

Resilient Infrastructure for Thriving Communities

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Bayou Preservation
Association Confluence

November 7, 2024



Flood Control District Mission

Provide flood damage reduction projects that work, **with appropriate regard for community and natural values.**

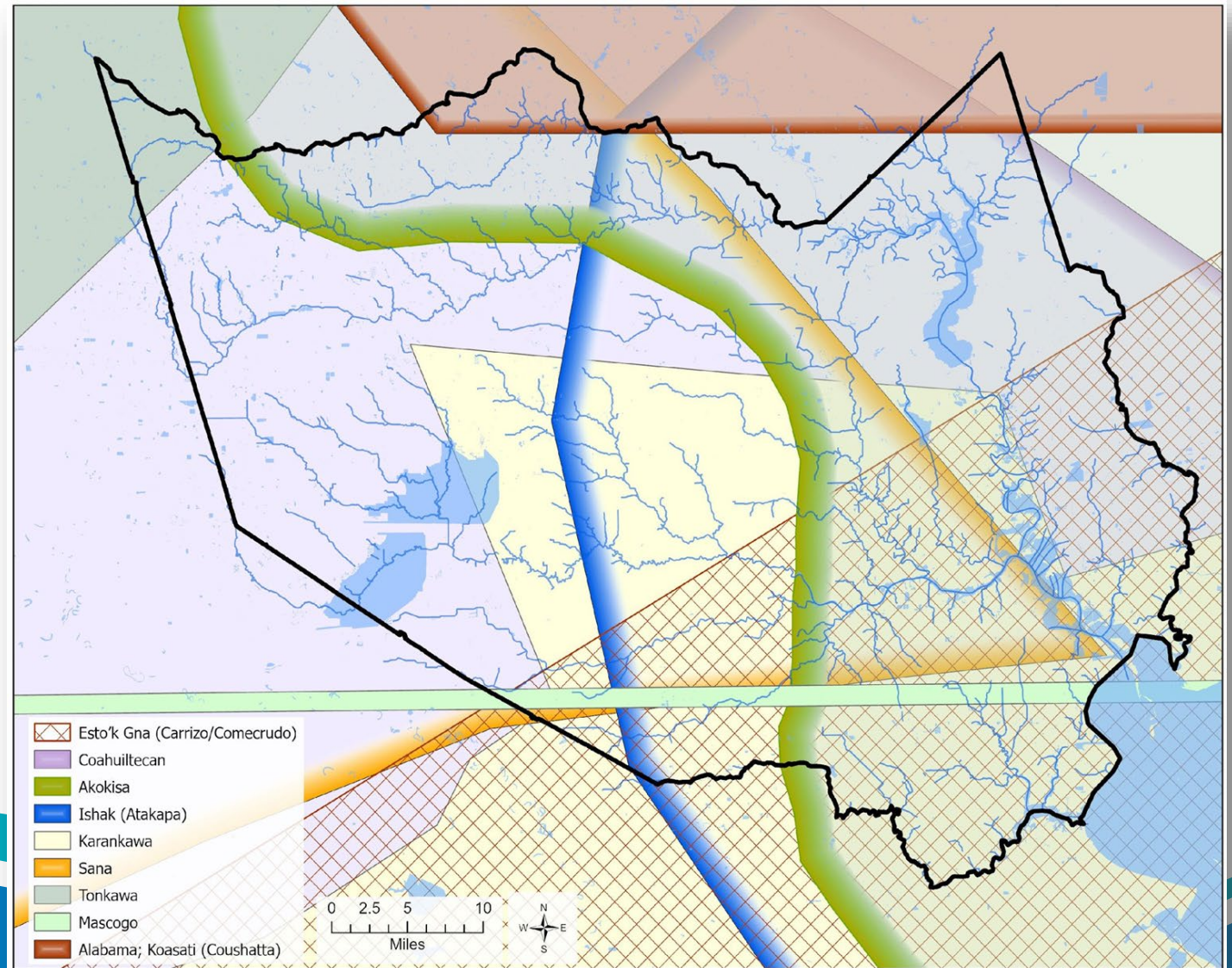
Today's Topics

- Confluence
- Equitable Resilience
- One Health in the Built Environment
- Sustainable Infrastructure in Practice

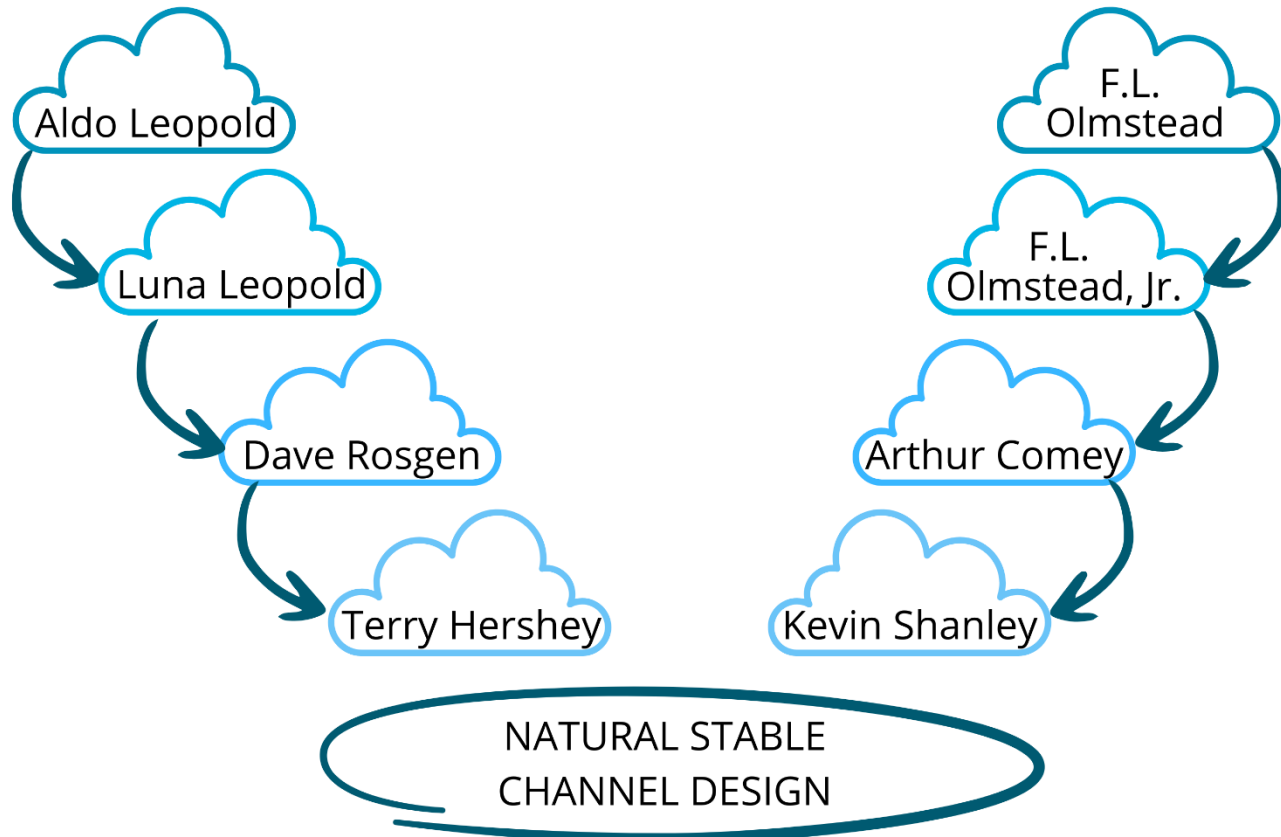


Land Acknowledgment

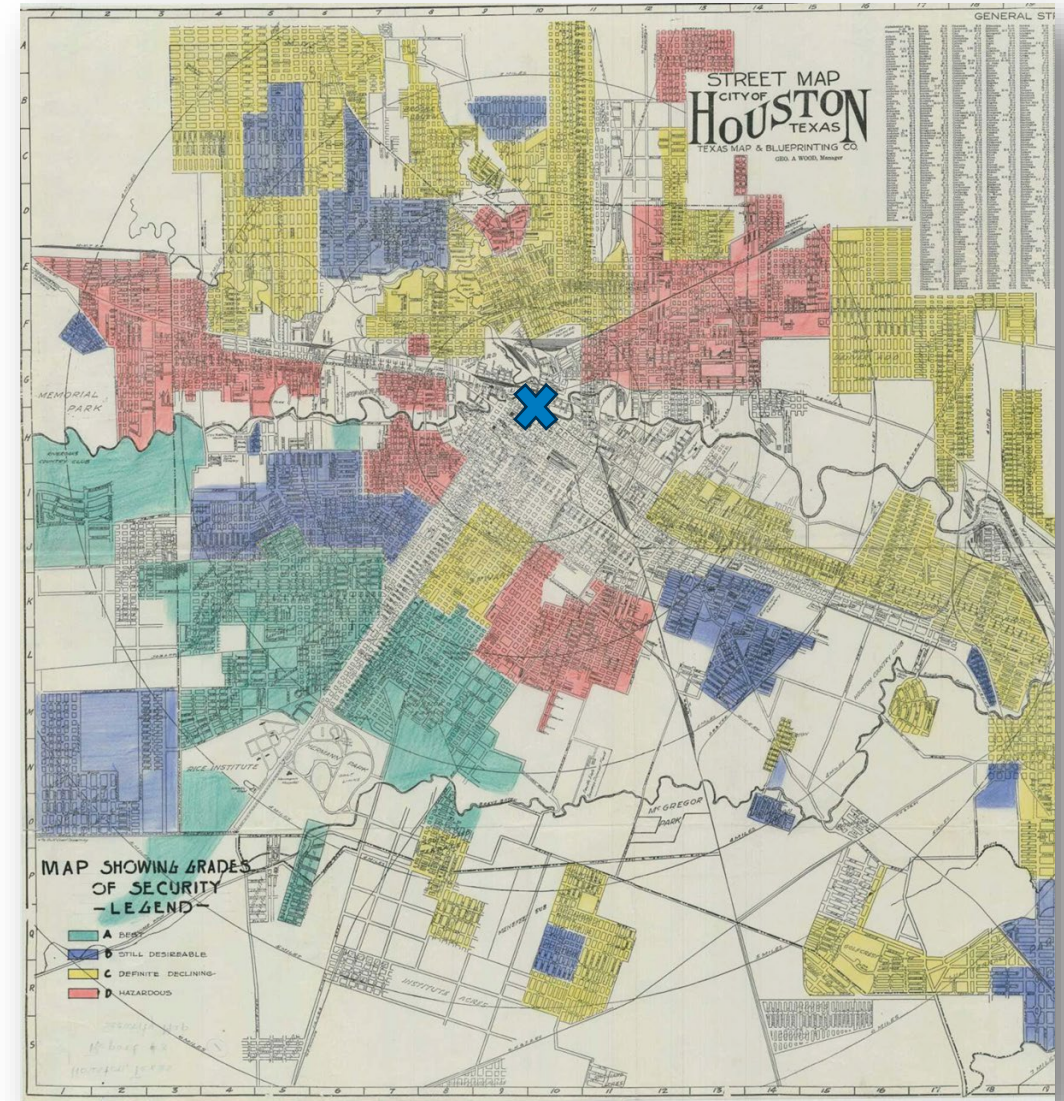
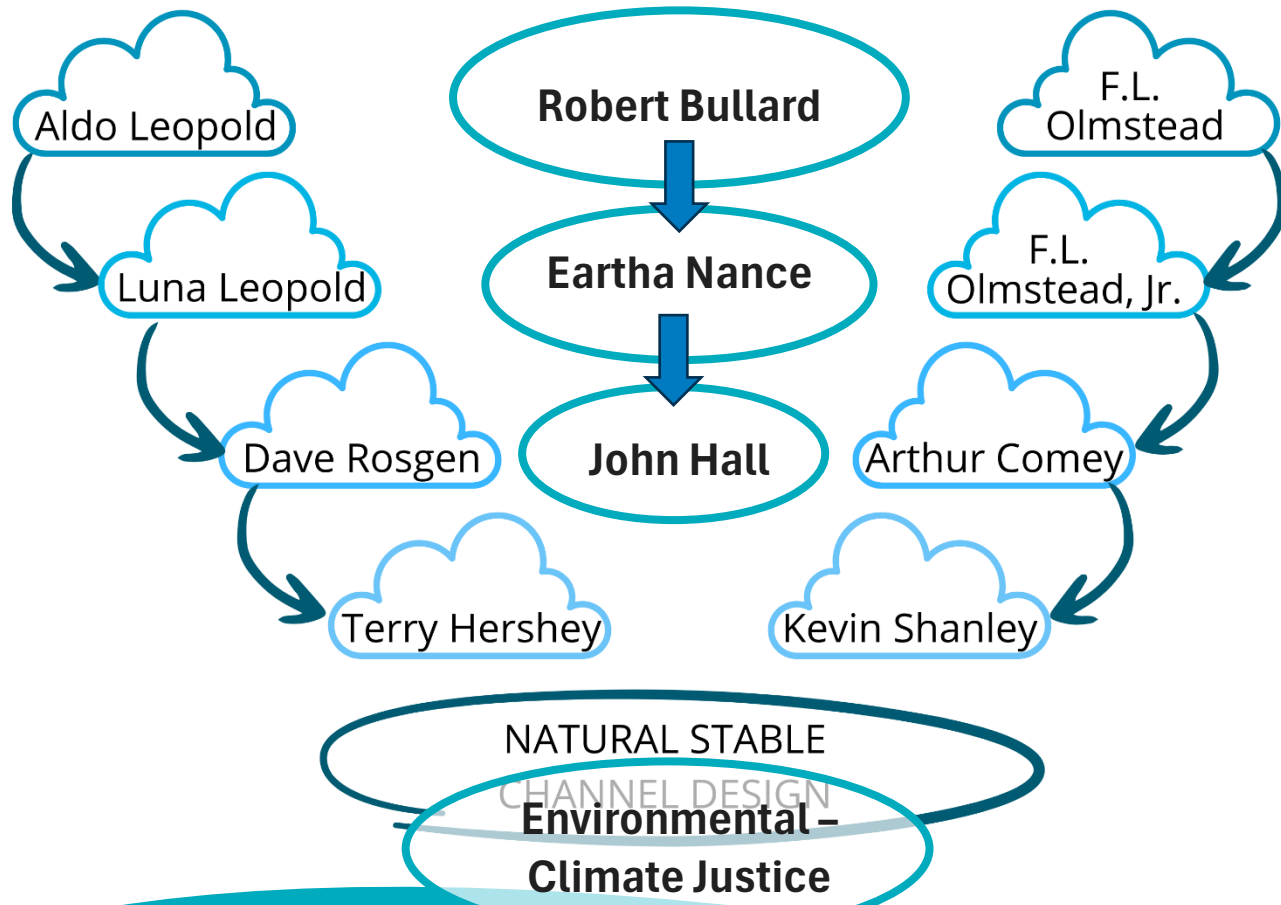
- Indigenous Peoples occupied area
- Gratitude for prior support & care of land and water
- Recognize power of “two-eyed seeing”



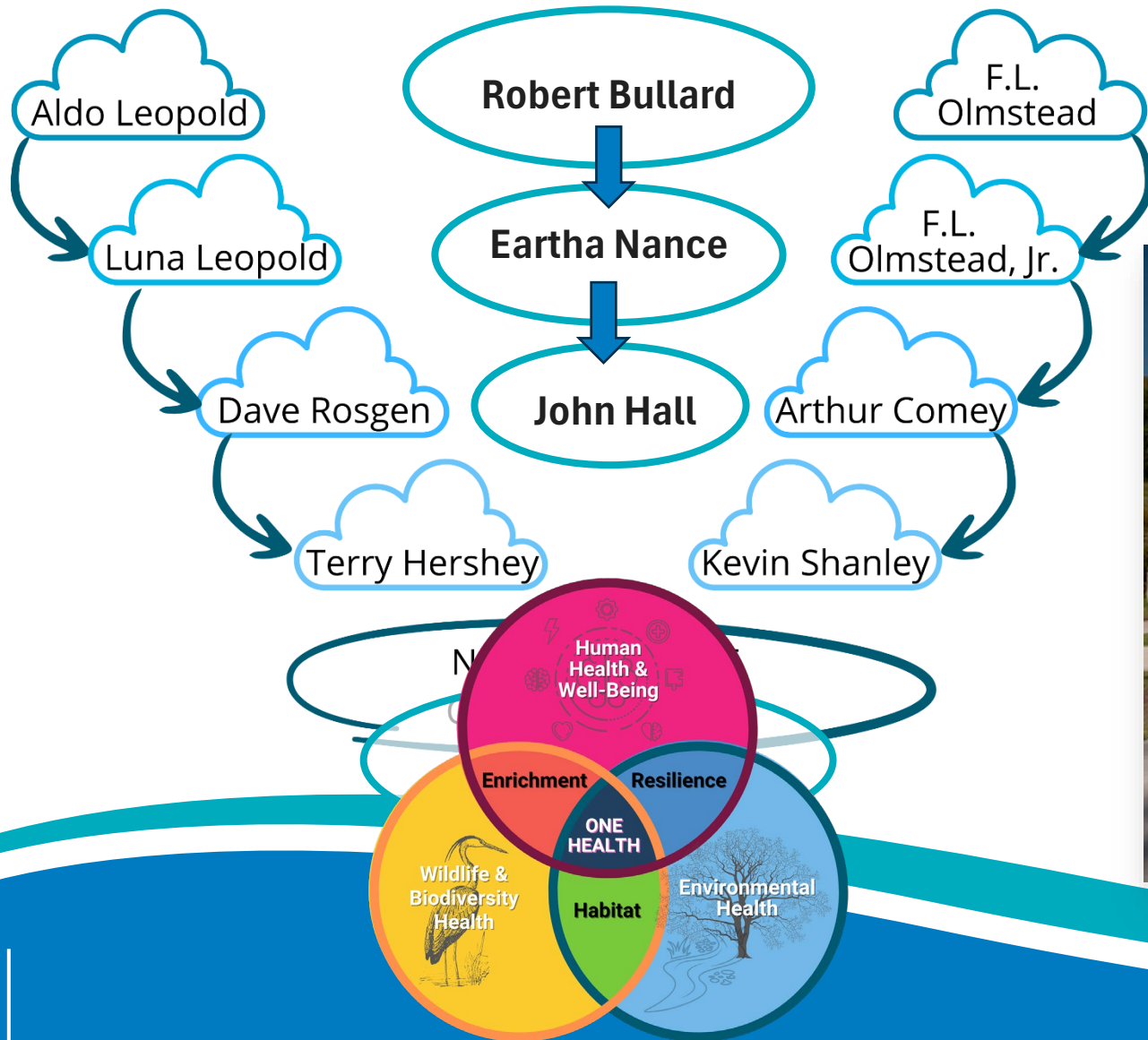
Confluence



Confluence



Confluence



Keith-Wiess Park

RACIAL BIAS AND CLASSISM

- residential segregation
- political representation
- gentrification
- law enforcement
- resource allocation



DEVELOPMENT

- pavement
- impervious surfaces
- resource distribution
- infrastructure investments



VEGETATION

- greenspace
- tree cover
- ground cover
- habitat



HEAT ISLAND

- trapped heat
- solar exposure
- ground cover
- habitat

POLLUTION SOURCES

- industry
- transportation systems
- water pollutant discharges



DISEASE DYNAMICS

- zoonotic diseases
- transmission
- infection rates
- mortality rates



LANDSCAPE RESILIENCE

- landscape heterogeneity
- habitat diversity
- species richness
- access to nature
- habitat health



Adapted from: Schell, C., et al., 2020

Community Health

Measuring Health Indicators

HUMAN HEALTH & WELLBEING

PERSON-RELATED HEALTH

ENVIRONMENT-RELATED

Access

Hazards

ENVIRONMENTAL HEALTH

SYSTEMS SCALE LANDSCAPE

Land Cover and Composition

Quality

SITE-SPECIFIC GREENSPACE

Spatial Configuration

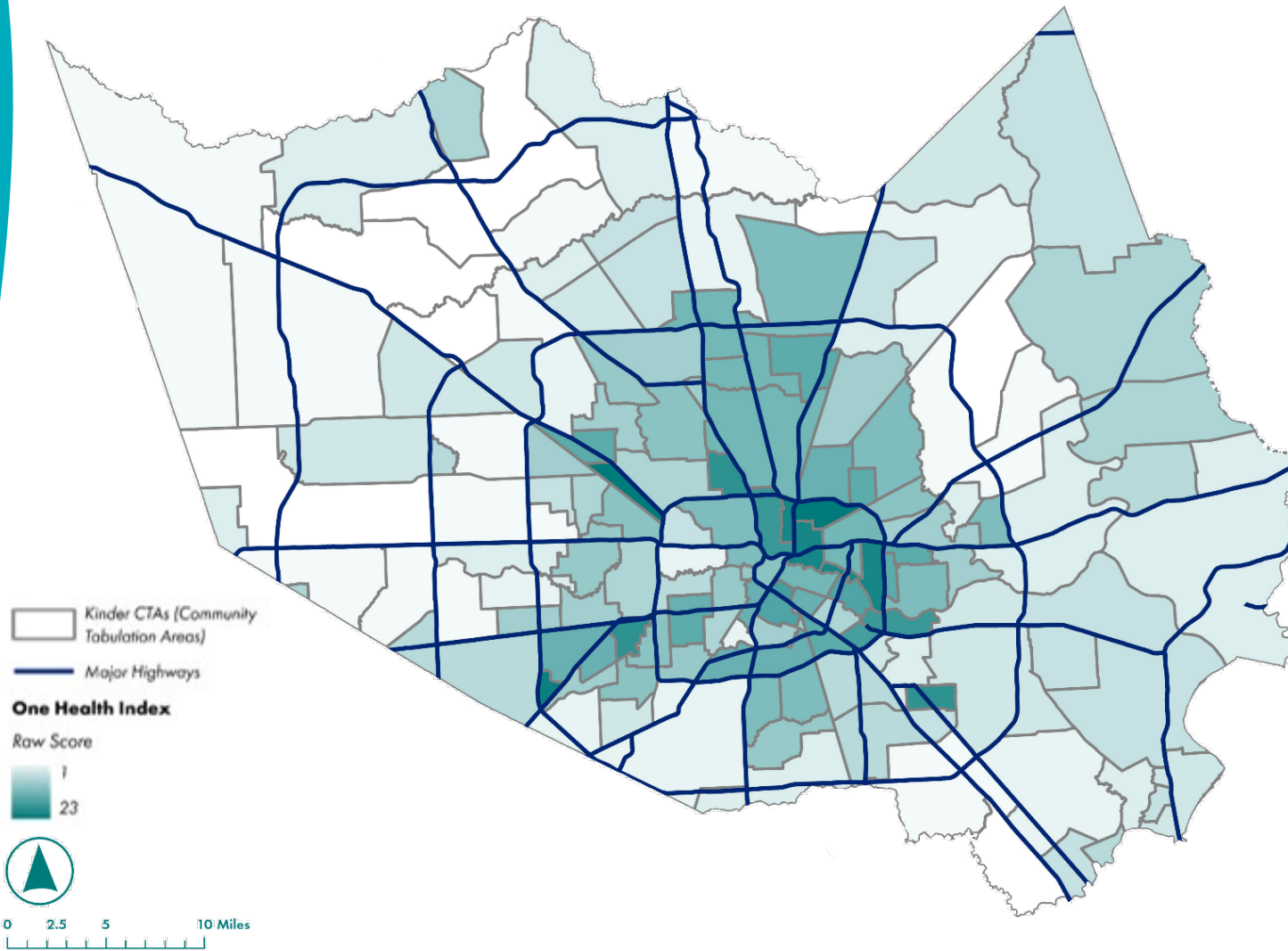
Vegetation Structure

ANIMAL/ BIODIVERSITY HEALTH

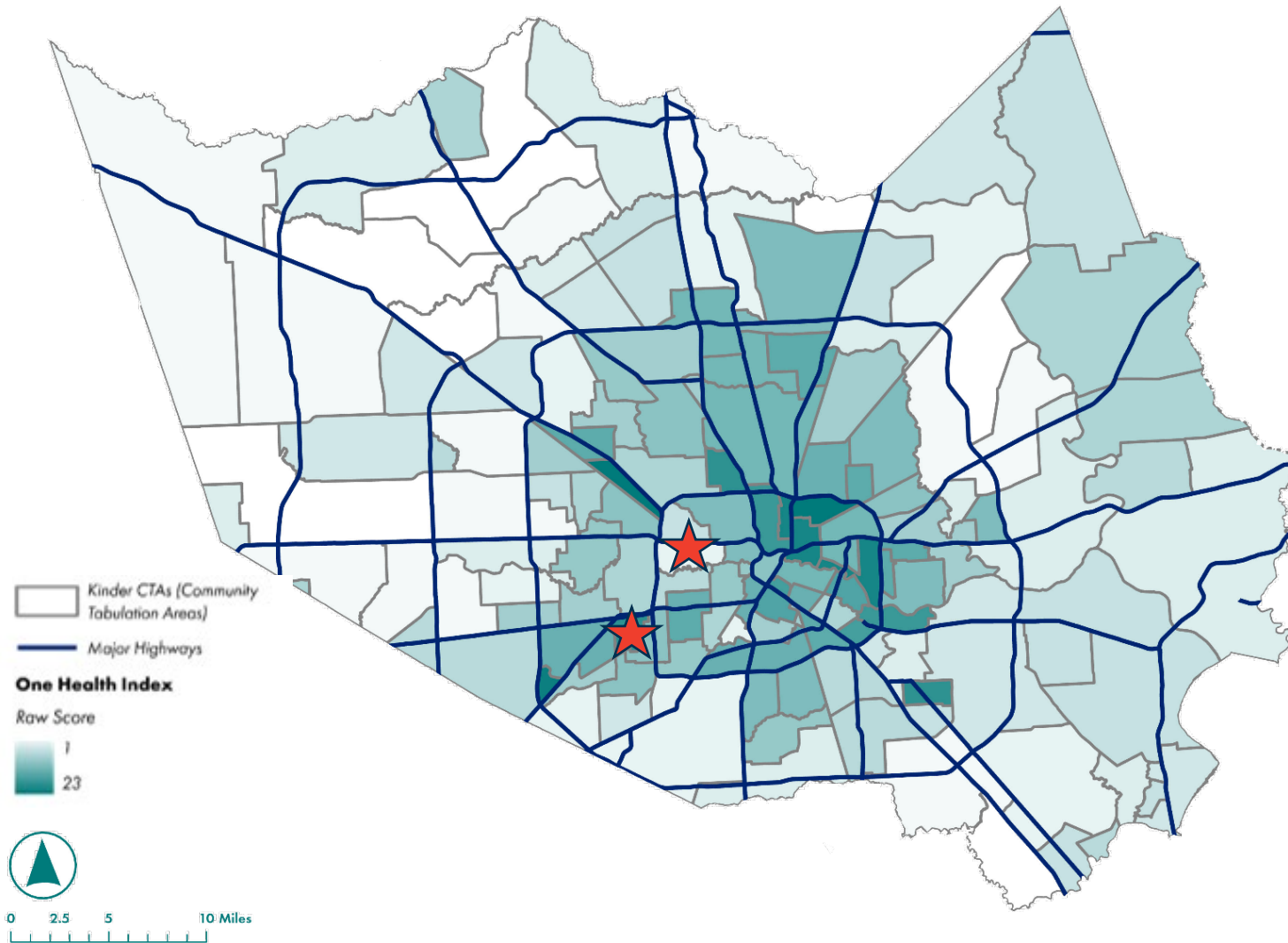
DIVERSITY

HABITAT QUALITY

CONNECTIVITY



A Tale of Two Counties



Memorial Park

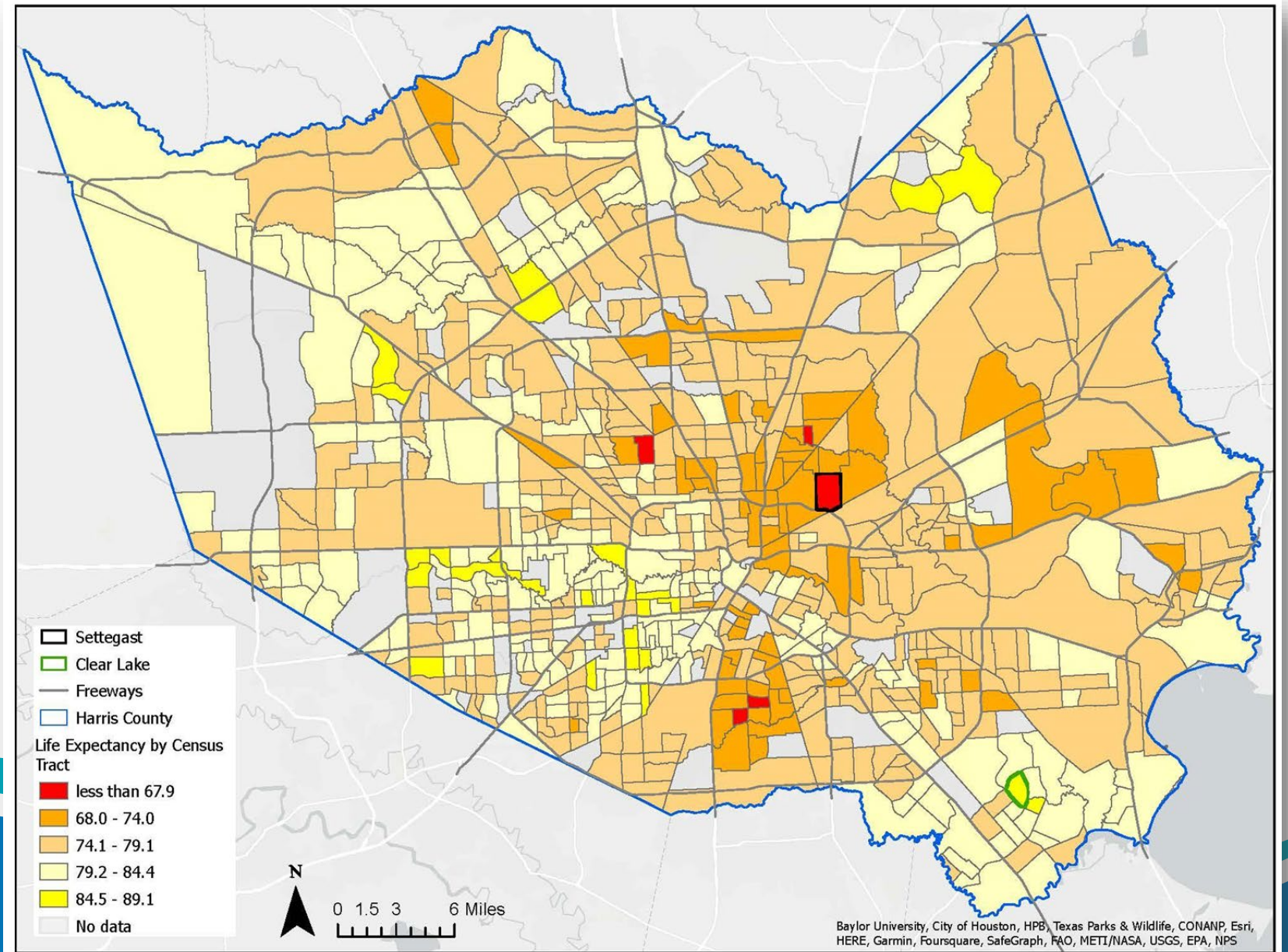


Gulfton Area



Role of our Built Environment

Damaging landscapes, streetscapes, and environments result in negative health outcomes

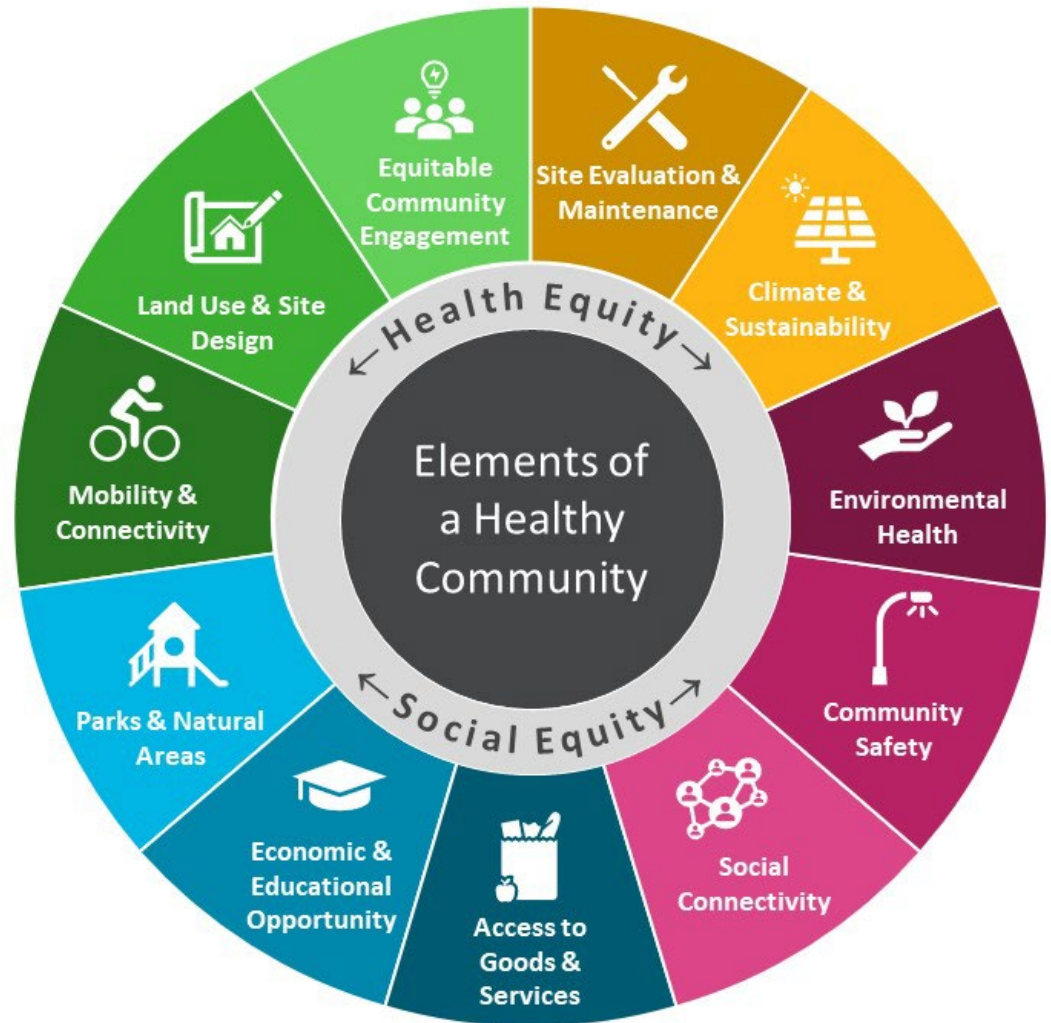
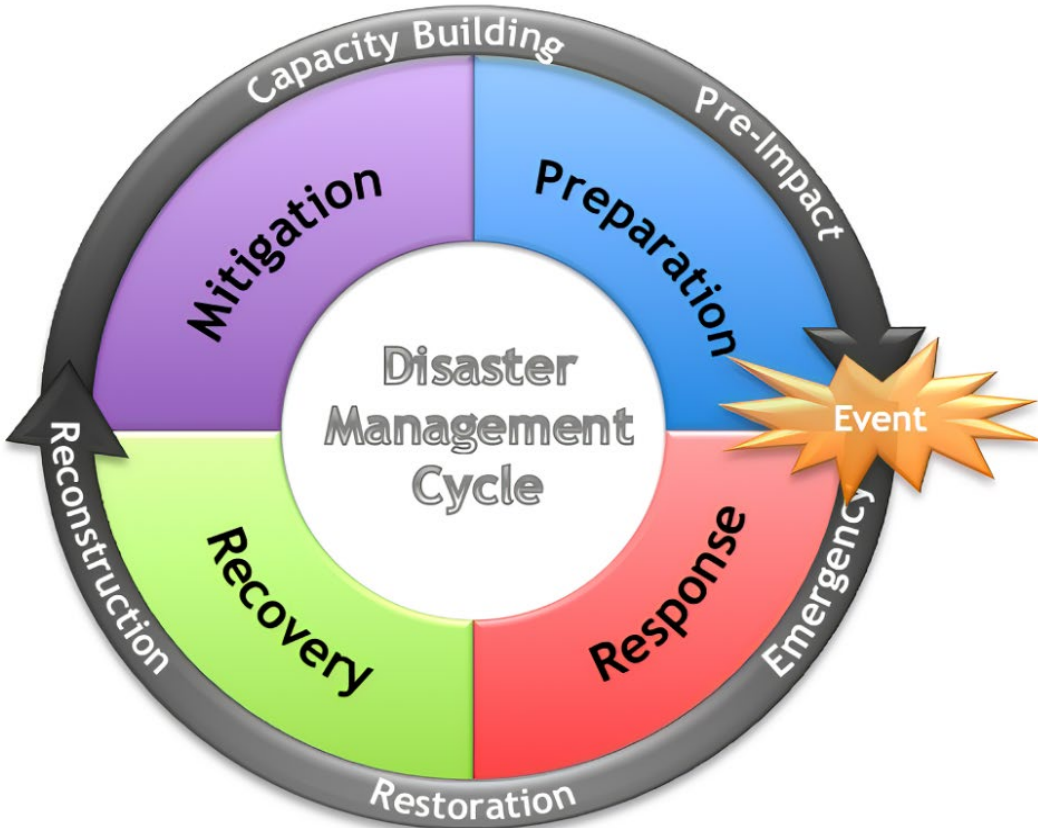


Role of our Built Environment

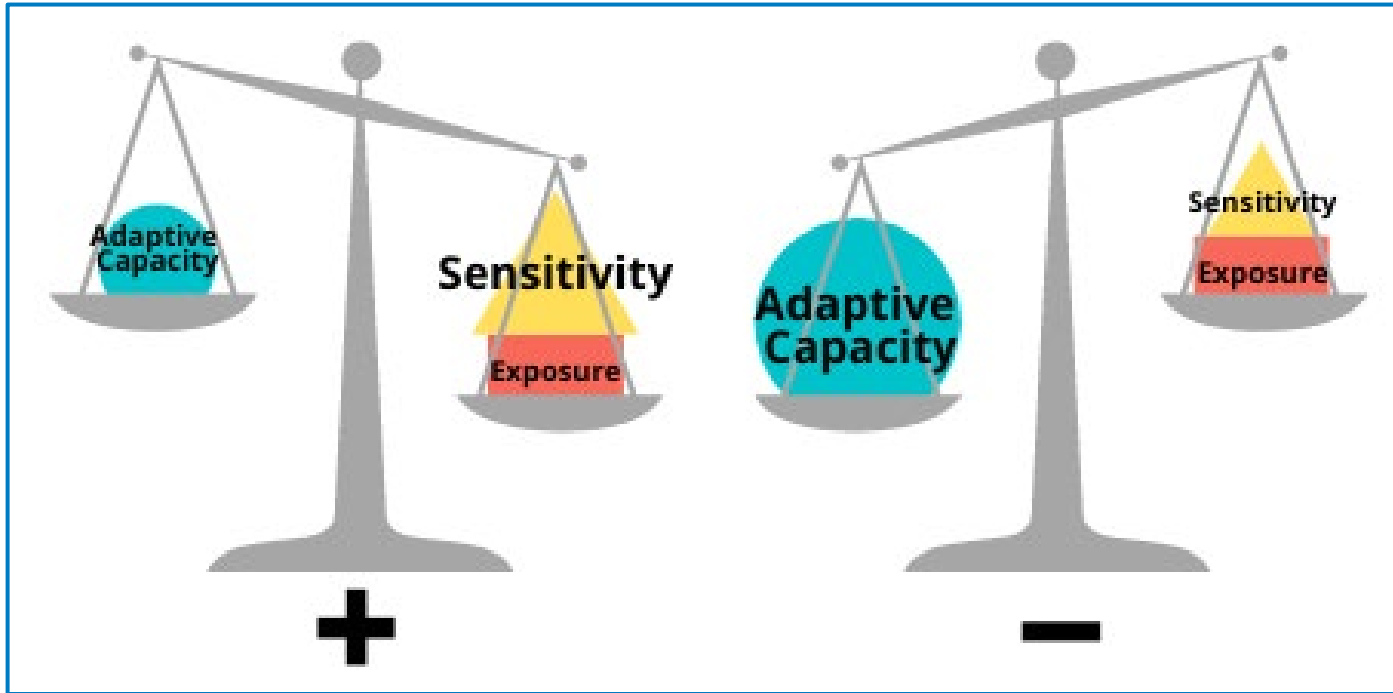
- Access to nature – restorative
- Access to healthy foods
- Community – gathering; safety
- Multi-modal transportation
- Climate adaptive features



Disruptions



Vulnerability



Exposure

Where is your home relative to floodplain?



Sensitivity

How likely are you to be harmed?



Capacity

Are services available to help you cope?



“...a form of human-environmental resilience that takes into account issues of **social vulnerability** and **differentiated access** to power, knowledge and resources. It starts from people’s own perception of their position within their human-environmental system and accounts for their realities and their need for a change of circumstance to avoid imbalances of power into the future.”

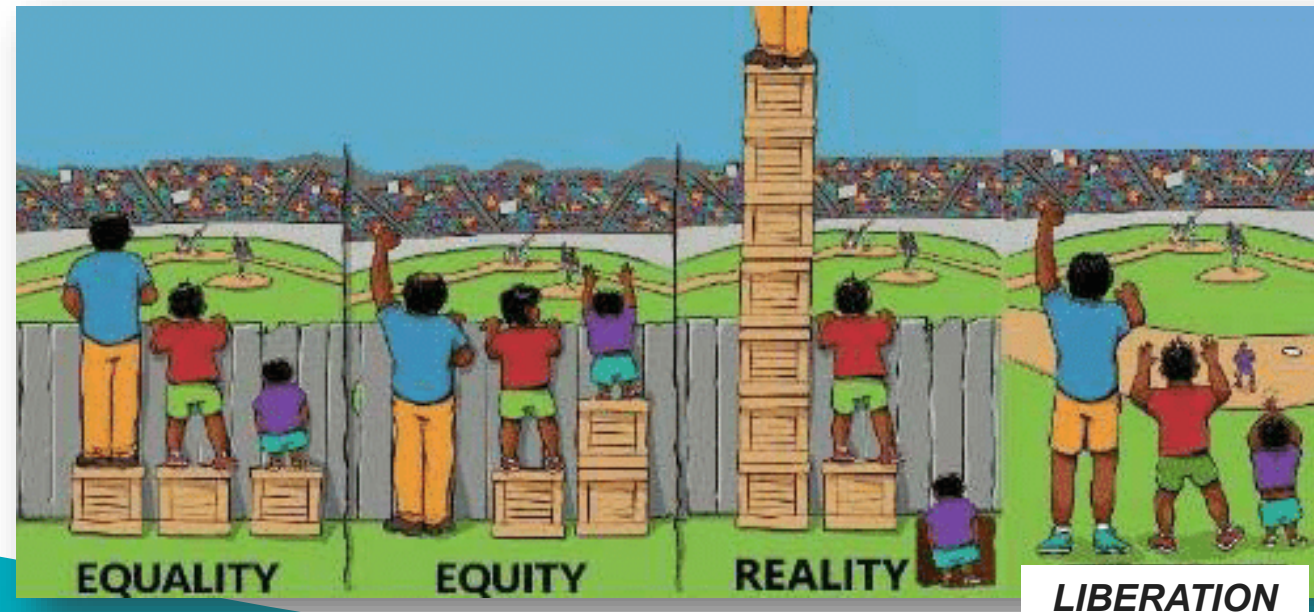
- *Matin, et al., 2018 (referenced in Community Flood Resilience Task Force Bylaws)*

“...equity is the actionable commitment to significantly reduce the **disparity in the distribution** of benefits and the actionable commitment in reducing the burdens of aligning and embedding goals, objectives, and outcomes related to inclusivity and accessibility to the historically marginalized.”

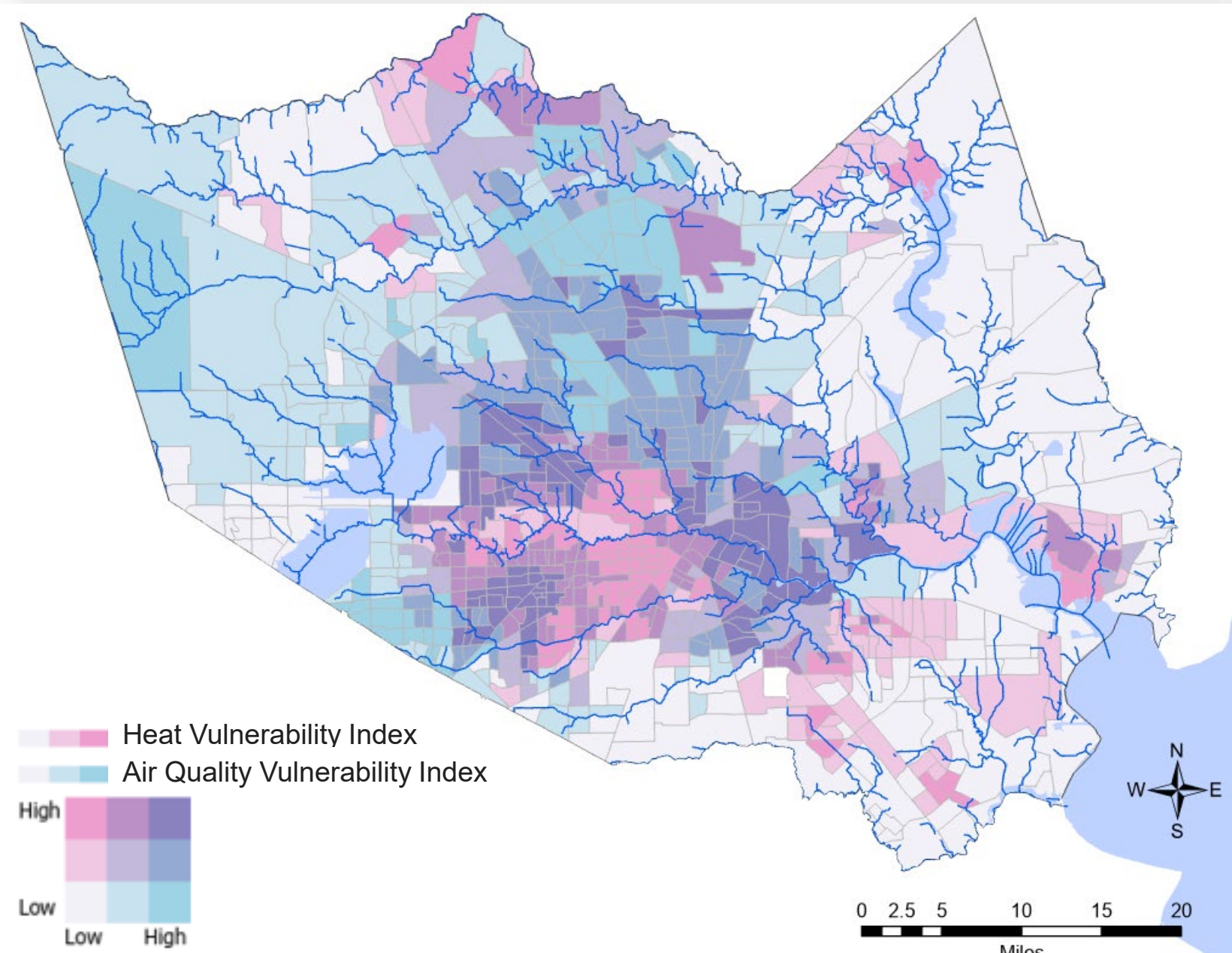
- *Harris County Equity Guidelines, 2024*

“Advancing equity striving for the same outcomes and opportunities across different groups, not simply delivering the same treatment when it fails to yield fair, just, and equal results.”

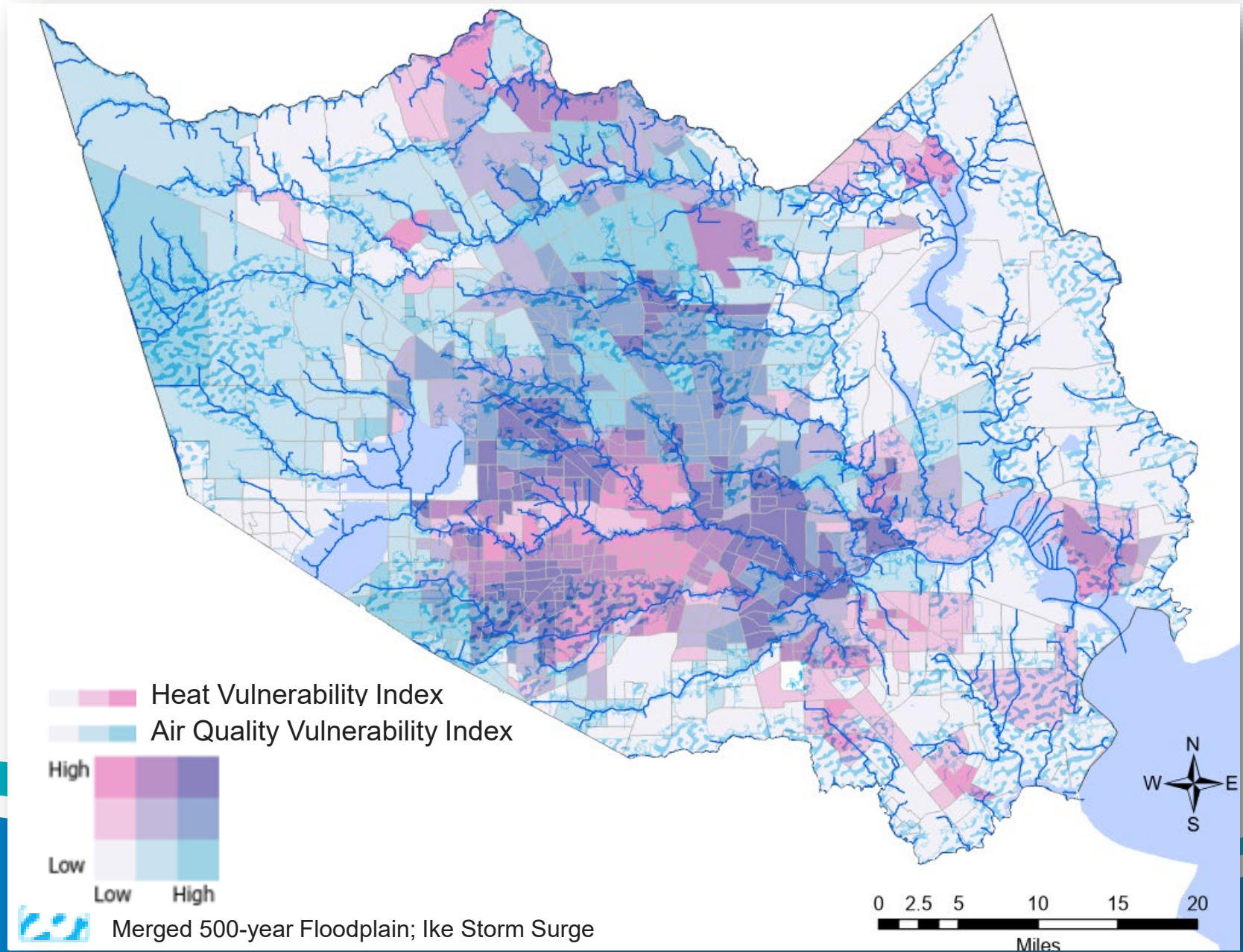
- *Harris County Equity Guidelines, 2021*



Heat & Air Quality Vulnerability

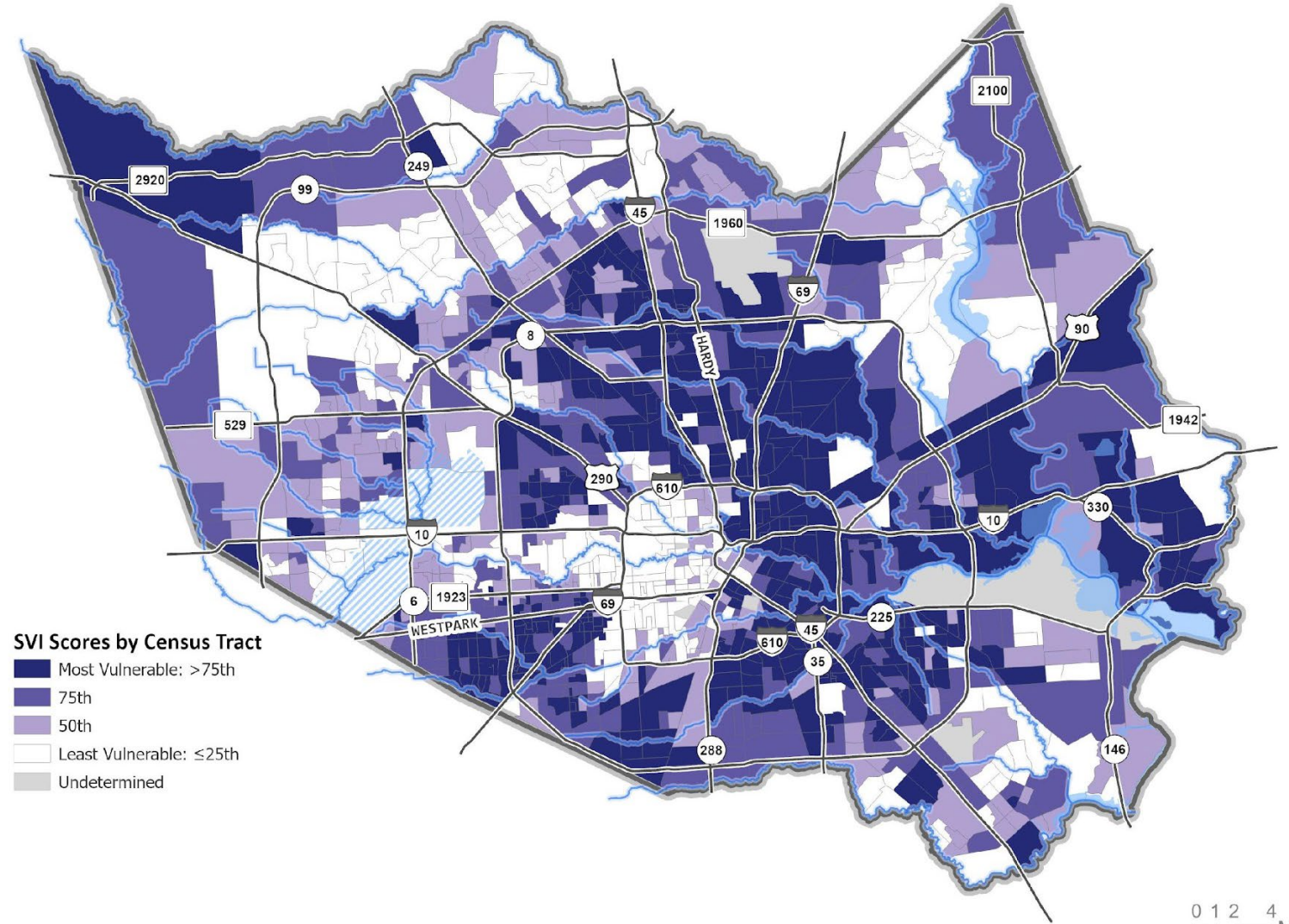


Layer on Flood Risk



Social Vulnerability

CDC's Social Vulnerability Index (SVI)



SVI Scores by Census Tract

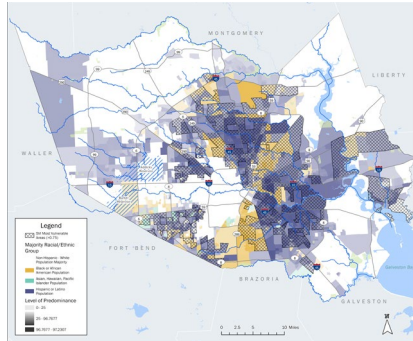
- Most Vulnerable: >75th
- 75th
- 50th
- Least Vulnerable: ≤25th
- Undetermined

0 1 2 4 Miles

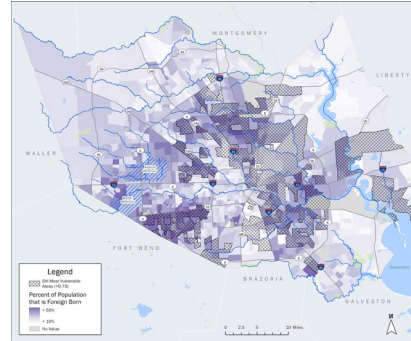
Data Source: 2016-2020 American Community Survey (ACS) 5-year Estimates, Center of Disease Control (CDC), Agency for Toxic Substances & Disease Registry (ATSDR)

Additive Vulnerability Factors

Minority and Foreign-Born Populations

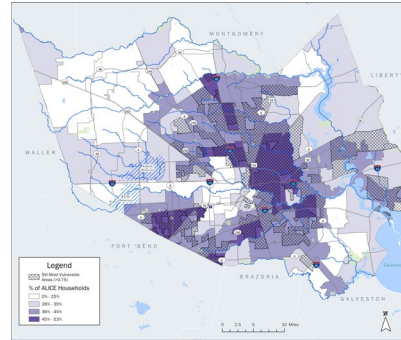


Minority

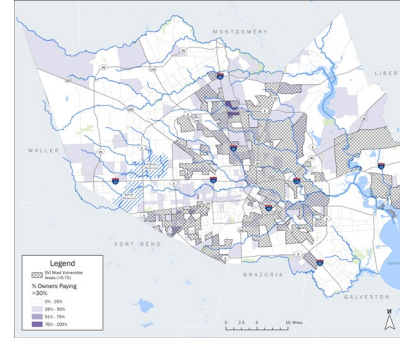


Foreign Born Populations

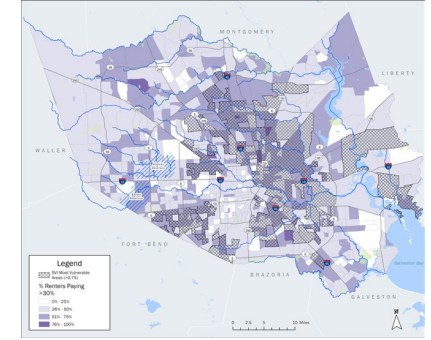
Financial Security



ALICE Populations

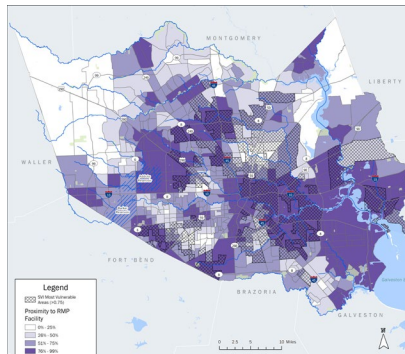


Mortgage Burdened Households



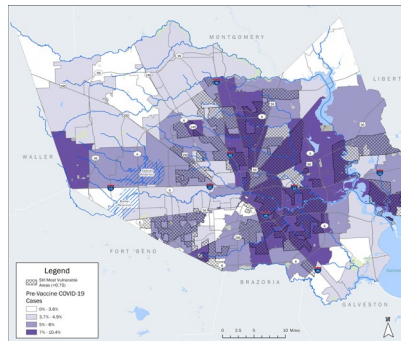
Rent Burdened Households

Chemical and Industrial Hazards

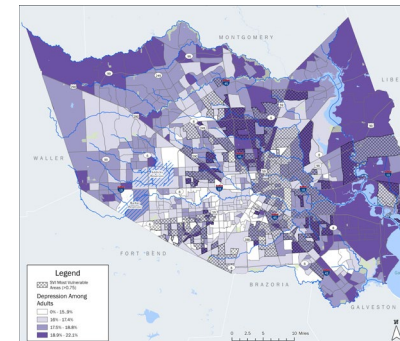


Proximity to facilities with RPMs

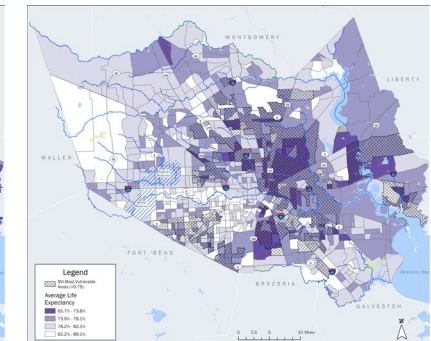
Health



COVID19 Cases



Incidence of Depression

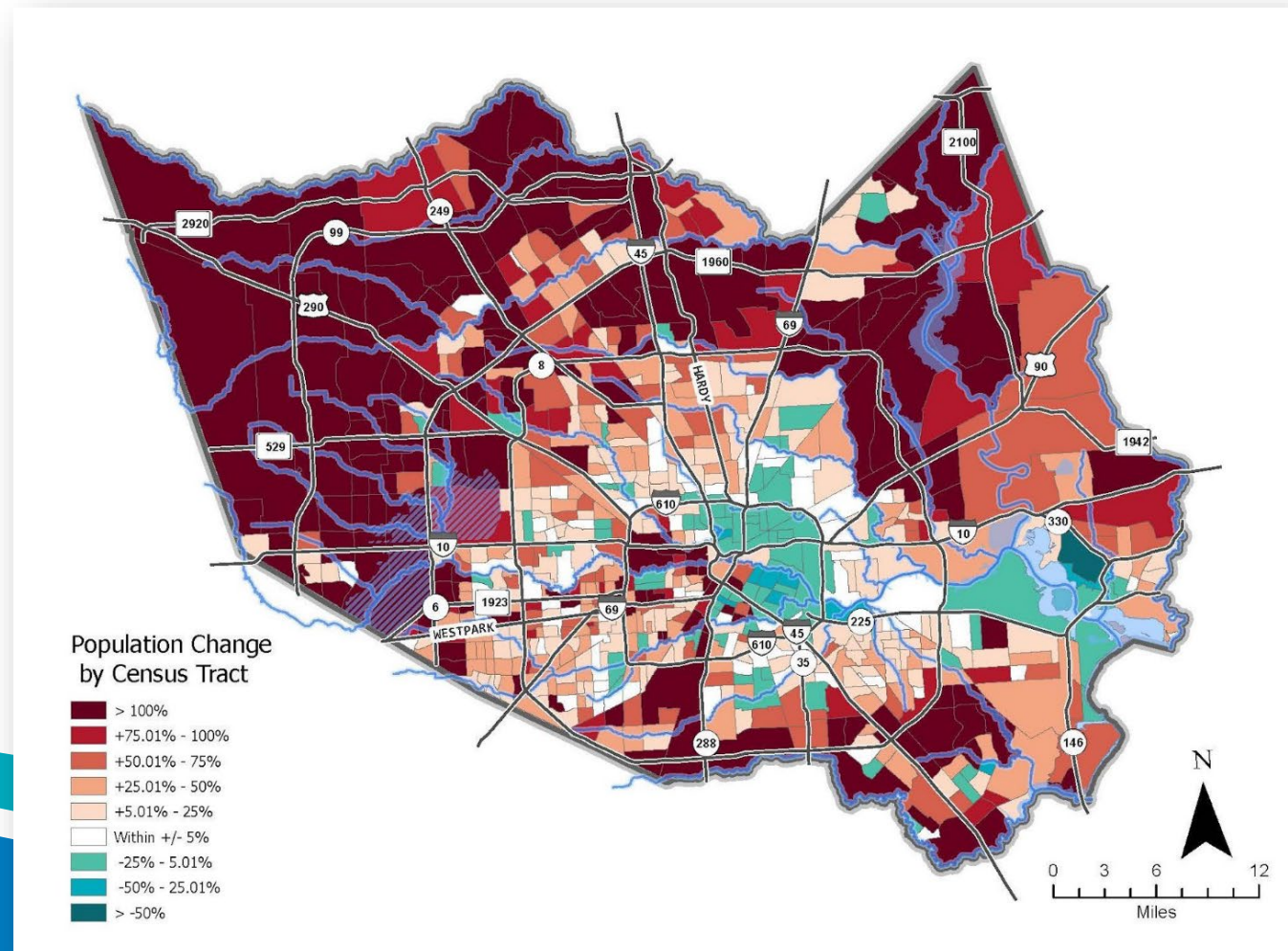


Average Life Expectancy

Why One Health?

One Health framing addresses challenges that human & wild residents of Harris County face:

- Climate disasters
- Health disparities
- Rapid biodiversity loss
- Population growth & development pressures
- Chronic environmental injustice
- Access to nature disparities >>>



What is One Health?

One Health embraces interconnections between people, animals, plants, and their shared environment

One Health Actions aim to achieve optimal health outcomes for all residents (human and wild)



One Health Framework attends to each component, building **connections** for additive and synergistic **outcomes**

Human Health & Wellbeing

- Physical
- Mental
- Cultural
- Spiritual

- Environmental Justice
- Climate Justice
- Access to Nature
- Equitable Resilience

- Food Sources
- Economic Production
- Disease Control
- Spirituality



Wildlife/Biodiversity

- Habitat
- Migration
- Pollination
- Food Web

Environmental Health

- Climate
- Air
- Soil
- Water

- Land Protection
- Resource Conservation






















One Health Actions

One Health in the Built Environment Toolkit



Harris County
Public Health
 Building a Healthy Community



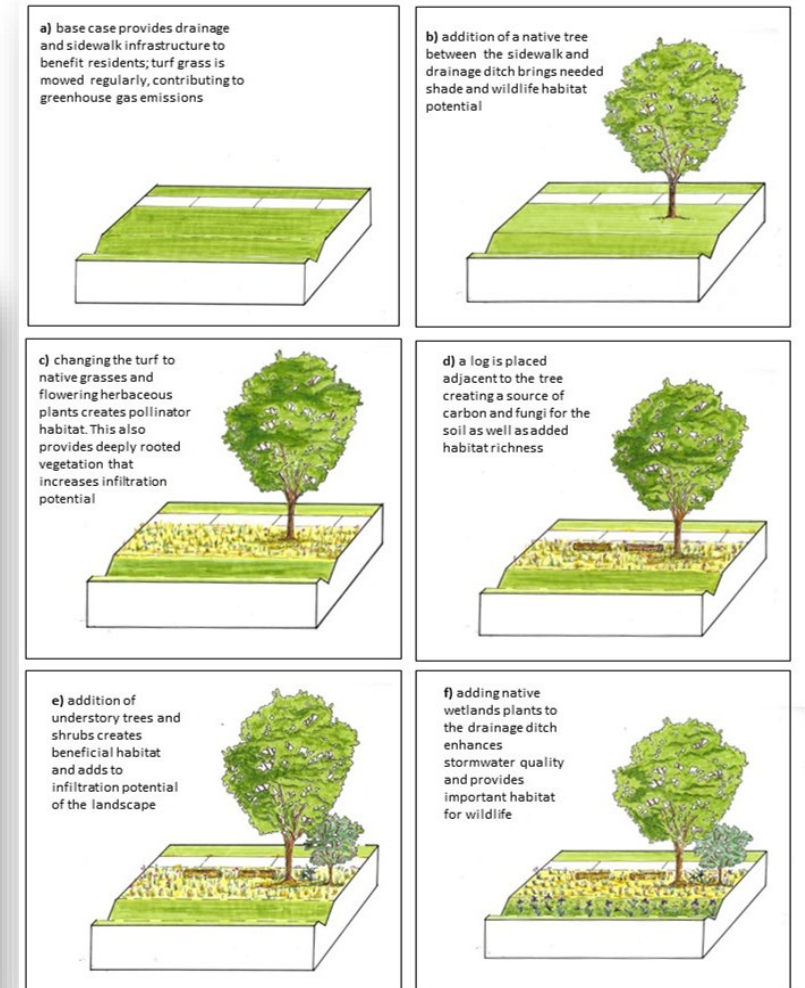
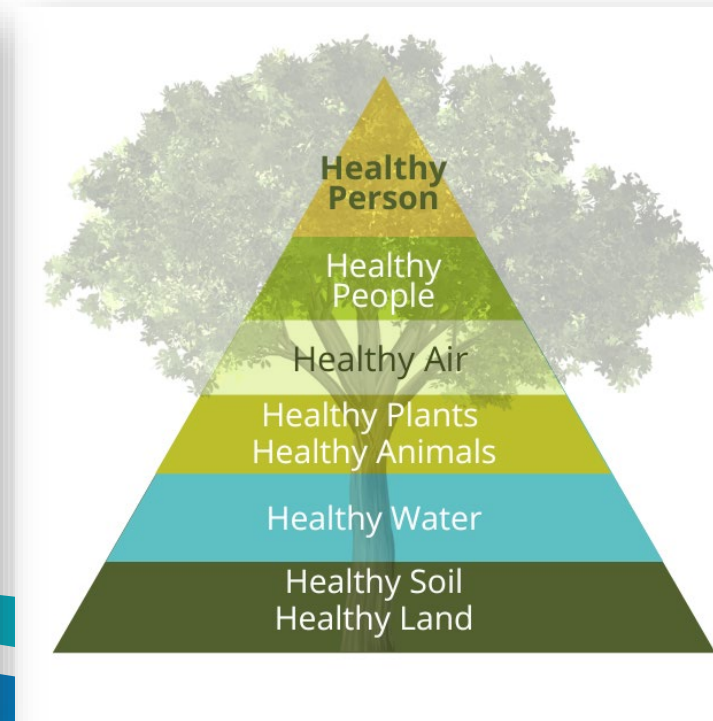
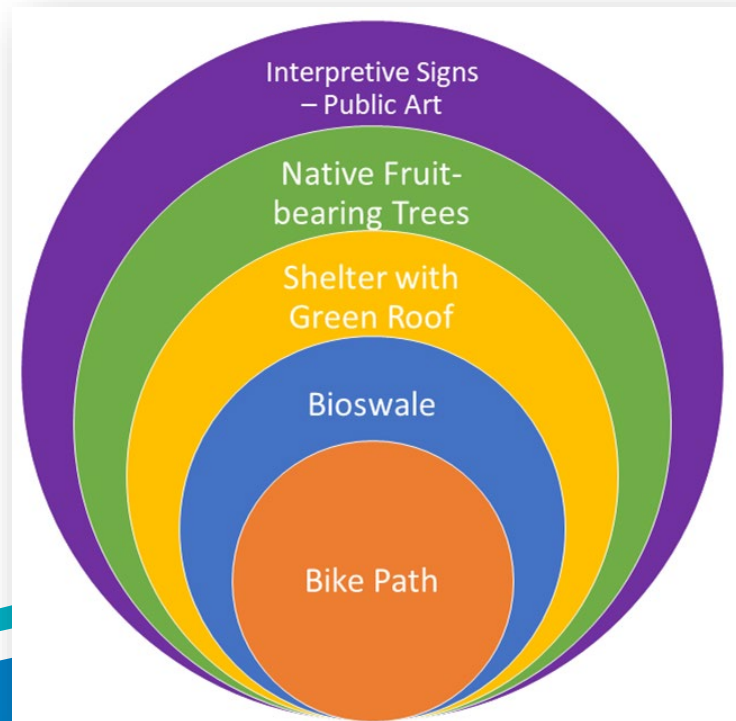
Spatial Relationships		
 Corridors – Refuges	 Pathways – Places	 Drainage – Flood Storage
Soils and Permeability		
 Support Native Vegetation	 Absorb Rainfall	 Site Stability – Erosion Control
Vegetation and Land Cover		
 Habitat – Disease Management	 Intercept Rainfall and Pollutants	 Cooling – Shading
Water and Wetlands		
 Water Source	 Water Quality	 Stormwater Resilience
Air, Noise, and Climate Mitigation		
 Air Quality	 Noise – Light	 Climate - Heat - Flood Adaptation
Safety and Placemaking		
 Land Uses	 Nature Access	 Participatory Public Places
Community		
 Convening – Engaging	 Education Opportunity	 Operating – Maintaining

Built Environment Improvement Actions	Human							Environment				Wildlife			BENEFIT															
	Disease Control	Economic Opportunity	Healthy Foods & Nutrition	Mental Health – Well-Being	One Health Education & Guidance	Physical Health	Recreation & Exercise	Safety & Hazard Mitigation	Social & Community Cohesion	Air Quality	Carbon Sequestration	Noise Abatement	Runoff Management	Soil Health & Stability	Temperature Regulation – Shade	Water Quality & Quantity	Biodiversity	Corridor	Habitat – Forage & Cover	Pollinator Support	Water - Source	Human Health	Environment	Wildlife / Biodiversity	One Health					
KEY:																														
	Indirect Benefits																													
	Direct Benefits																													
One Health Benefits																														
+	Low/Low/Med																													
++	Low/Low/High																													
+++	Med/Med/High																													
++++	Med/High/High																													
MOBILITY																														
• Pedestrian																										HIGH	LOW	LOW	++	
• Bicycle																											HIGH	LOW	LOW	++
• Vehicular																											MEDIUM	LOW	LOW	+
STORMWATER MANAGEMENT																														
• Non-Vegetated																											LOW	MEDIUM	LOW	+
• Linear Systems																											MEDIUM	HIGH	HIGH	+++
• Bioretention																											MEDIUM	HIGH	HIGH	+++
• Stream Enhancement																											MEDIUM	HIGH	HIGH	+++
ARCHITECTURAL-STRUCTURAL																														
• Green Roof																											MEDIUM	MEDIUM	HIGH	+++
• Vertical Green																											LOW	LOW	HIGH	++
GREENING																														
• Parks & Schoolyards																											HIGH	MEDIUM	MEDIUM	+++
• Gardens - Yards - Balconies																											HIGH	MEDIUM	HIGH	++++
• Community Agriculture																											HIGH	MEDIUM	MEDIUM	+++
• Plant Nursery																											MEDIUM	MEDIUM	MEDIUM	++
• Habitat & Wildlife Support																											MEDIUM	HIGH	HIGH	++++
COMMUNITY CAPACITY																														
• Gathering Spaces																											MEDIUM	LOW	LOW	+
• Community Services																											HIGH	LOW	LOW	++
• Enterprise Zone																											HIGH	LOW	LOW	++
• Public Art																											MEDIUM	LOW	LOW	+

Co-Benefits
Build Over
Time

One Health Outcomes

- Additive
- Synergistic
- Require tradeoffs



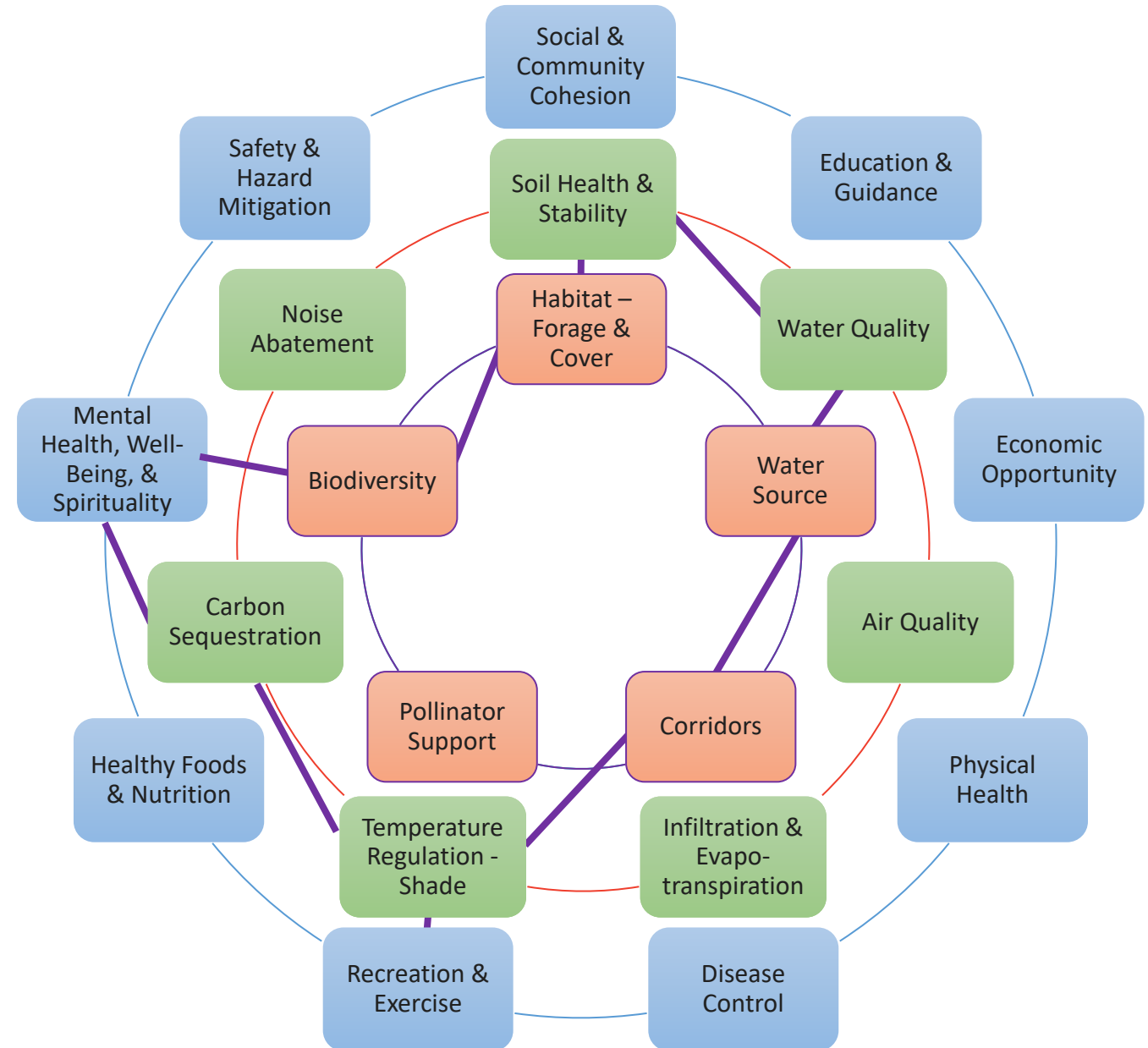
Building Outcomes

- Multi-functional infrastructure is imperative; we no longer have luxury of separating nature and biodiversity from urban design
- One Health is added value that requires cooperation between human and animal health
- Design can manage human-wildlife interactions in space and time – separate wildlife habitats; be sensitive to timing of habitat uses



Building Outcomes

- Multi-functional infrastructure is imperative; we no longer have luxury of separating nature and biodiversity from urban design
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Building Equitable Resilience*

Higher levels of function
reaching broader
stakeholder base

EQUITY >>> *Social Justice, Environmental Justice, Health Equity, and equitable adaptation to disaster*

ONE HEALTH >>> *Synergy of Environmental, wildlife, and human health for community resilience, sustainability, and disease control*

ENVIRONMENT VEGETATION >>> *Biodiversity; soil biology, aquatic resources, riparian habitats, wildlife corridors, trails and recreation*

WATER QUALITY >>> *Temperature and oxygen regulation; processing organic matter & nutrients*

NATURAL STABLE CHANNEL DESIGN >>> *Transport of sediment and water to create & maintain diverse bed forms, meander patterns, and stable cross section resulting in dynamic equilibrium*

HYDRAULICS >>> *Transport water in the channel and on the floodplain*

HYDROLOGY >>> *Transport water from the watershed to the channel*

* example: watershed and stormwater management function model



Cypress Creek - Before



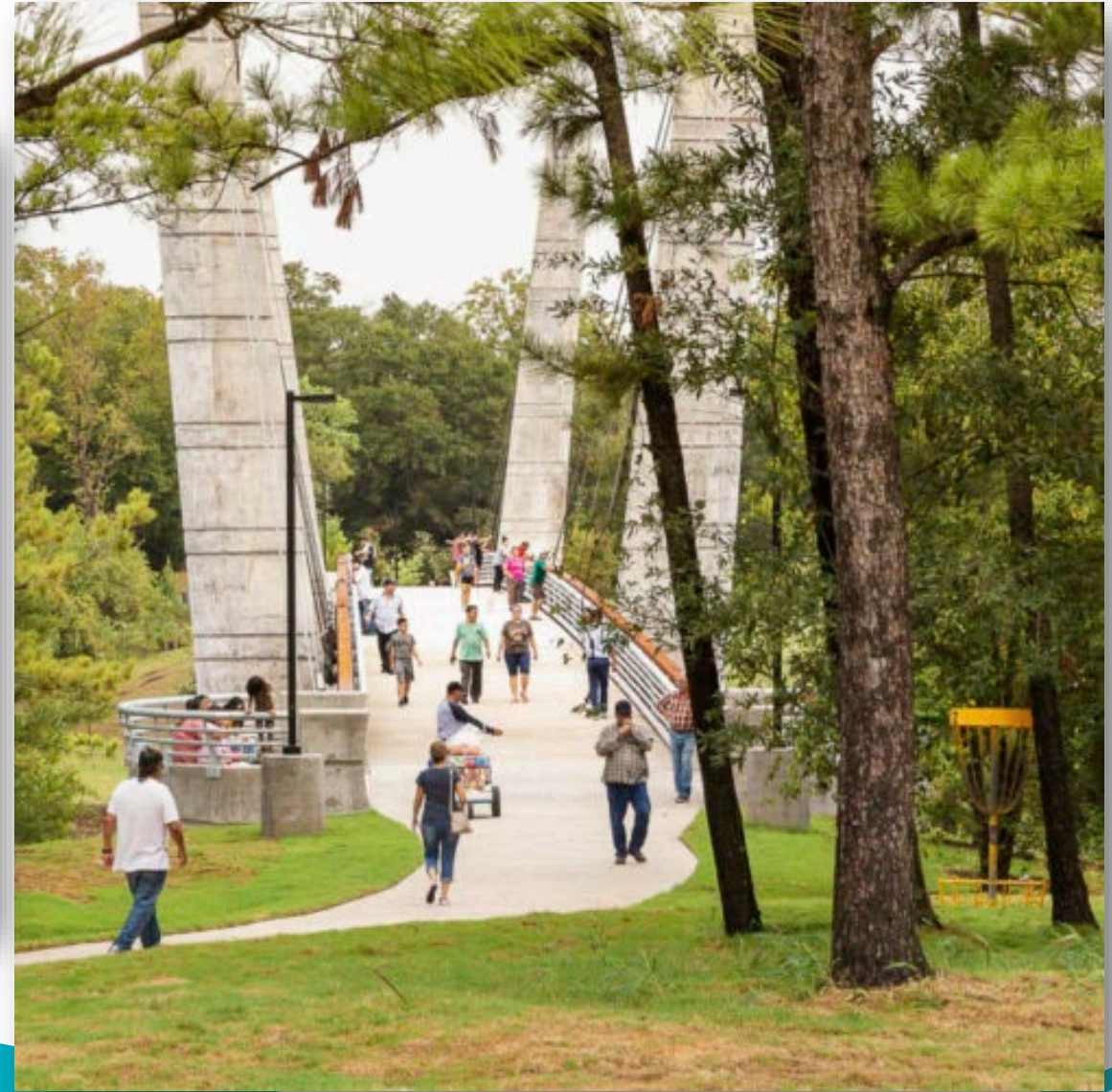
Cypress Creek - After

Mason Park

- Stormwater Interceptor Wetlands
- Floodwater Capacity
- Wildlife Habitat
- Connecting Community to Nature



Mason Park



Buffalo Bayou Park



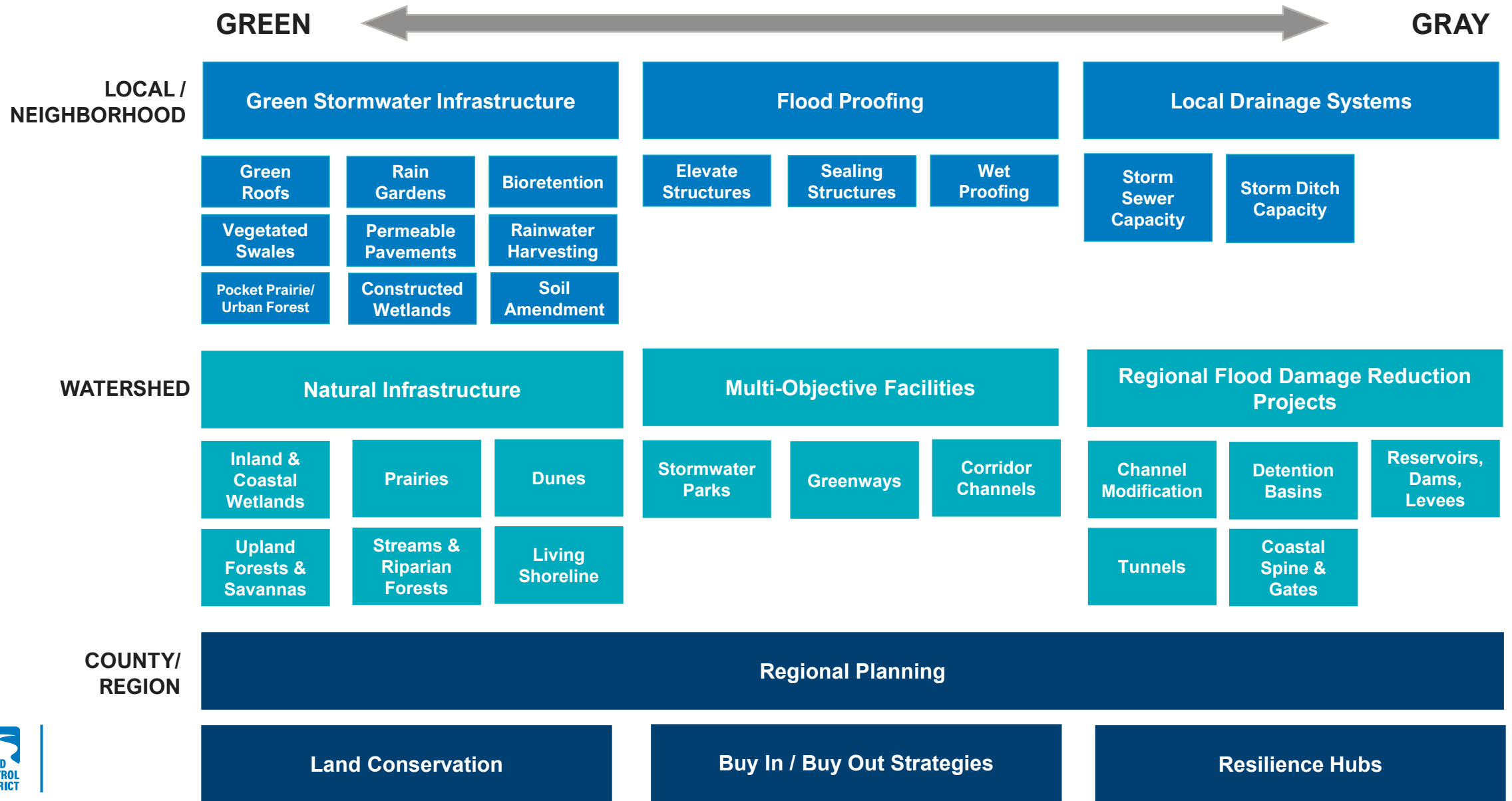
Buffalo Bayou Park



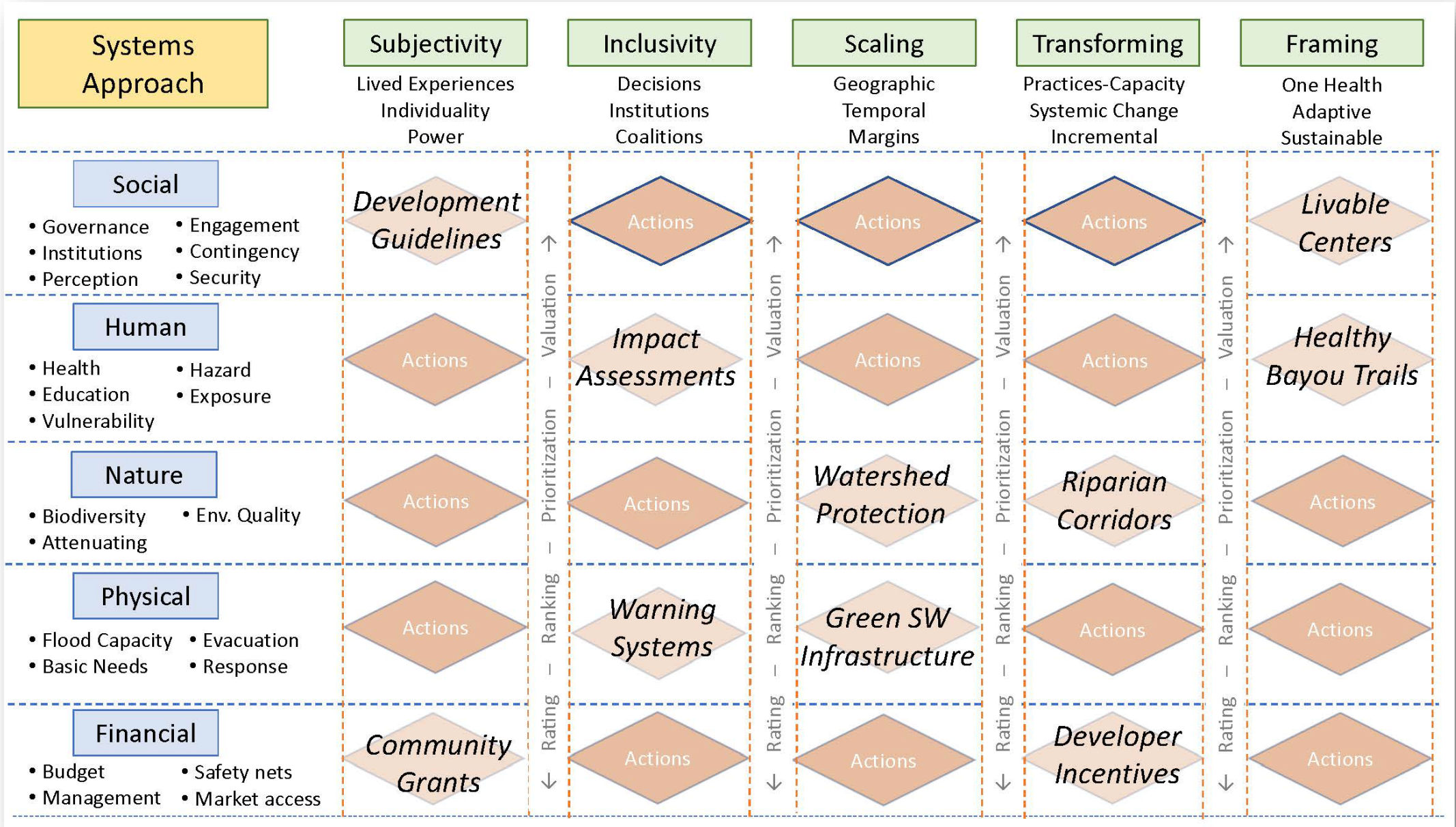
Buffalo Bayou Park

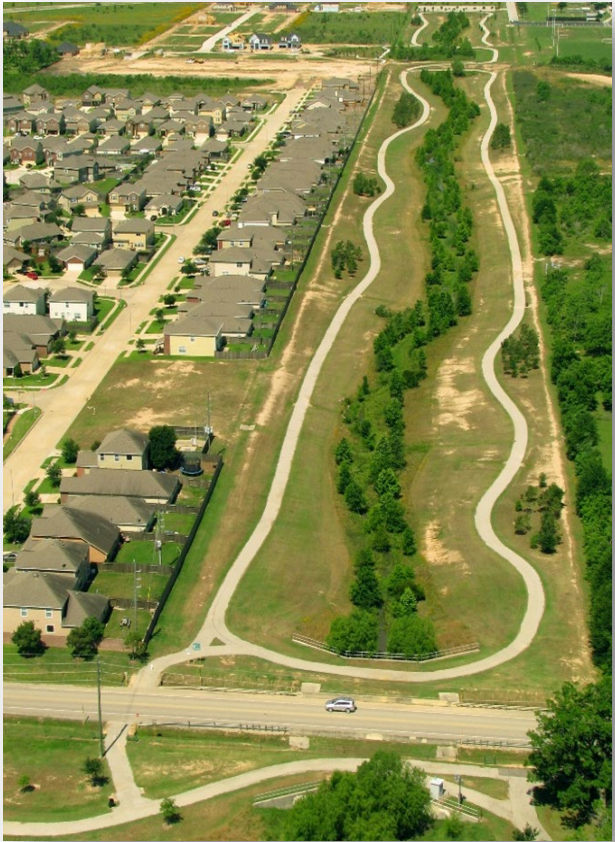


PHYSICAL INFRASTRUCTURE STRATEGIES



RESILIENCE FRAMEWORK MODEL





ONEHEALTH

ONE HEALTH ACTIONS ECOSYSTEM

REFINES

One Health Index

- Establish Local Metrics
- Build the Case for Action
- Develop Priorities
- Monitor Change

Implement One Health Actions

- Implement Community-Based Projects
- Improve Health Outcomes
- Learn from Practice

INFORMS

One Health Toolkit

- Collect Data
- Communicate the Approach
- Establish Partnerships
- Pursue Funding
- Identify and Implement One Health Actions

IMPLEMENTS

Collect Data

- Collective Research and Data Governance
- Refine Conceptual Models
- Improve Data Quality

Communicate the Approach

- Develop Online Mapping Tools
- Educate Our Community

Establish Partnerships

- Build Community Partnerships
- Organize a Local Community of Practice

Pursue Funding

- Identify and Apply for Research and Implementation Grants
- Identify Funding Partners
- Leverage Resources

CREATES
STRATEGIES