

Measuring Sustainability: Project Houston

A Discussion of Research Findings

Jim Blackburn

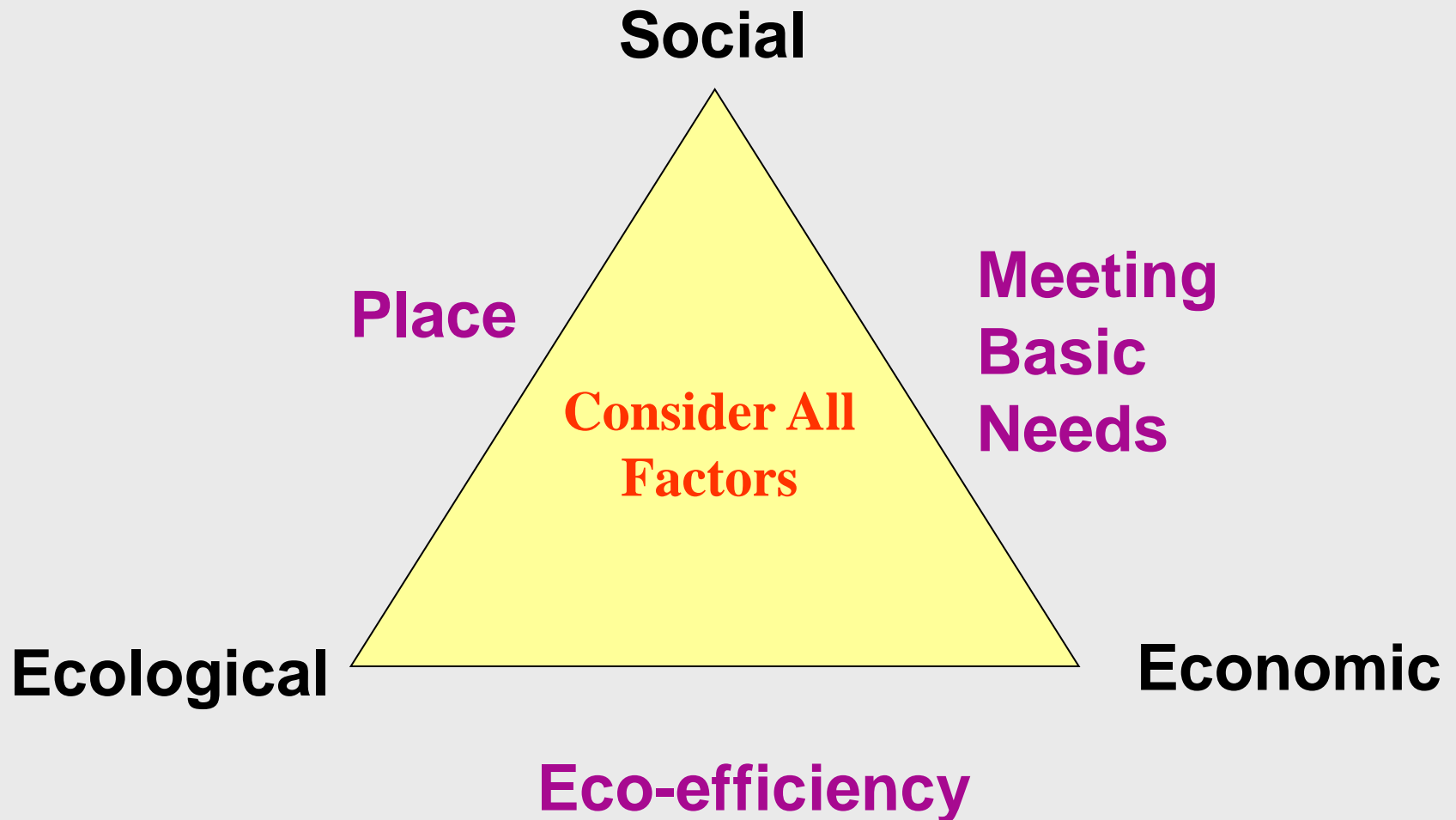
Director

Energy and Water Sustainability Minor

Rice University



Sustainable Development



Categories	SustainLane	Calgary	Issaquah	Santa Monica	Chicago	Missoula	Calvert-Henderson	Cincinnati	Baltimore	Pasadena	NRDC - Smarter Cities	Fraser Basir	Bay Area Alliance	Tuscor	Seattle	Hamilton	Minneapolis	Ontario	Boston	FOF - British Cities	Total
Educational Achievement & Performance	X	X	X	X	X	X	X	X	X			X	X	X	X		X	X	X	X	16
Community Engagement		X	X	X	X		X	X	X		X	X	X	X	X	X	X		X		15
Employment/Unemployment		X	X		X		X		X			X	X	X	X	X	X	X	X	X	15
Land Use			X	X	X	X	X	X	X	X		X	X	X	X	X		X	X		15
Water Conservation	X	X	X	X			X		X	X	X	X	X	X	X	X	X		X		15
Affordable Housing	X	X	X	X	X	X			X				X	X	X	X	X	X	X		14
Crime		X	X		X	X	X	X	X			X	X	X	X	X	X		X		14
Air Quality - PM	X			X		X	X			X	X	X	X	X	X	X		X	X		13
Cost of Living		X	X	X	X	X	X	X	X		X		X	X			X		X		13
Health Care: Access		X	X	X	X	X	X	X	X			X	X	X	X				X		13
Homelessness/Poverty		X	X	X	X	X	X		X	X	X	X	X				X		X		13
Waste Production	X	X	X	X			X	X		X	X	X	X		X	X				X	13
Commuting	X	X	X	X		X				X	X		X	X	X			X		X	12
Ecological Footprint		X	X	X			X			X	X	X		X	X		X		X	X	12
Income Distribution		X			X	X	X	X				X	X	X	X	X		X	X		12
Public Transportation	X		X	X	X	X		X	X	X		X	X	X					X		12
Air Quality - Ozone	X			X	X	X			X	X	X		X	X		X			X		11
Ecological Health		X	X	X		X	X					X		X	X		X		X	X	11
Green Space			X			X			X	X	X	X	X	X	X				X	X	11
Recreation Area	X		X	X		X			X	X		X		X		X		X	X		11
Air Quality - Toxics				X	X	X	X			X			X		X	X			X	X	10
Bicycling/Walking	X		X	X		X				X		X		X			X	X	X		10
Childhood Health		X		X	X	X						X		X	X		X		X		10
Demographics		X		X	X	X	X		X			X	X	X		X			X		10
Economic Diversification		X	X		X		X		X			X	X	X				X	X		10
Health Care: Affordability			X	X		X	X	X				X	X	X	X				X		10
Obesity/Weight			X	X		X	X	X		X						X	X	X	X		10
Educational Accessibility		X			X		X		X			X	X		X	X			X		9
Entrepreneurship & Innovation				X	X		X	X	X	X			X	X					X		9
Public Health - Asthma, HIV, etc.				X	X	X	X	X		X	X						X		X		9
Recycling	X		X	X						X	X	X		X					X	X	9
Traffic Congestion	X		X	X	X				X	X		X	X			X					9
Water Supply			X	X	X		X			X		X		X		X			X		9
Access to Food	X	X	X	X						X			X	X					X		8
Alternative Energy	X		X	X						X	X	X					X		X		8
Population		X				X			X			X			X	X		X	X		8
Resource Conservation			X	X		X						X	X	X	X				X		8
Safety			X	X		X	X			X		X			X				X		8
Climate Change	X		X	X						X		X	X						X		7
Green Building	X		X	X			X			X	X								X		7
Green Economy	X			X			X			X		X	X						X		7
Historic & Cultural Resources									X				X	X	X	X		X	X		7
Labor Force				X	X		X		X	X			X	X							7
Local Food		X	X	X						X	X			X	X						7

Concept of Metrics

- **Numerical Indicators Where
Appropriate or Available**
- **Geographic Representation of Patterns**

Poverty

Metric: Per Cent of Population
Below Poverty Level (Est. 2009)

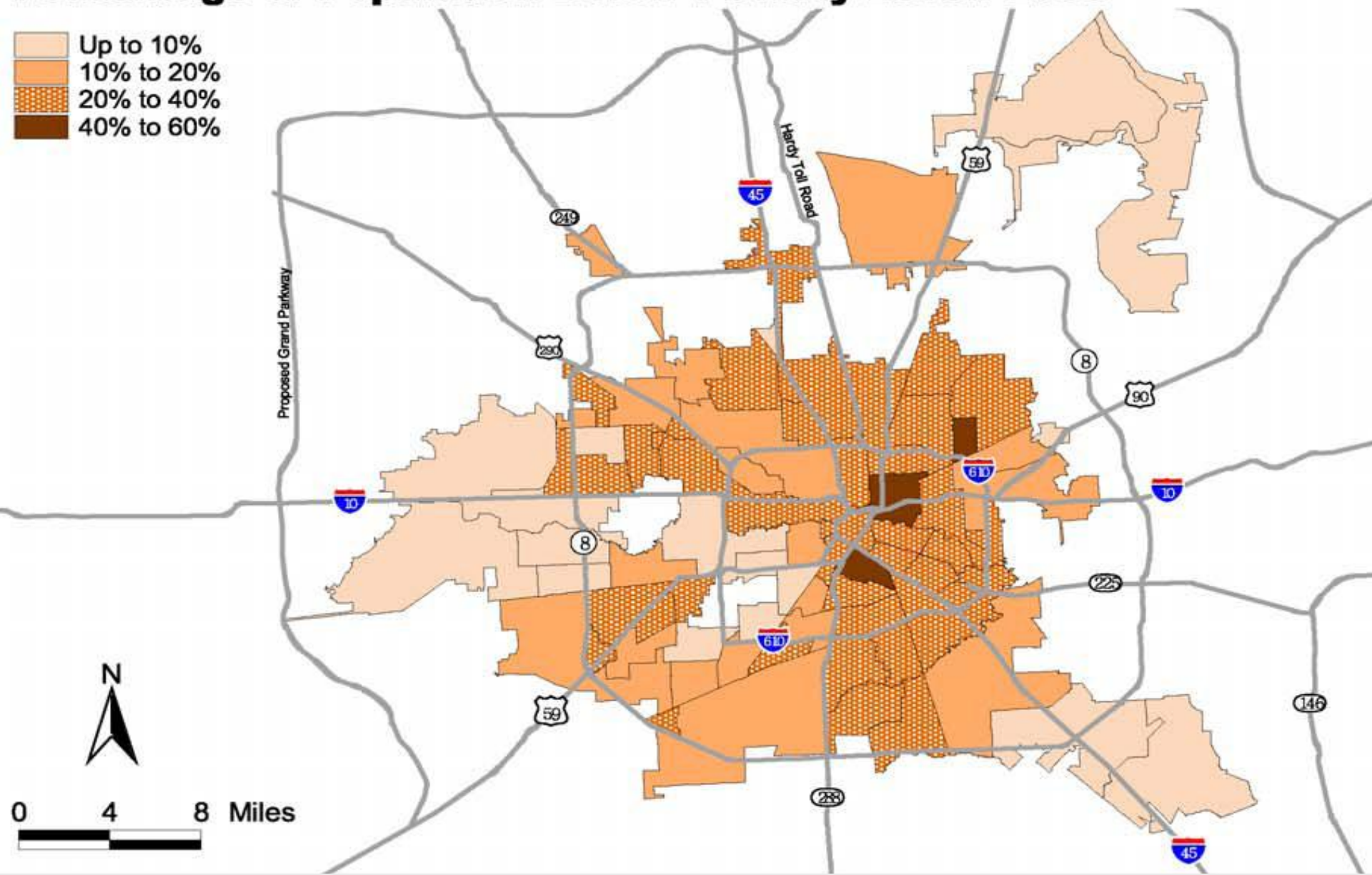
City of Houston – 20.6%

Harris County – 20.5%

Source: Houston Galveston Area Council

Percentage of Population Below Poverty Level: 2000

- Up to 10%
- 10% to 20%
- 20% to 40%
- 40% to 60%



Income Disparity

- **Center on Budget and Policy Priorities
and Economic Policy Institute,
Washington D.C. Jan, 2006 Study**
- **income disparity in Texas greater than
any other state**
- **Per Cent Income Increase Nationally**
 - Upper 5% = 62%**
 - Upper 20% = 44%**
 - Lowest 40% = 11%**

Air Quality

Metric – Ozone, PM2.5 and Benzene Levels

Ozone – severe non-attainment

8 hour high – 97 ug/m³ (std = 75)

PM2.5 – attainment

2009 highest yearly avg – 14.4 ug/m³ (std – 15)

Benzene – attaining ESLs

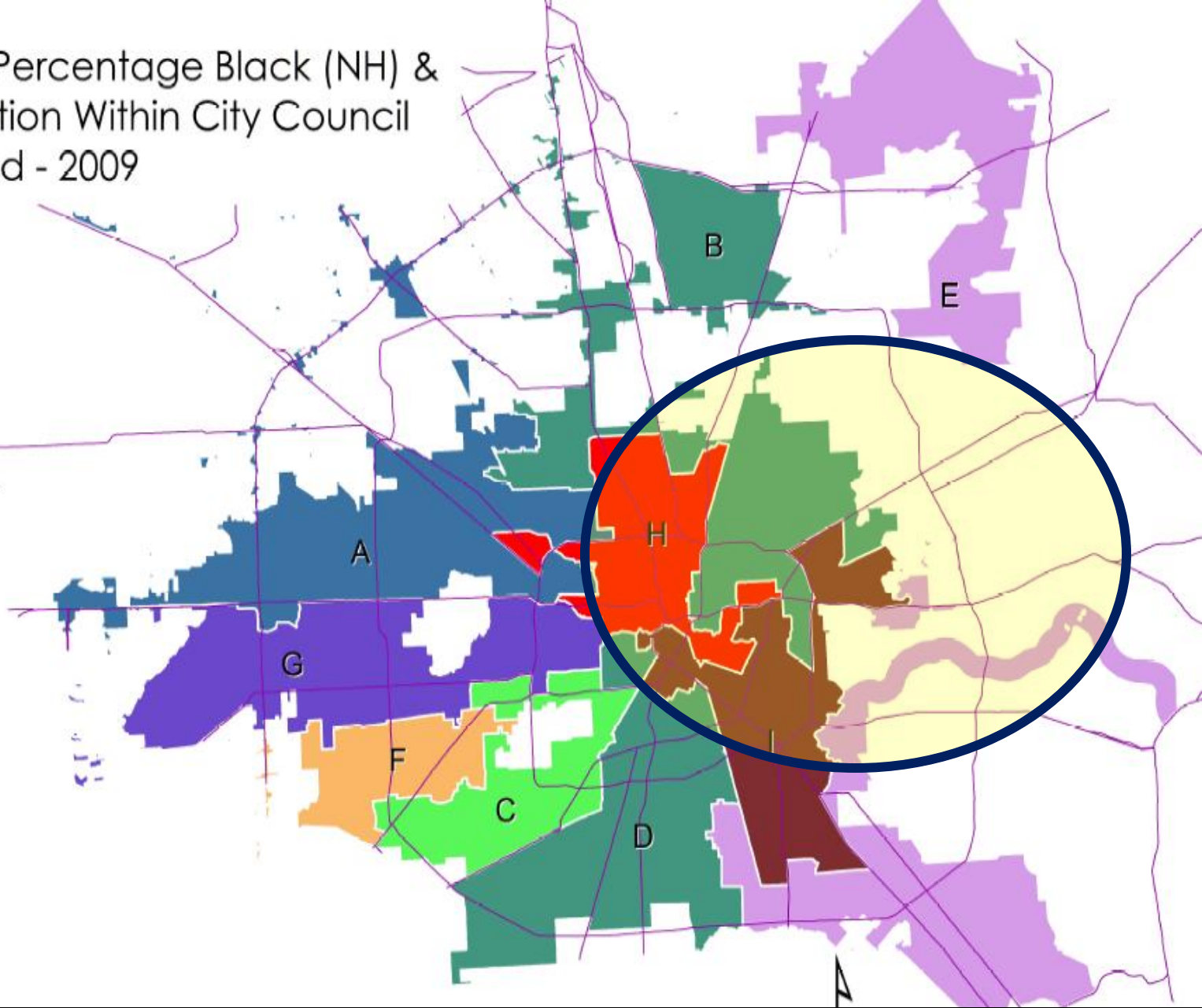
2010 highest monitor – 1.39 ppb (ESL = 1.4)

City of Houston Percentage Black (NH) & Hispanic Population Within City Council Districts Estimated - 2009

Legend
Major Roads

Percentage Black
Non Hispanic & Hispanic
Population

- 31 %
- 44 %
- 58 %
- 64 %
- 71 %
- 82 %
- 84 %
- 87 %



Environmental Justice Issues

Education

Metric: High School Dropout Rate
2009 Harris County

Overall – 35%

Anglo – 13%

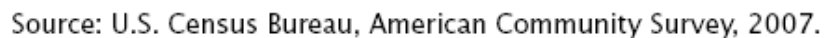
African American – 39%

Hispanic – 46%

Source: Intercultural Development Research
Association

Percent of People Aged 25 and Over Who Have Completed High School or More Education Relative to the National Mean by State: 2007

Texas – 79.1% (49 out of 50)



Food Supply – Local Food

Metric – Food Deserts and Urban
Gardens

61% of Low Income Area of City of
Houston = Food Desert = 143 square
miles = 22% of City of Houston

Number of Community Gardens –
Houston Sugarland Area = 125

Potential Urban Food Deserts - City of Houston 2000 Census Median Household Income

Legend

▲ National & Major Local Grocery Chains

■ One Mile Buffer From Store

— Major Thoroughfares

□ Houston City Limit

2000 Census Median Household Income

Income in Dollar Figures

0 - 32,500

32,501 - 50,795

50,796 - 76,622

76,623 - 121,747

121,748 - 200,000

Harris County

NOTES:
Grocery Store data compiled from individual store operators effective September 2010. Data and store depiction confined to the City of Houston, Harris County and includes the following entities: Randall's, Kroger, HEB, Central Market - HEB, Whole Foods, Fiesta, Rice Epicurean, Walmart, Sam's Club, Food Town, Food Fast.

Disclaimer:

The information used in this application was derived from digital databases from multiple private sources. Beck GeoMedia does not accept any responsibility for any errors, omissions, or positional accuracy, and therefore, there are no warranties which accompany this product.

Users of the information displayed in this map are strongly cautioned to verify all information before making any decisions.

Drafted October, 2010 Rev. 0. B. Carlie



0 3 6 12 18 24 Miles

Cost of Living/Housing Cost

Metrics:

ACCRA cost of living index – 8% below national average

Avg % income spent on housing – 22%

% population spending >30% on housing – 34%

Cost of gasoline 5/2011 - \$3.99 per gallon

1/2012 - \$3.29

Land Use

Metric: Density (persons per sq. mile) Est. 2010

City of Houston –

2.26 million persons – 640 sq. miles

3,492 persons per sq. mile

City of Houston ETJ

1,347,697 persons – 1815 square miles

743 persons per square mile

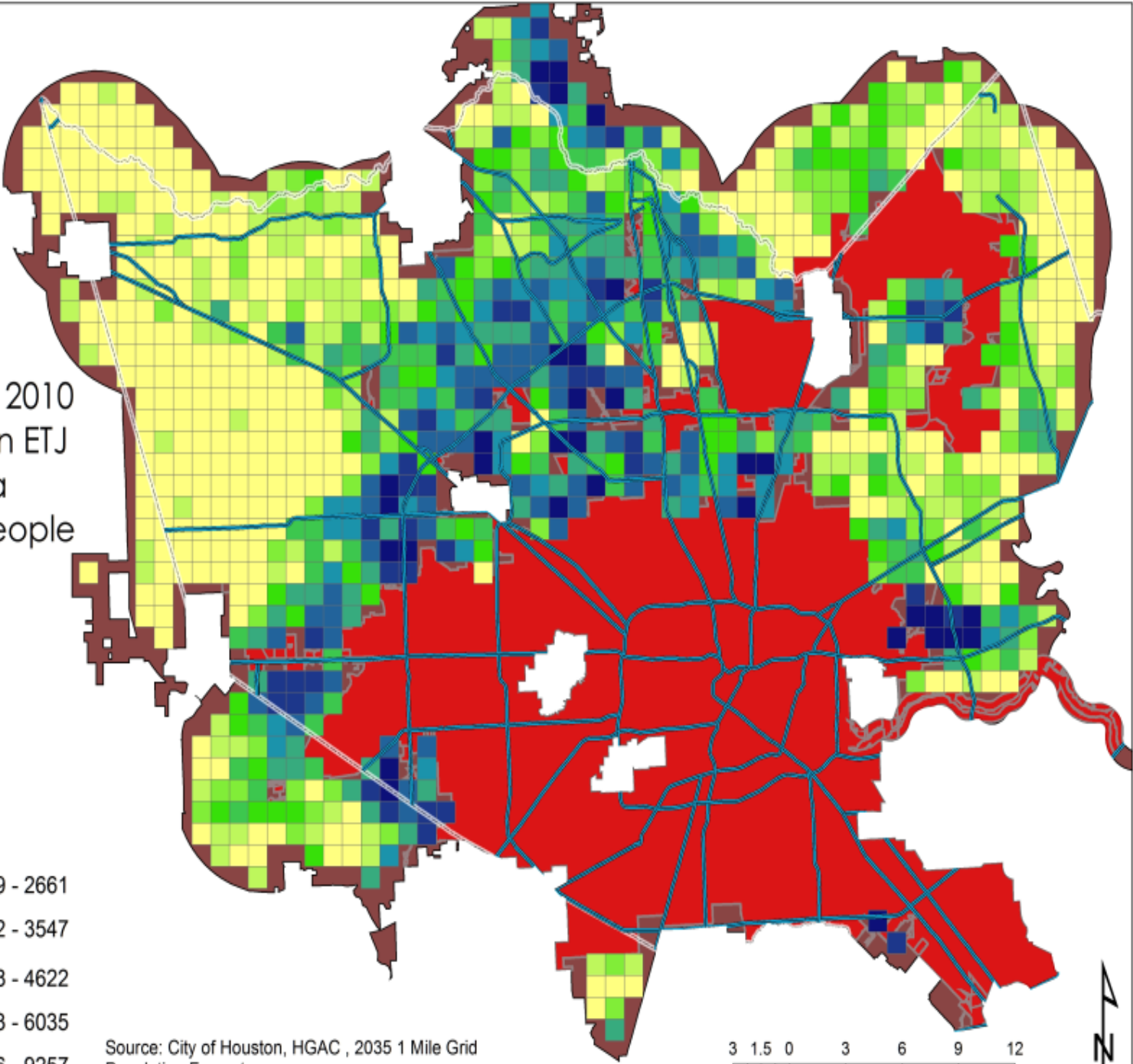
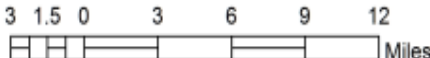
Population Estimates 2010
Within City of Houston ETJ
Unincorporated Area
Approx.: 1,347,697 People

- Legend**
- Major Roads
 - Harris County
 - Houston City Limit
 - ETJ

**1 Mile Square Grid 2010
Population Projections**

0 - 130	1869 - 2661
131 - 378	2662 - 3547
379 - 734	3548 - 4622
735 - 1237	4623 - 6035
1238 - 1868	6036 - 9257

Source: City of Houston, HGAC , 2035 1 Mile Grid
Population Forecasts.



Land Use Comparison

New York – 27,000 persons per sq. mile

Chicago – 12, 600 persons per sq. mile

Los Angeles – 8,200 person per sq. mile

City of Houston – 3,492 persons per sq. mile

San Diego – 1,612 persons per sq. mile

Dallas – 1.427 persons per sq. mile

City of Houston ETJ - 743 persons per square mile

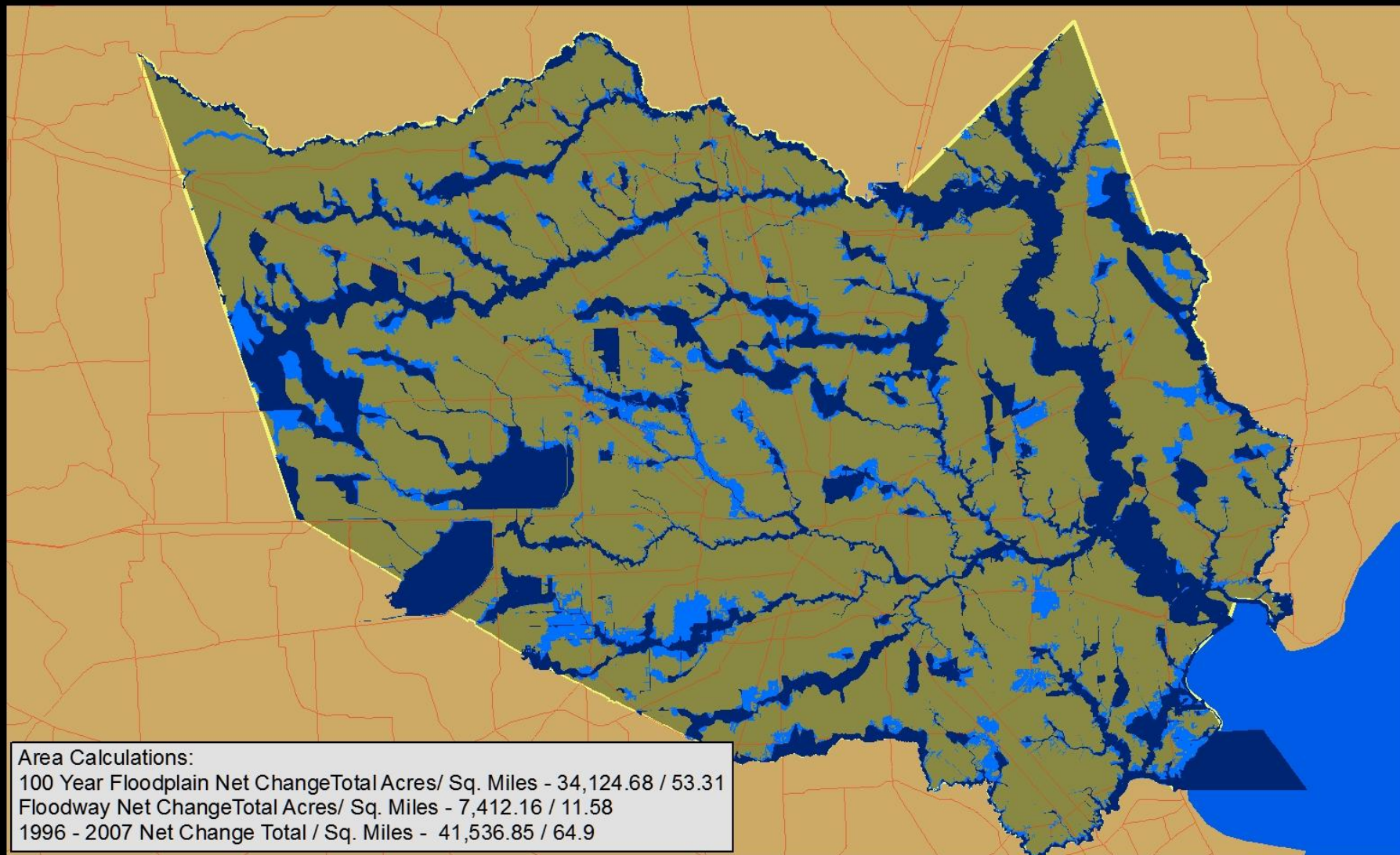
Flooding

Metrics:

Flood Damages as % of GDP for Houston
area – 3%

Increase in flood plain area Harris County
1996-2007 – 34,125 acres

Net Area Change 1996 - 2007 100 Year Floodplain & Floodway



Legend



2007 Floodway &
100 Year Zn.



1996 Floodway &
100 Year Zn.



Major Roads



Harris



Open water



Source: FEMA, HCFCD, 2007.

B. Carlile for James Blackburn

Date: 01_05_2010

Standard Economic Metrics

- **Growth in GDP**
- **Commercial Leasing**
- **Home Sales**
- **Building permits issued**
- **New housing starts**
- **Unemployment**

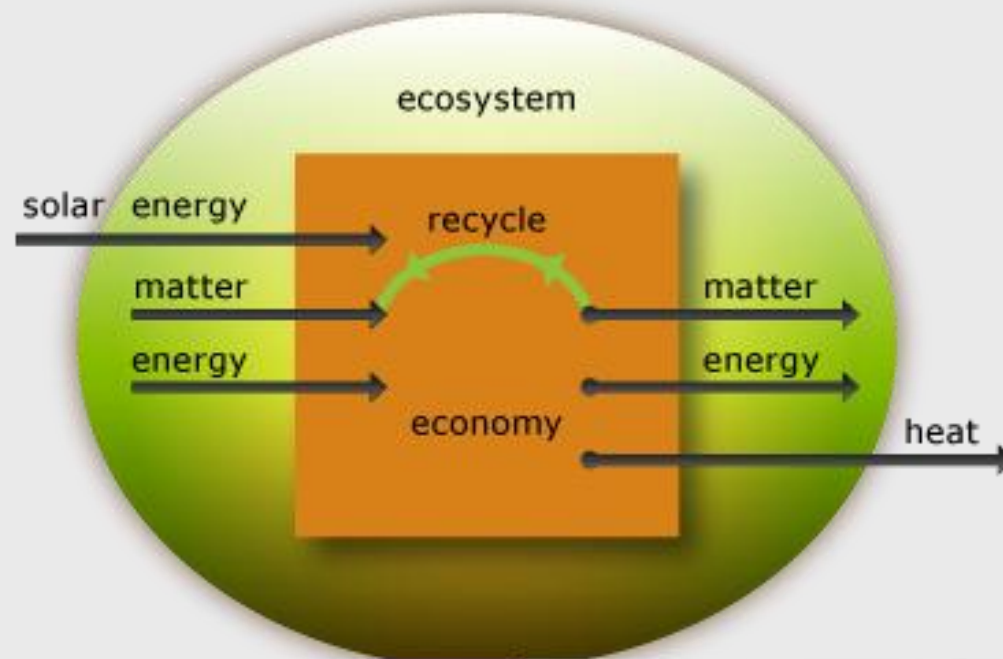
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**DO NOT MEASURE THE ECONOMIC SYSTEM
DESCRIBED IN DEFINITION –**

**the production, distribution, and consumption of goods
and services that meets the needs of today without
compromising the needs of future generations**

Economic Success Is Minimization of Energy and Water Use In Society



Energy Efficiency

Metric – Gross Area Product (GAP) per
capita/Residential Energy Consumption per capita
- 8.9×10^{-4}

City of Houston Leadership Projects
IMPORTANT

Recycling

Metric:

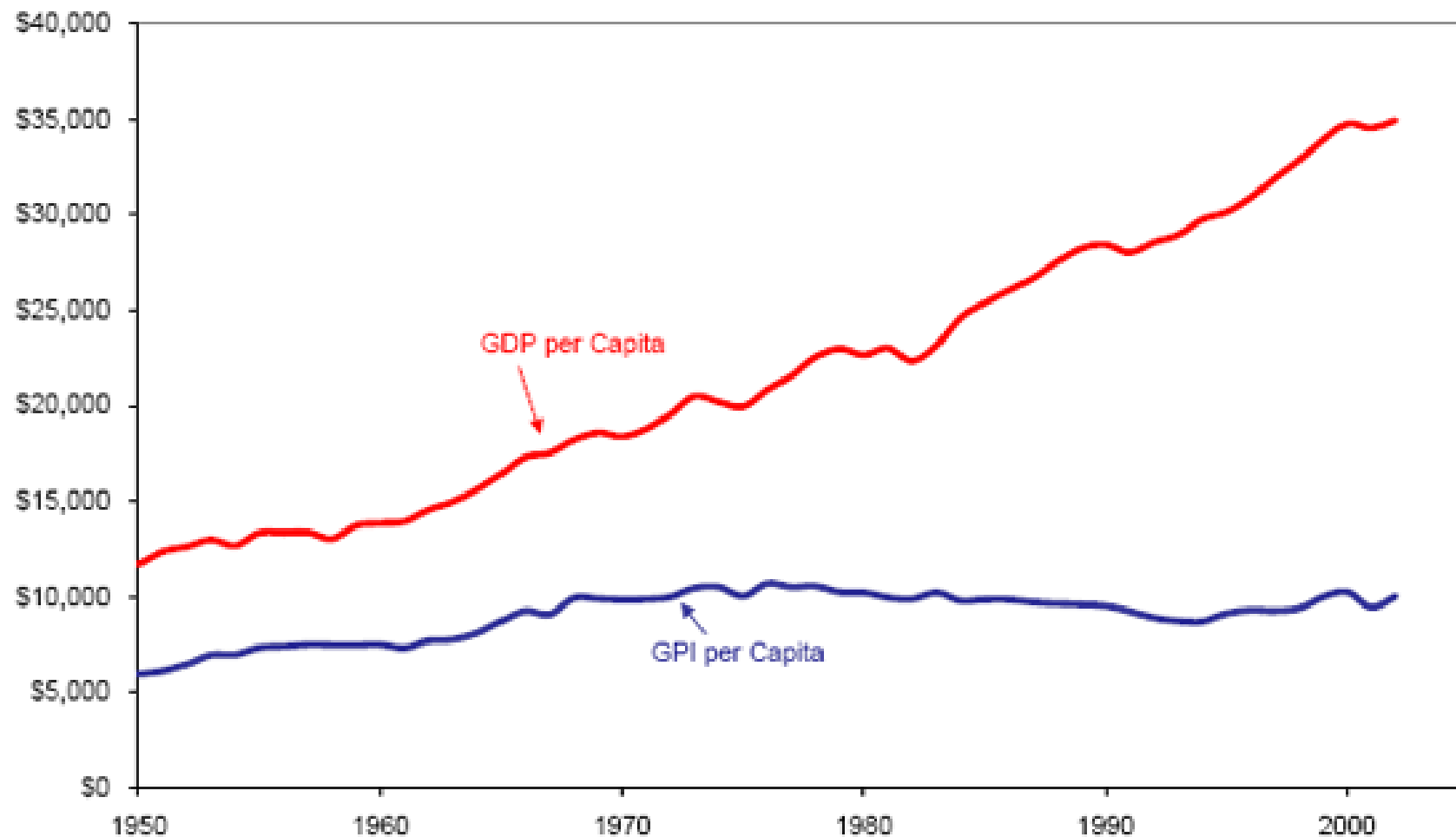
% waste diverted for recycling in City of
Houston –

2.6% (2003)

26% (unofficial, 2010)

Much Room For Improvement

Genuine Progress Indicator versus Gross Domestic Product, 1950-2002
(per capita \$2,000)



Source: Redefining Progress. Genuine Progress Indicator, 1950-2002, (2004 Update)

http://www.redefiningprogress.org/newpubs/2004/gpi_march2004update.pdf

Hurricane Ike - \$30 billion in Damage = Positive GDP



Loss of Natural Capital

Metric: Per Cent (acreage) Loss By
Category For 8 County Region

Big Thicket – 25%

Coastal Marsh – 14%

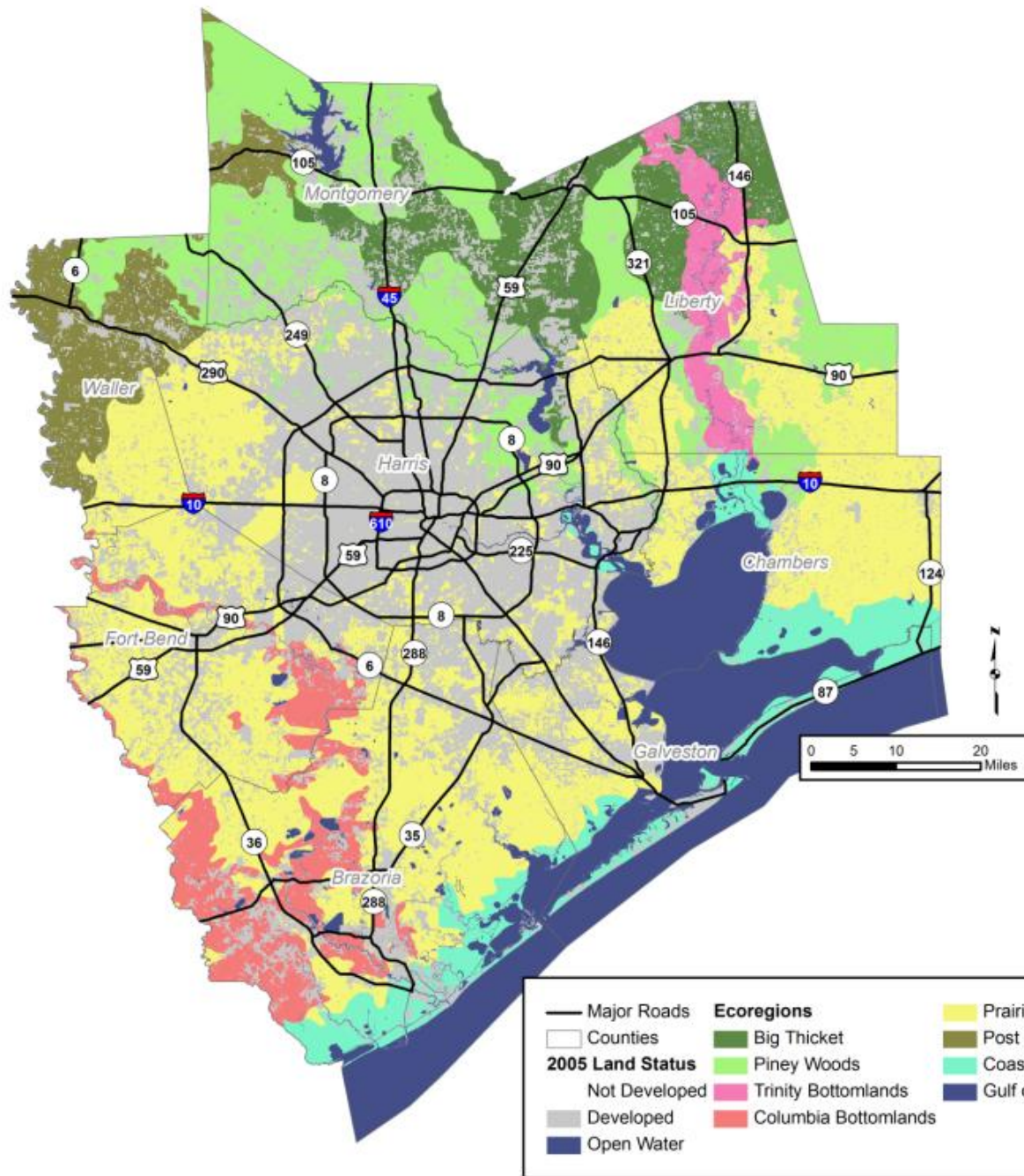
Columbia Bottomlands – 21%

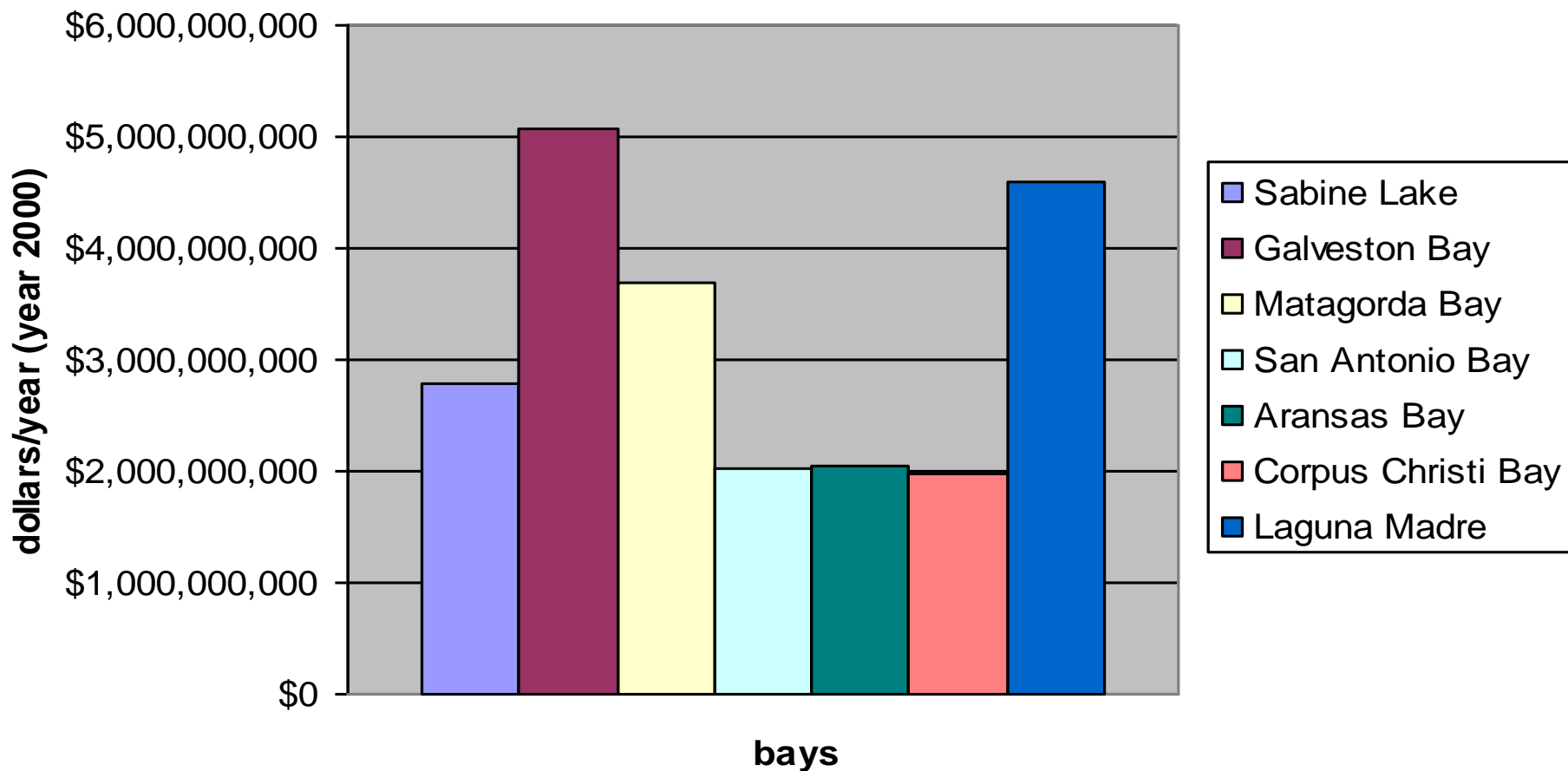
Piney Woods – 31%

Post Oak Savannah – 16%

Coastal Prairie – 40%

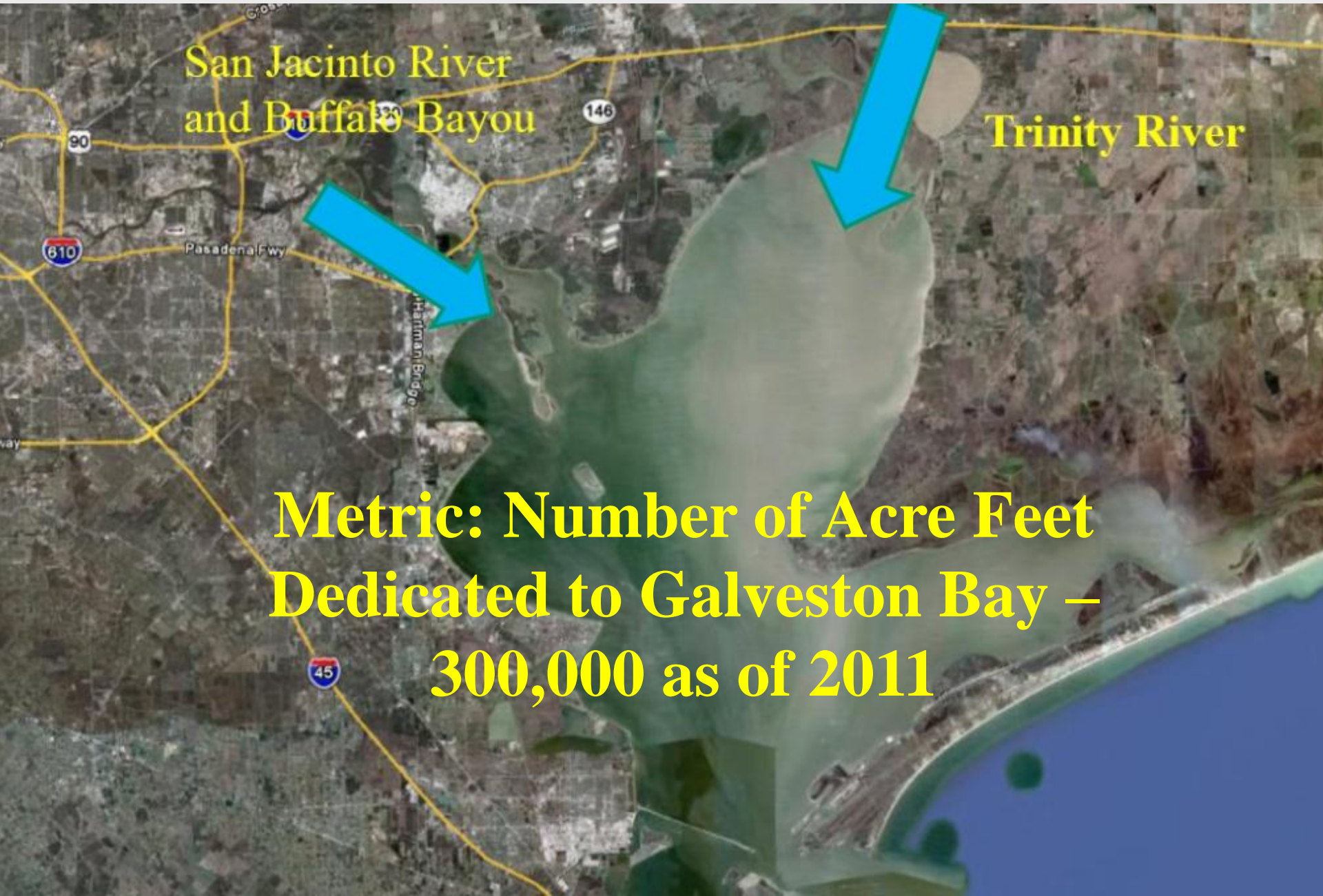
Trinity Bottomlands – 11%





COSTANZA'S VALUE OF TEXAS COASTAL BAYS AND ESTUARIES

Freshwater Inflow To Galveston Bay



San Jacinto River
and Buffalo Bayou

Trinity River

**Metric: Number of Acre Feet
Dedicated to Galveston Bay –
300,000 as of 2011**

Local Debt Structure

- **No acceptable metric determined – ideally debt per capita but not sure about reliability of debt reporting**
- **Concerns about integration of city retirement funds and TIRZ obligations**
- **Concerns about all county obligations plus MUD debt**

Sustainability

- Painting With a Different Brush
- Key is maintenance into the future
- Key is willingness to innovate and change
- Concepts Applicable to Corporations, Cities, Regions and Nations