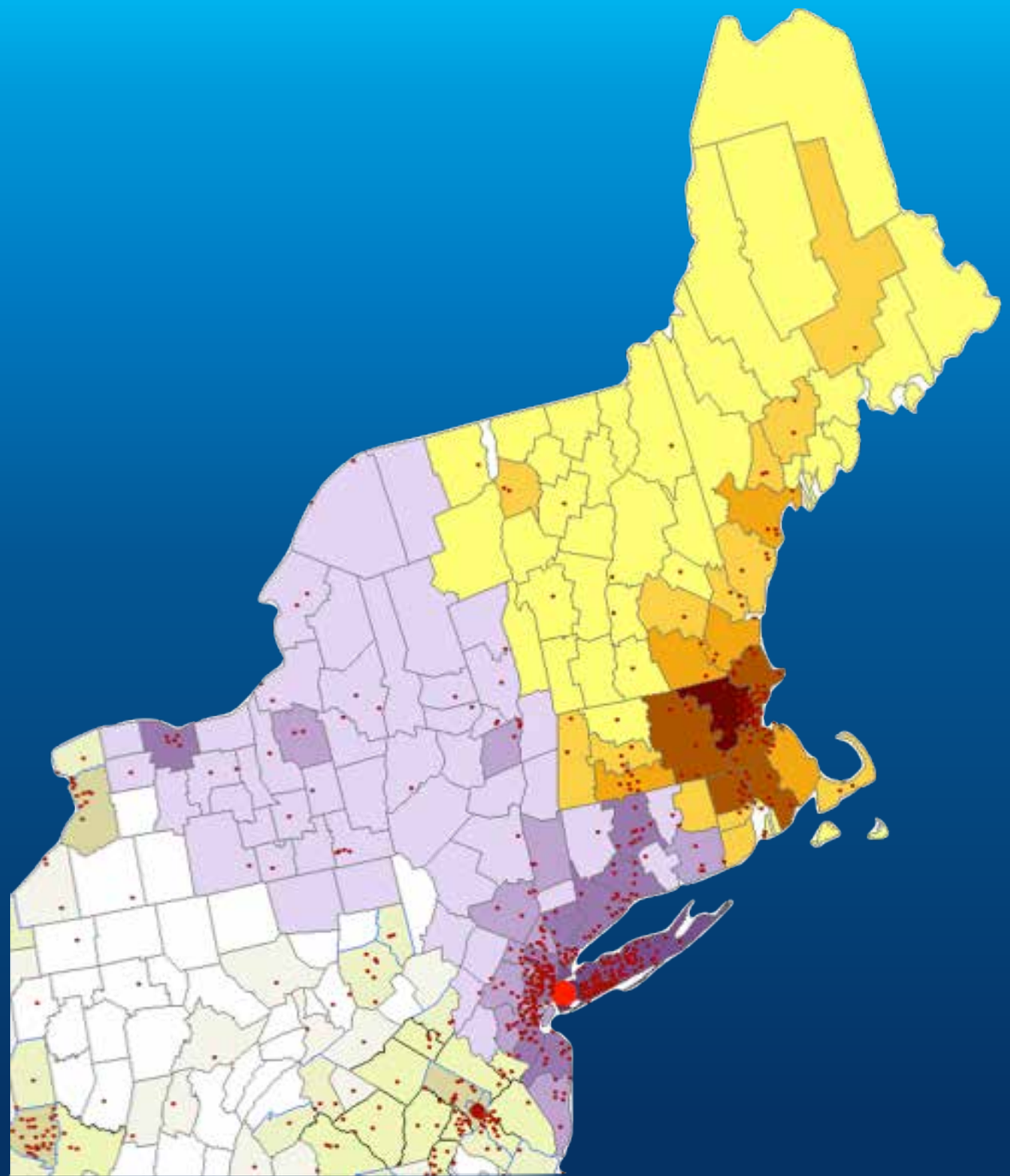
**RESOURCE BUDGETS—from the global to the local**



# Renewable WATER Self Sufficiency Indexes

**WATER in Boston Bioregion:**

Population = 11,200,840 (2007 estimate)
Land Area = 166,115 Km2 (64,137.4 sq.mi)
Density = 67.43 people/Km2
Renewable Water:
Human Share (5%) = 9,966,900,000 m3 (9.97 Km3)
Per Capita Available = 889.84 m3
**Total WATER SSindex = 890/2400 = 37%**
(based on US average consumption including virtual water)
**Local WATER SSindex = 890/1600 = 56%**

**WATER in New York Bioregion:**

Population = 28,175,647 (2007 estimate)
Land Area = 130,595 Km2 (50,423 sq.mi)
Density = 215.75 people/Km2
Renewable Water:
Human Share (5%) = 6,529,750,000 m3 (6.53 Km3)
Per Capita Available = 231.75 m3
**Total WATER SSindex = 232/2400 = 10%**
(based on US average consumption including virtual water)
**Local WATER SSindex = 232/1600 = 14.5%**

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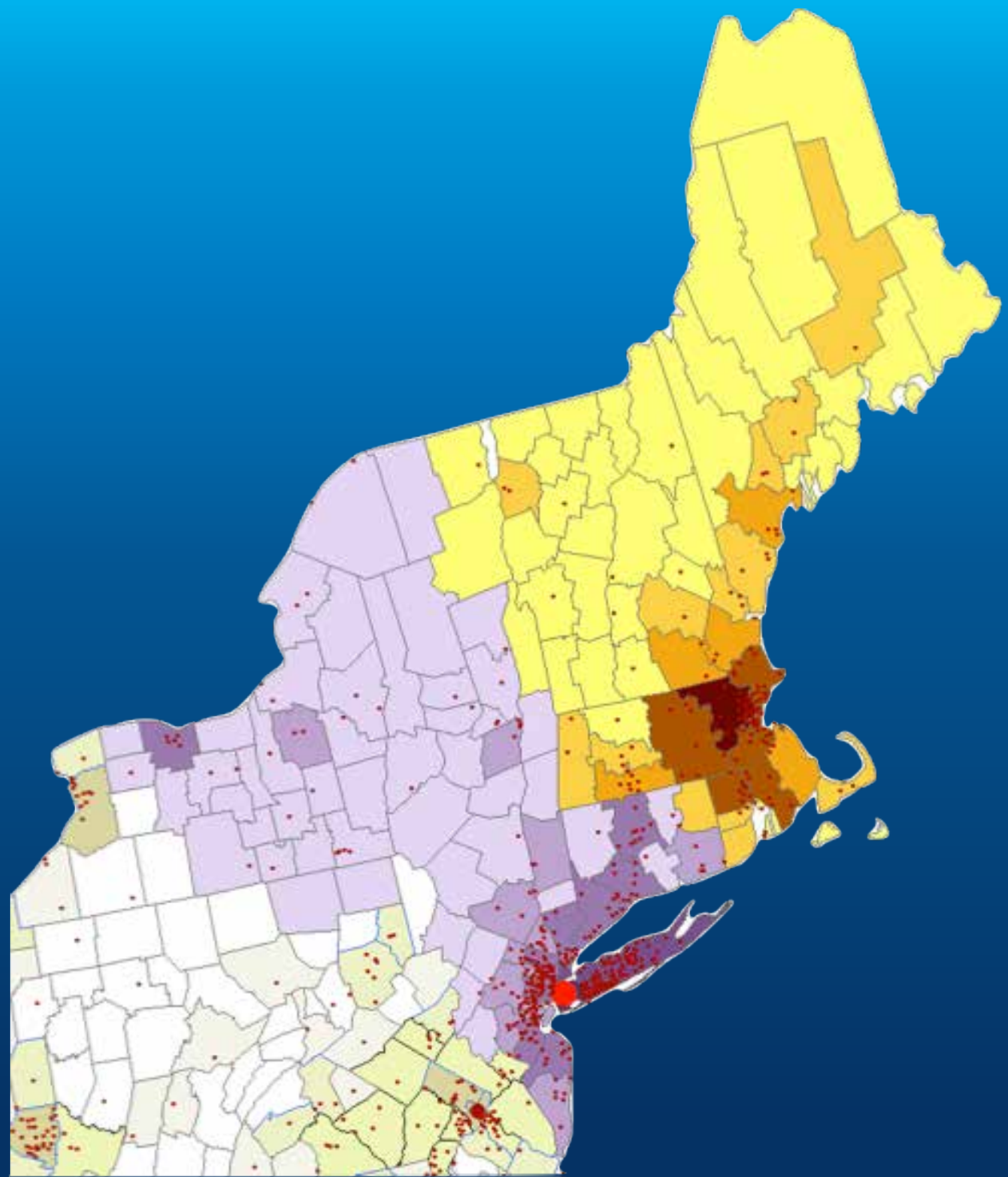

## ENERGY in Boston Bioregion:

**Renewable Energy Sources (energy.gov 2013)**

| | |
|---|---|
| Maine | 139,654 billion BTUs (100%) |
| New Hampshire | 39,969 billion BTUs (30%) (133,230 = 100%) |
| Vermont | 26,524 billion BTUs (32%) (82,888 = 100%) |
| Massachusetts | 42,103 billion BTUs (43%) (97,914 = 100%) |
| Rhode Island | 2,652 billion BTUs (100%) |
| Connecticut | 26,087 billion BTUs (13%) (200,669 = 100%) |

**Total Bioregion = 252,000 billion BTUs**
**Total Requirement = 466,338 billion BTUs needed**

**SSindexENERGY = 54% local**
**(energy.gov 2013, not including imports)**

## ENERGY in New York Bioregion:

**Renewable Energy Sources (energy.gov 2013)**
**Total Bioregion = 407,678 billion BTUs**
**Total Requirement = 905,951 billion BTUs needed**

**SSindexENERGY = 45%**
**(energy.gov 2013, not including imports)**

# Renewable ENERGY Self Sufficiency Indexes [Partial Data]

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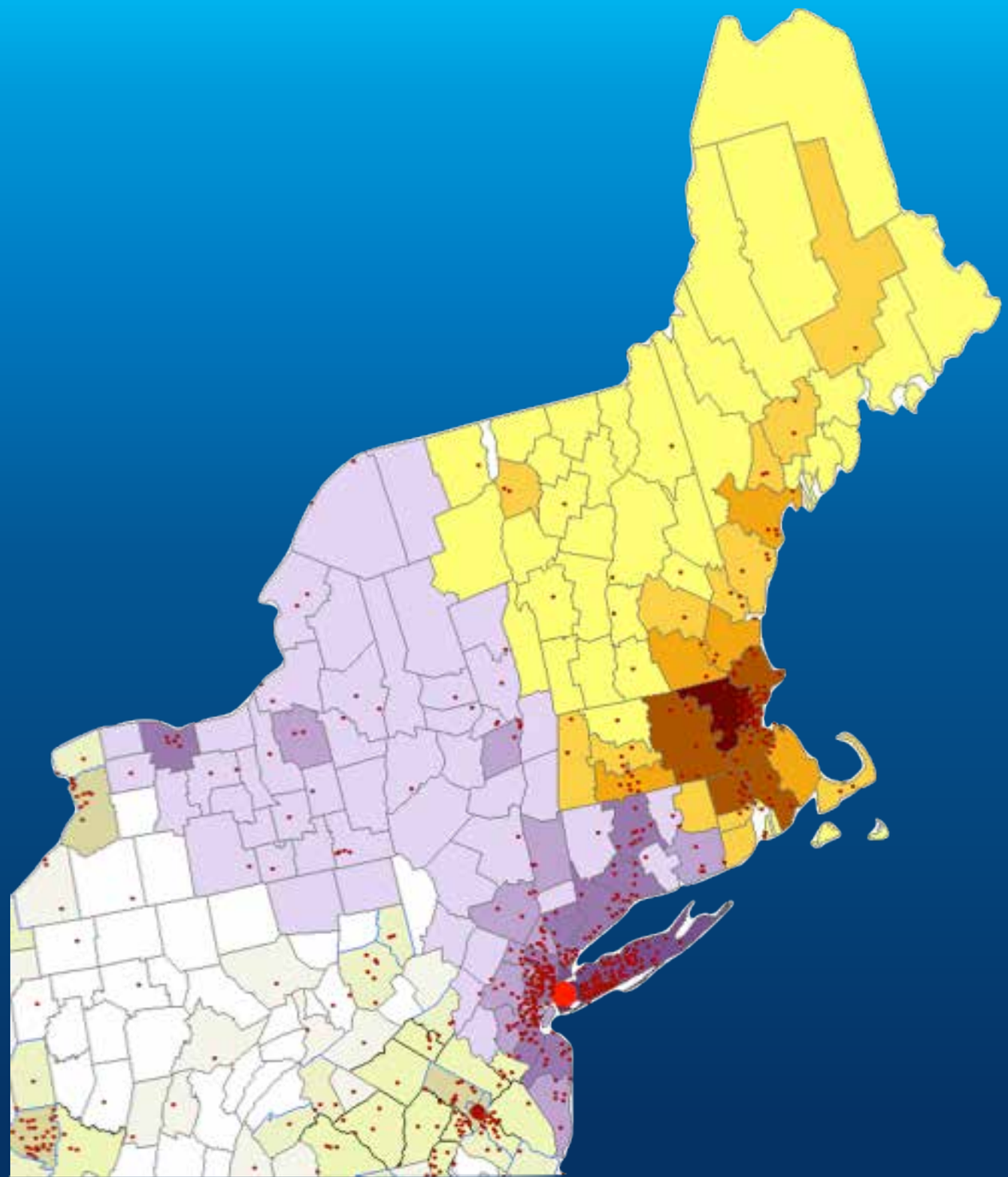

## WASTE in Boston Bioregion:

Maine Generated = 2,495 tons (2,524 managed)
New Hampshire = 3,950 tons (3,950 managed)
Vermont = 2,813 tons (366,785 managed)
Massachusetts = 36,915 tons (45,341 managed)
Rhode Island = 8,597 tons (26,279 managed)

Total Produced = 51,957 tons
Total Managed = 444,879 tons

MA: 39% waste to energy; 31% landfill; 22% recycling; 7% composting

(2011 EPA data)

## WASTE in New York Bioregion:

New York = 186,486 tons produced
New York = 269,685 managed

(2011 EPA data)

# Bioregional WASTE Self Sufficiency Indexes [Partial Data]

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# Bioregional Urbanism:
## Connecting Scientific Metrics to Design

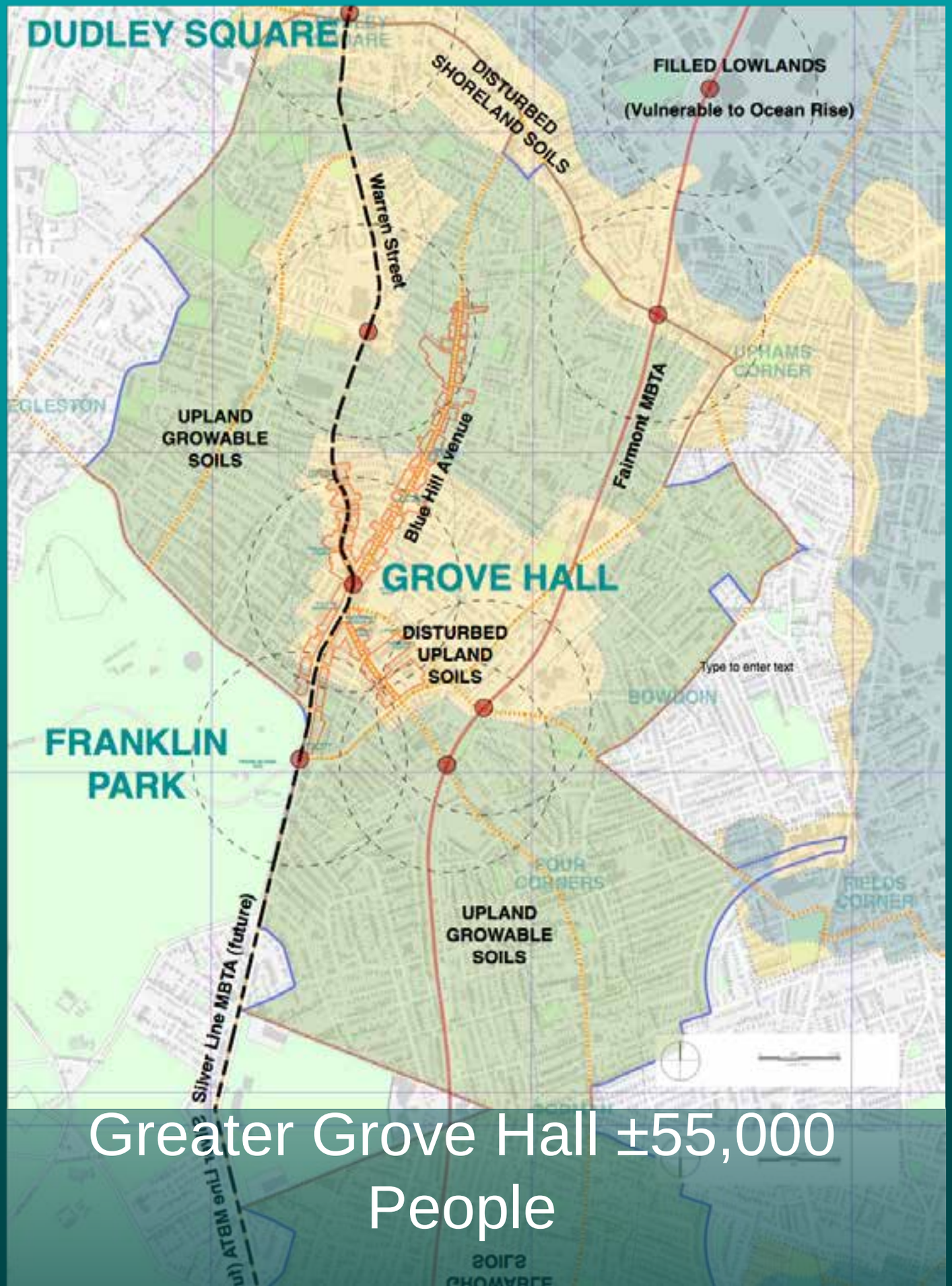
## II. Case Study…
# THE GROVE HALL COMMUNITY
## Boston, Massachusetts

# II. Case Study…
# GROVE HALL

**We applied the BIOREGIONAL URBANISM method…**

## SCIENCE

- **Mapped regional resources**
- **Mapped community resources**

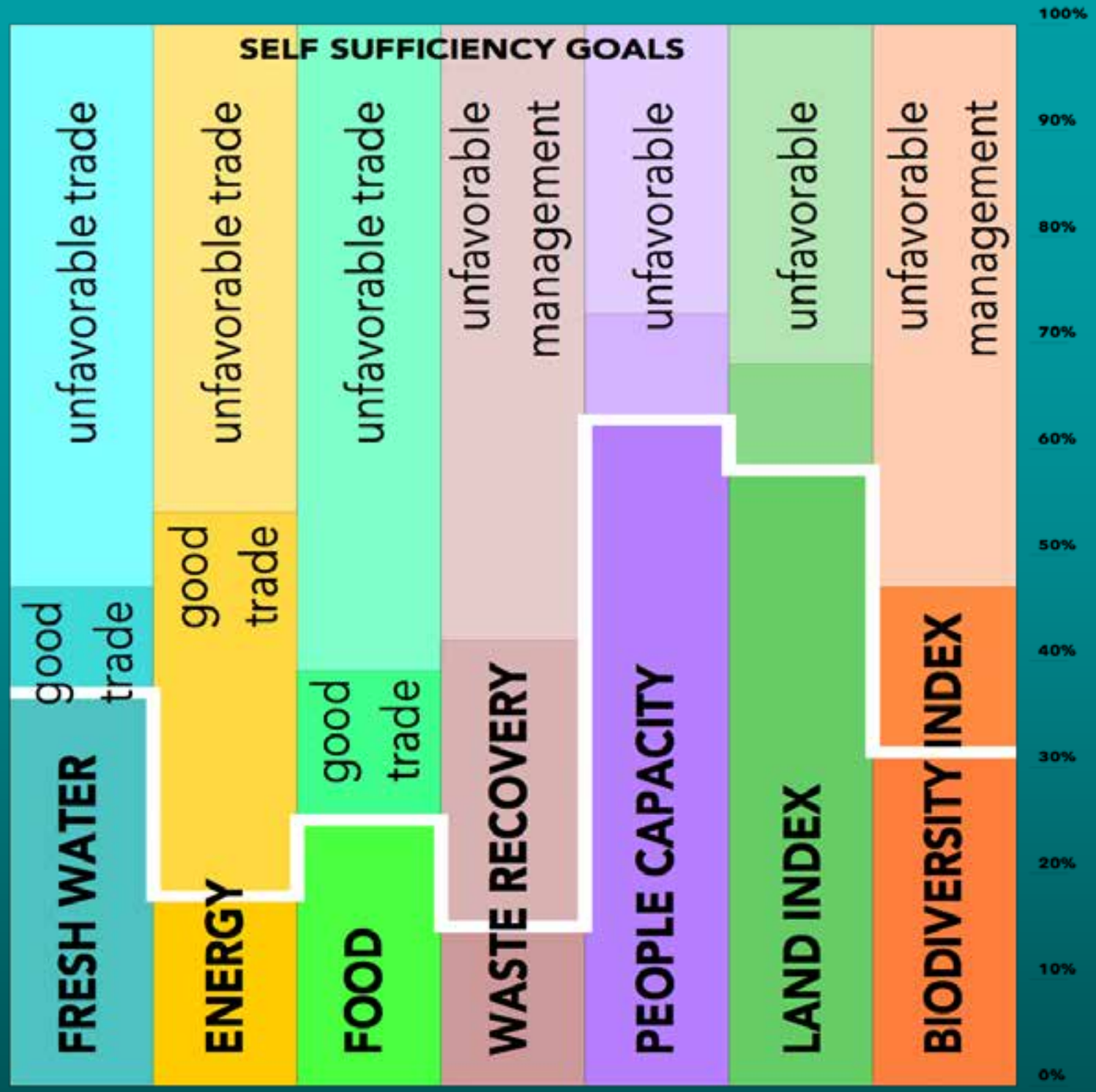


# II. Case Study…
# GROVE HALL

**We applied the BIOREGIONAL URBANISM method…**

## SCIENCE

- **SCORED**
  **Regional Index**
- **ESTABLISHED**
  **Priorities+budgets:**
  - **Community scale**
  - **Regional scale**




REGIONAL INDEX
CMPONENTS

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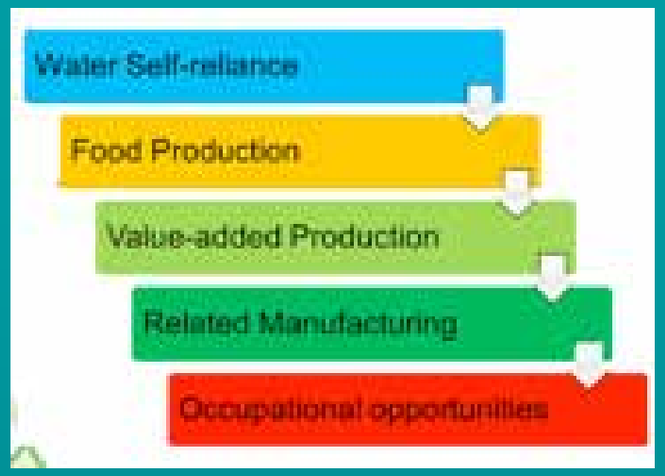
# II. Case Study…
# GROVE HALL

**Ongoing application of the BIOREGIONAL URBANISM method…**

## DESIGN—STRATEGIES

- **TYPOLOGIES**
  - **Bioregional building typologies**
  - **“green” corridors**
  - **Bioregional economics**
- **OTHER**
  - **Heritage Projects**
  - **STEM+ incubation/education**




**Bioregional Economic Strategy**


**STEM+ education +Green incubation**

**Bioregional Building Typologies**

**+ Green Corridors**

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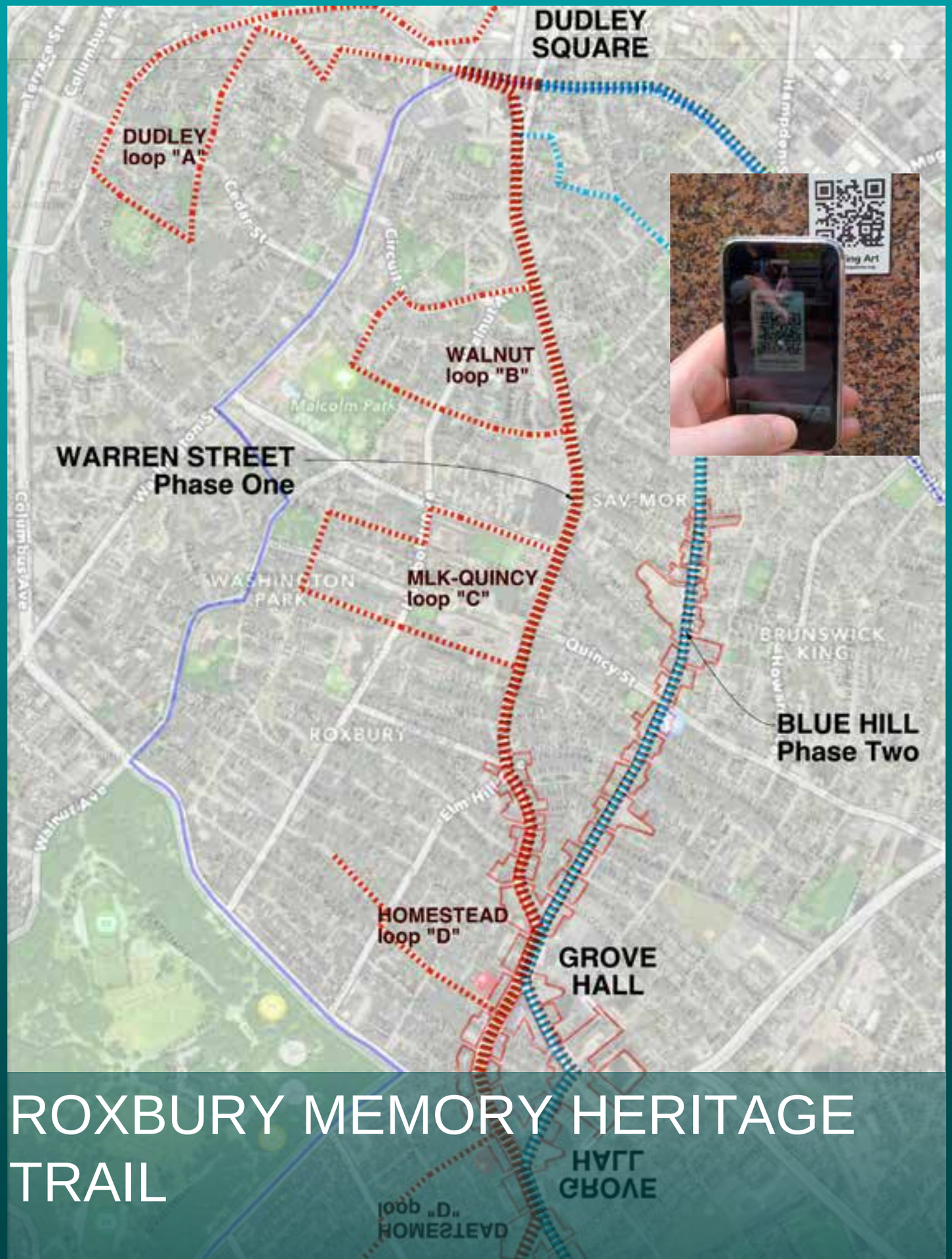
# II. Case Study…
# GROVE HALL

**Ongoing application of the BIOREGIONAL URBANISM method…**

**DESIGN IMPLEMENTATION**

**ROXBURY HERITAGE MEMORY TRAIL—Creating a community+regional cultural asset**




ROXBURY MEMORY HERITAGE TRAIL

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# II. Case Study…
# GROVE HALL

**Ongoing application of the BIOREGIONAL URBANISM method…**

## DESIGN IMPLEMENTATION

## S.T.E.A.M.

**School for Resiliency (Science, Technology, Engineering, Arts, Mathematics)**

**creating a community + regional education hub**


GROVE HALL STEAM SCHOOL CONCEPT

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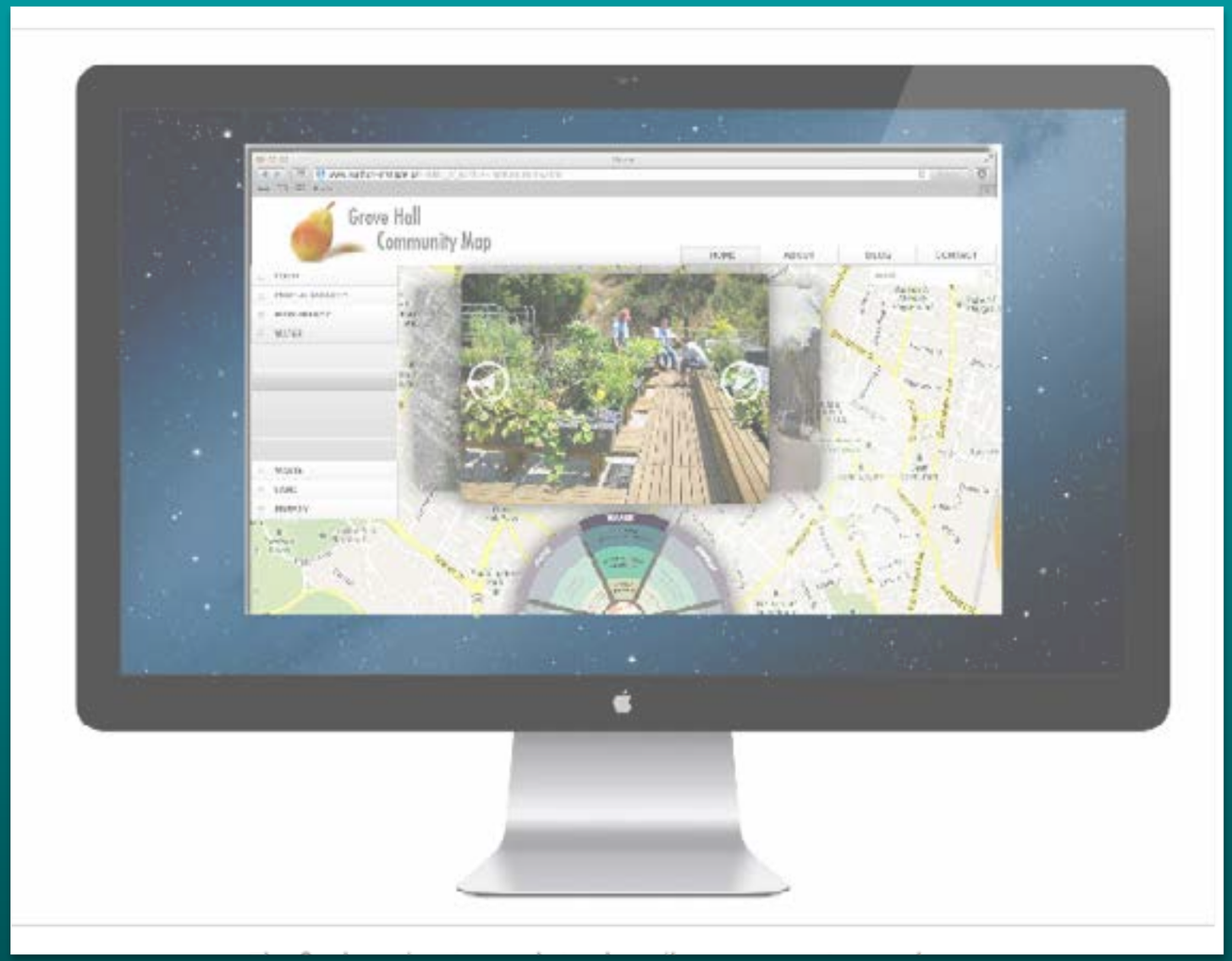
# II. Case Study…
# GROVE HALL

**Ongoing application of the BIOREGIONAL URBANISM method…**

**TOOLS NEEDED!!!!**

**Online mapping system with:**

- **Regional and Local GIS**
- **Crowd-sourced Inputs**
- **Continuous Community Activity Updates**

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# Bioregional Urbanism:
## Connecting Scientific Metrics to Design

### III. Ongoing Knowledge Building…
# Existing and Desired Collaborations

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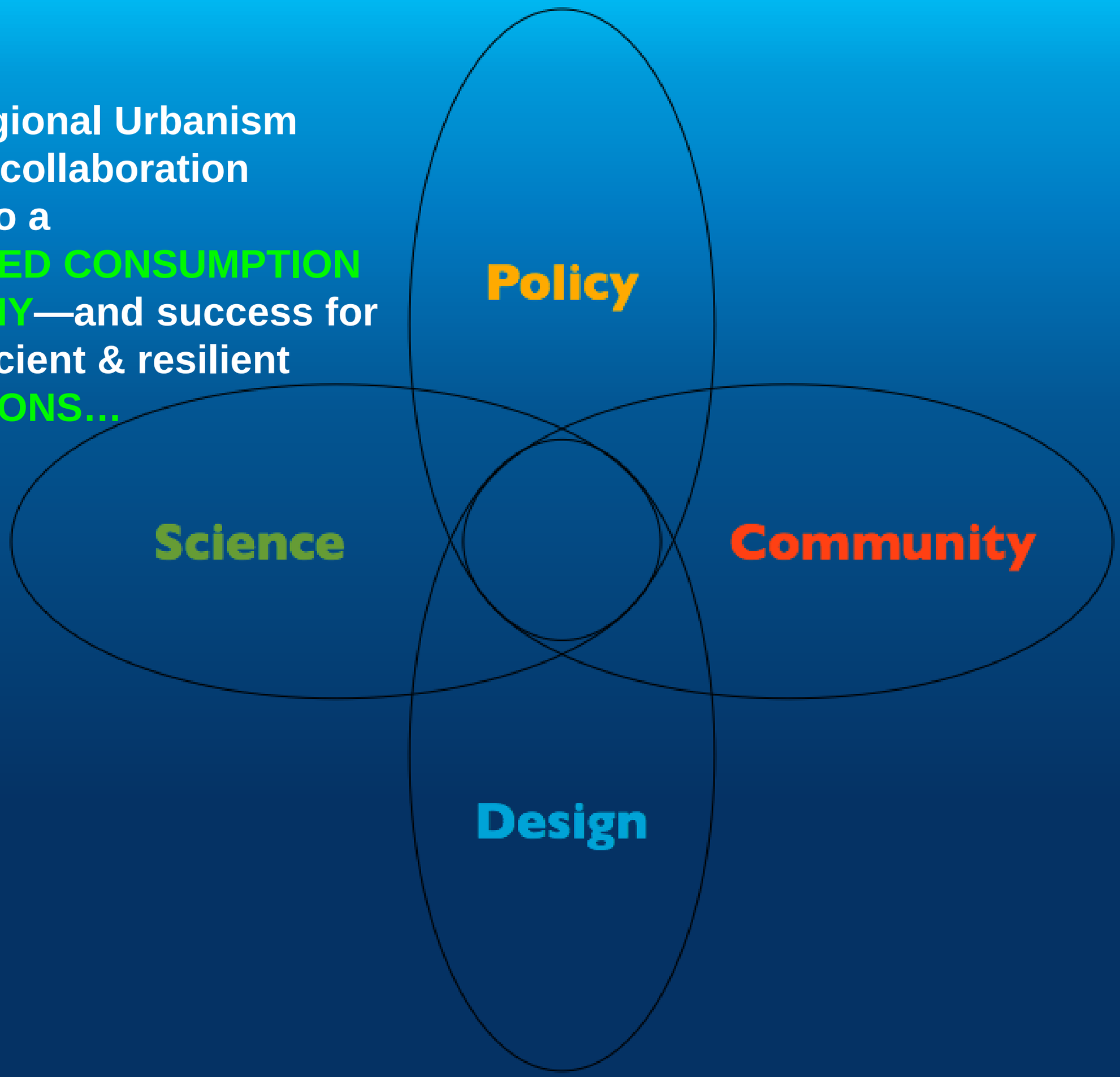
**III. Bioregional Urbanism is based collaboration leading to a BUDGETED CONSUMPTION ECONOMY—and success for self sufficient & resilient BIOREGIONS…**

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## SCIENCE

- GIS Sophistication
- Application Programmers
- Crowd-Sourced Mapping
- System modelers

## DESIGN

- Integrated Design Analysis
- Infrastructure Designers
- Urban Ecologists
- Systems designers
- Economy designers

## COMMUNITY

- Local, regional, global
- Residents, leaders
- Diverse representation

## POLICY

- Local, regional, global

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# Some desired Collaborations for Knowledge Building & Applications

# Bioregional Urbanism:
## Connecting Scientific Metrics to Design

# Thank You for Your Interest!

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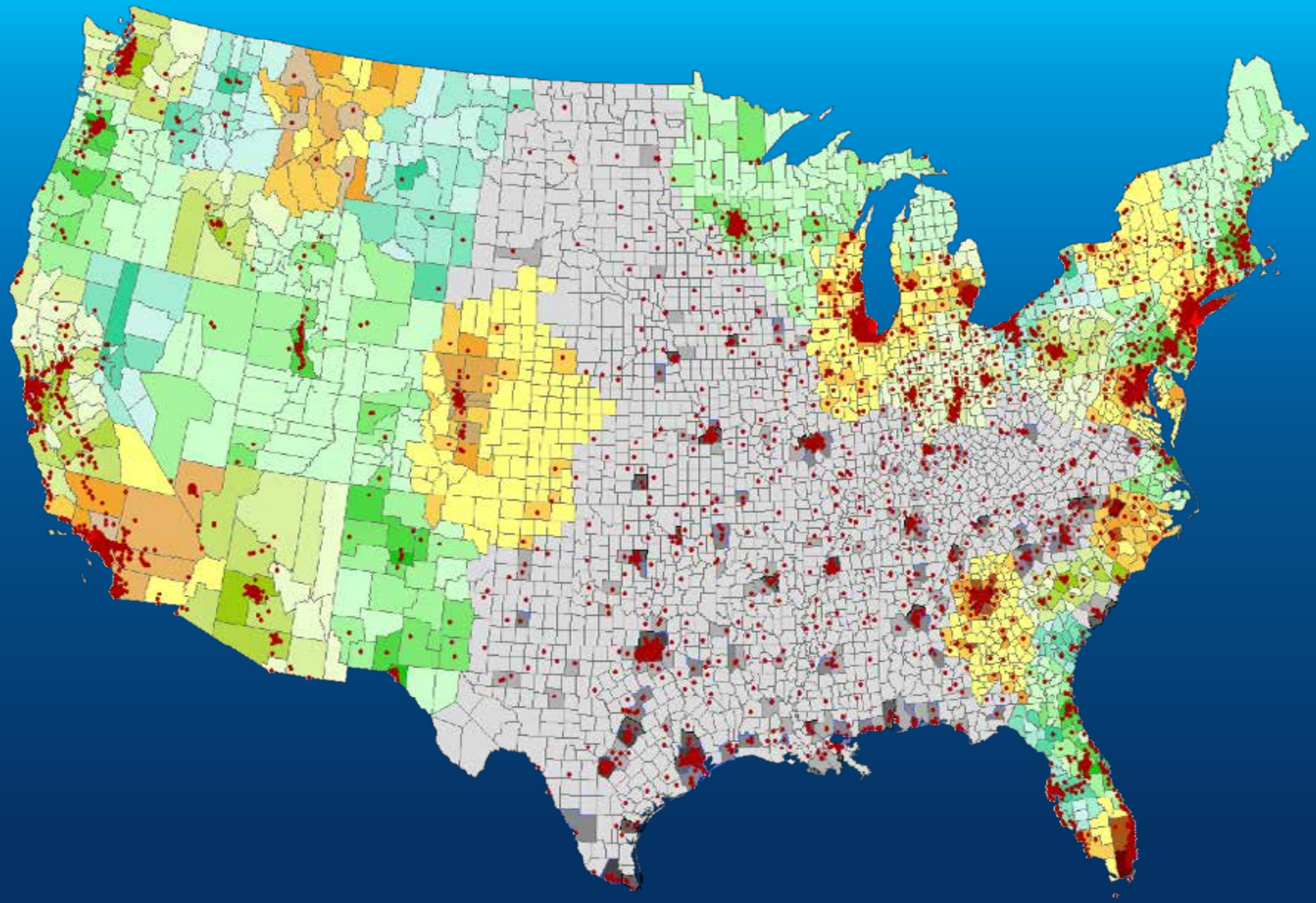

# BIOREGIONS: Analytical Tiles of Populations in their Influence Zones

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# A special form of GeoDesign…

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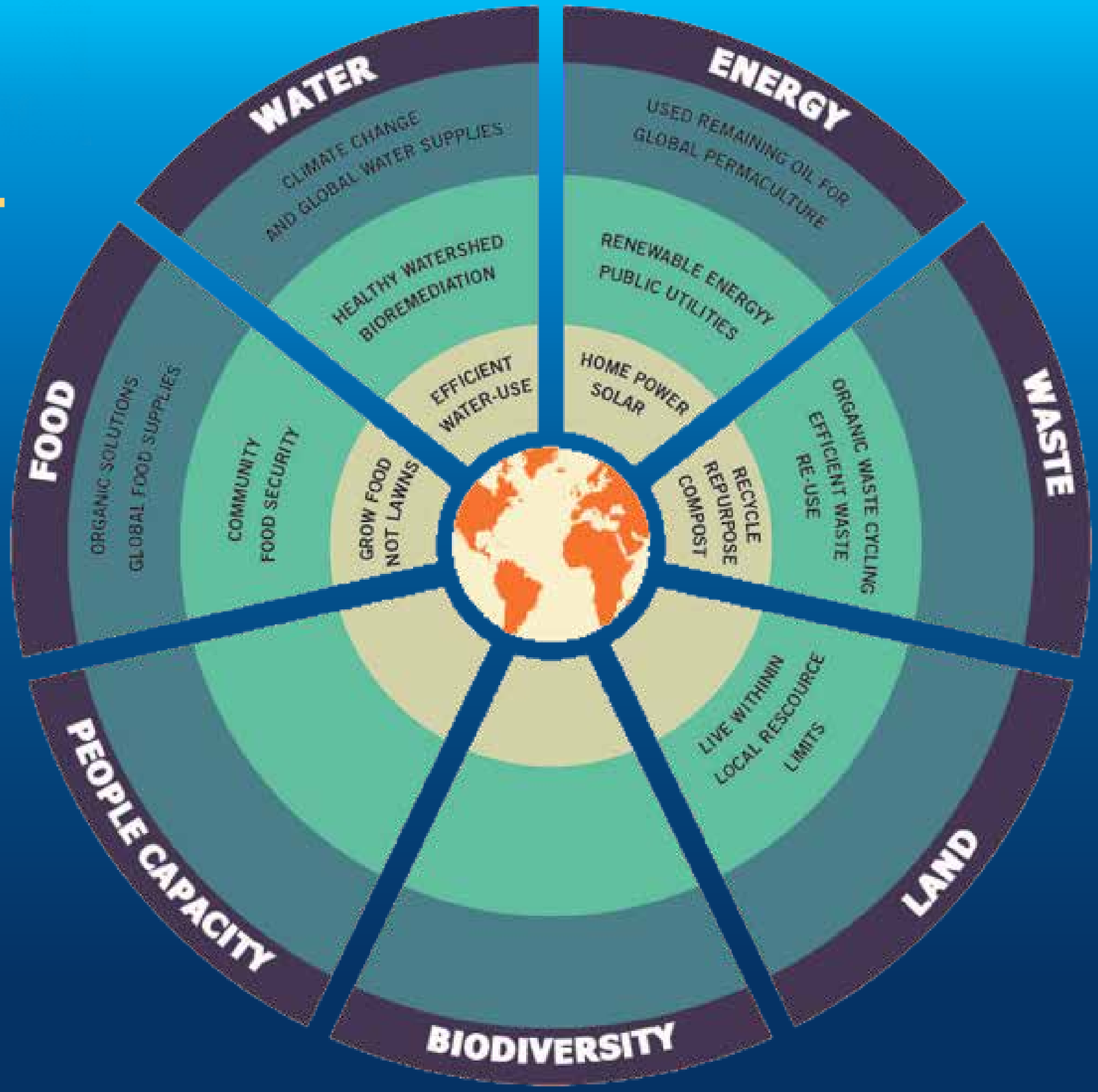
**The ratio of LOCAL RESOURCES divided by IMPORTS**

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**RESOURCE BUDGETS—from the global to the local**