BEST PRACTICES REPORT

Fall 2013

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INTRODUCTION

Communities nationwide are using innovative tools and policies to ensure their long-term prosperity and sustainability. Public and private entities working in the Houston-Galveston area can use these model policies to achieve the goals of the Regional Plan for Sustainable Development (RPSD), adapting them to meet local needs and preferences. These projects vary in cost and complexity, but have been effective at improving quality-of-life in other communities. Local decisionmakers can learn from the accomplishments and shortcomings of existing policies to build successful programs in their own communities.

The exemplary plans and projects described address several topic areas, including:

- Housing;
- Transportation;
- Environment;
- Healthy communities;
- Economic development; and
- Coastal resiliency.

Many of these programs were intended to address multiple issues, demonstrating the interrelationship between *people*, *prosperity*, and *place.* They have been successfully implemented by rural, suburban, urban, and coastal localities throughout the country. Not only can these model programs and projects be used to realize the goals of the RPSD, but they can address other challenges faced by cities, towns, and rural areas within the Houston-Galveston region, improving local sustainability and quality-of-life.

HOUSING

Providing safe, affordable housing suitable for all lifestyles is necessary to create vibrant, prosperous communities. The RPSD envisions a region with affordable, diverse, energy-efficient housing options, which have easy access to multiple modes of transportation (mass transit, bicycle facilities, pedestrian infrastructure, etc.). Residents can choose from several housing options in a variety of different neighborhoods, ranging from dense urban environments to mixed-use villages.

Public agencies, non-profit organizations, and other entities across the country have worked collaboratively to provide affordable housing opportunities that meet the needs of an increasingly-diverse population. Communities nationwide have developed programs that focus on:

- Creating and maintaining affordable and accessible housing;
- Encouraging housing in areas served by transit;
- Encouraging the revitalization of declining residential neighborhoods;
- Address rural housing issues; and
- Creating intergenerational communities.

These programs can be tailored to meet local needs and resources.

Best Practices Related to *Housing*

Affordable Housing

- University of Chicago: Employer-Assisted Housing (EAH) Program (Chicago, IL)
- Capital Area Metropolitan Planning Organization (CAMPO) 2035 Regional Growth Concept (Austin, TX)

Neighborhood Revitalization

- Kansas City First Suburbs Coalition (Kansas City, MO)
- Chatham Square: Mixed-Income Redevelopment Project (Alexandria, VA)

Rural Housing

- Randolph County Housing Authority (Elkins, WV)
- Bayview Rural Village (Bayview, VA)

Intergenerational Communities

- Jewish Federation of Greater Atlanta (Atlanta, GA)

REGIONAL CHALLENGES

To meet future housing needs and achieve the environmental, transportation, and housing goals set forth in the RPSD, it is important to increase opportunities for new housing within developed communities and reduce the region's over-reliance on greenfield sites on the urban fringe. In

some localities, citizens have opposed policy changes that promote infill and/or affordable housing. When planning infill development, builders should consider the preferences of existing residents, many of whom want to protect the character of their neighborhood as the region grows. Encouraging infill development, while preserving existing neighborhoods, is an important component of the RPSD. Well-planned, context-sensitive development in established neighborhoods can provide new housing and economic development opportunities, while preserving or improving existing residents' quality-of-life.

Planning Jargon

A *greenfield* is property that is largely undeveloped, generally on the urban fringe. *Infill development* occurs within existing urban and suburban areas, either through redevelopment or construction on vacant land surrounded by existing development.

Local Context

Many residents oppose infill development, believing it will negatively alter the character of their community. In the *Think 2040* survey, 38.1% of respondents throughout the Houston-Galveston area stated that they do not want more growth in their area.

The region's diverse, fast-growing population has varying housing needs, ranging from starter-homes for workers in the petrochemical and service industries to multigenerational housing options for immigrant populations. The number of elderly residents is increasing dramatically; this demographic has a unique and varied set of housing needs. Traditionally, private retirement communities have been the market answer to senior housing. It is becoming clear that this solution is not economically feasible or appropriate for all seniors, many of whom would rather maintain their current residence than move to a special community late in life.[1] Providing opportunities to "age in place" will be important as the elderly population increases. Programs throughout the country have been used to create intergenerational communities, allowing seniors to age in place, maintain their existing social network, and forgo the stress and loss of independence associated with moving to a retirement community.

Development in the region exhibits a "leapfrog" pattern, in which new development skips over adjacent parcels, forming a patchwork of developed and undeveloped land. This leapfrog pattern of growth, combined with few constraints to outward expansion, makes infrastructure planning and the provision of public services a challenging task for local governments. These growth patterns may contribute to the region's relative affordability, but they also threaten its long-term economic, social and environmental sustainability. Jurisdictions could provide public services in a much more efficient and cost-effective manner, if new housing development were concentrated in developed areas already served by public infrastructure.

Affordability and Low-Income Households

While the Houston-Galveston area is a relatively affordable place to live, the region lacks affordable housing options with access to public transit, employment opportunities, parks, and

schools. This deficit often leaves low-income families with the choice of accepting disproportionately high housing costs or living in more affordable areas with limited access to high-quality educational and economic opportunities.

Access to Transportation Options

For the region to grow and develop in a sustainable manner, residents must be able to afford high-quality housing with access to the many opportunities the region has to offer. Affordable housing units may be geographically isolated from employment opportunities, high-quality schools, mass transit, and other amenities and public services vital to a good quality-of-life. The RPSD encourages communities to increase the supply of affordable housing units within walkable communities accessible to mass transit, public services, and jobs.

Barriers to Developing Affordable Housing

Due to limited financial incentives, it is difficult for private developers to justify the lower profit margins associated with building affordable housing for low-income residents. The distorted real estate market does not meet the substantial demand for affordable single-family and multi-family units. With the housing needs of low-income populations going largely unaddressed, parts of the region, including Fort Bend County and Chambers County, have seen a proliferation of mobile homes in rural areas and within incorporated areas that allow such homes.[2] The lack of affordable housing opportunities has resulted in the majority of low-income households occupying multi-family rental properties. These trends demonstrate that demand for affordable housing is not being adequately met by the traditional real estate market.

There are some financial incentives that encourage the construction of affordable housing units. Even when these incentives are readily available to developers, they are not always utilized. Sometimes developers make an economic decision that the incentives offered (typically expedited permitting process, tax credits, or density bonuses) are insufficient to offset lower profit margins associated with affordable housing. Other times, well-organized community opposition effectively discourages developers from constructing affordable housing, particularly multi-family units, in established communities. This "NIMBYism" is often based on concerns that the presence of affordable housing will negatively impact the character of the surrounding neighborhood and compromise its economic health.

Planning Jargon

NIMBY is an acronym for "not in my backyard." It refers to local opposition to the location of a feature deemed undesirable within a neighborhood, such as a landfill or jail.

These negative perceptions extend beyond affordable housing to include multi-family apartments in general. For example, community members in Sugar Land, Texas opposed the construction of a compact, mixed-use development because it included luxury apartments. Residents expressed concerns about the "transient nature" of renters and an unwanted transformation of the community from a suburban enclave into an urban center.[3] This local example highlights the

prevalent perception of homeownership as a stabilizing factor in a community, while renters are typically cast as an inherently destabilizing force.

Those opposed to multi-family projects often warn of lowered property values, an increased burden on local public schools, and a general deterioration of the neighborhood's character. These fears may be perpetuated by misconceptions, and can be addressed effectively through public education campaigns and a robust participatory community engagement process, which allows the developer to interact with concerned current residents. A number of other strategies can be used to ease NIMBY concerns, including quality management and architectural considerations that ensure the building's design is compatible with the surrounding neighborhood.

BEST PRACTICES

Affordable Housing

Across the county, public agencies and non-profit organizations have worked together to provide affordable housing opportunities within their communities. These programs may provide financial assistance to low- or moderate-income homebuyers, or offer financial counseling, homebuyer education courses, and other informational resources.

Employer-Assisted Housing Programs

Employer-Assisted Housing (EAH) programs are a method of providing or maintaining affordable housing for workers throughout a community. In a typical EAH program, employers (either public or private) help interested employees become homeowners, usually in a neighborhood close to the employment location. The employer contribution can come in the form of:

- Direct financial assistance towards down payments and other housing costs; or
- Homebuyer education, credit counseling, and other advisory programs.

An effectively designed and implemented EAH program:

- Strengthens the community surrounding the participating employer;
- Empowers participating employees; and
- Provides substantial economic benefits to participating employers and local lending institutions.

Employers benefit from greater worker productivity, at least partially due to the reduced commuting costs incurred by their employees, and local lending institutions enjoy increased demand for home loans.[4] As more employees are able to afford housing near their place of work, increased investment revitalizes the surrounding area.

EAH programs in some cities are geared toward providing affordable housing options for public employees, such as teachers, firefighters and police officers. Other programs come in the form of a comprehensive benefits package offered by a private employer or a non-profit organization. Regardless of the economic sector they serve, EAH programs can be an effective tool for

strengthening communities and providing affordable workforce housing. At the regional level, councils of government can play a facilitative role by connecting interested employers with non-profit housing groups that have the skills, capacity, and networks to effectively implement an EAH program.

Successful EAH programs have been established throughout the country, including one administered by the University of Chicago. University EAH programs are typically based on a widely-held belief that institutions of higher education are not merely isolated entities, but an integral pillar of the surrounding community.[5] The same principle can be transferred to private businesses implementing an EAH program. In certain instances, these programs have greatly improved relations between an employer and the surrounding neighborhood. The U of C program provides an exemplary model of a remedial effort to improve community relations and diminish any historical tensions between employers and the public.

Types of Employer-Assisted Housing (EAH) Programs

Financial Partner Model

Under the financial partner model, the employer provides direct financial assistance to its employees, typically in the form of down payment assistance.

Service Provider Model

Under the service provider model, the employer provides essential supportive services for employees who wish to become homebuyers. These services can include homebuyer education programs, credit counseling, and property search assistance.

Connector/Facilitator Model

Under the connector/facilitator model, the employer acts as an information resource for interested employees. Employers administering a connector/facilitator EAH program refer employees to relevant financial institutions and housing service providers, including private lenders, public sources of housing assistance, and non-profit community partners.

Developer Model

The developer EAH model is the only model in which the employer takes an active role in creating affordable housing in the surrounding community. Under this model, the employer makes a direct effort to build housing for its employees. Employers taking on the 'developer' role must navigate the complex real-estate development process, which can make this model difficult and costly to implement.

Source:

Hoereth, Joseph K., Dwan Packnett, and David C. Perry. *University Employer Assisted Housing: Models of University-Community Partnerships*. Working paper. Chicago, IL: Lincoln Institute of Land Policy, 2007.

University of Chicago: Employer-Assisted Housing (EAH) Program
Chicago, Illinois
Helping Employees Purchases Homes in the Urban Core

In 2003, the University of Chicago and University of Chicago Hospitals created an EAH program to help mitigate the high cost of housing for employees wishing to live in one of the communities surrounding the campus. To assist with the design and implementation of the EAH program, the University of Chicago partnered with Neighborhood Housing Services of Chicago (NHS), a local non-profit housing services organization. The partnership was arranged by the Metropolitan Planning Commission as part of a regional effort to match interested employers with housing groups to form effective EAH programs.

The University of Chicago's EAH program offers eligible employees down payment assistance loans (up to $7,500), which are incrementally forgiven over a five-year period. NHS distributes the loans, while the University provides homebuyer education courses and handles the marketing costs associated with promoting the program. The University of Chicago also pays the salary of the NHS staff person responsible for administering the program, and provides NHS with an on-campus office to increase the responsiveness of the program.

The benefits of the EAH program are contingent on household income, price, and location of the house being purchased. While the income thresholds are not low enough to cater exclusively to low-income residents, they are contextualized in relation to the income levels of the surrounding population, and therefore assist potential homebuyers who have otherwise been priced out of the expensive neighborhoods surrounding the University. Furthermore, the program was originally designed to address a local disconnect between incomes and housing costs, and to meet an existing demand among University employees for more affordable housing in close proximity to the University itself.[6]

A weakness of the University of Chicago's EAH program is its neglect of the supply side of the housing equation. The University and NHS are trying to help employees afford housing in neighborhoods with housing stocks that are essentially fixed. Absent any efforts to create affordable housing stock in the neighborhoods surrounding the campus, the down payment assistance program may not be as effective, as it is entirely dependent upon the number of available houses on the market at any given time. However, the University of Chicago would have to take on a developer role to remedy this supply-side problem; this approach is often prohibitively complex and expensive. In this specific case, a tight real-estate market and the complexity of land acquisition issues in the city would likely be substantial barriers to the implementation of a developer-based EAH program.[7]

Lessons Learned: Employer-Assisted Housing Programs

- Context of employer-community relationship is crucial to developing a successful EAH program
- Important to engage high-level university officials/business executives in the planning process
- Take advantage of the expertise and capacity of non-profit housing agencies
- Regional COG can take on a facilitative role and make connections between employers, housing groups, and lending institutions
- Programs can be used to direct housing investment to neighborhoods that need revitalization and have adequate infrastructure

Transit-Oriented Development & Employer-Assisted Housing Programs
Loyola University's Employer-Assisted Housing Program

In many aspects, Loyola University's EAH Program is similar to the program implemented by the University of Chicago. These programs were both formed with assistance from the Metropolitan Planning Council, which connected participating employers with housing groups throughout the Chicago region. Both programs help employees become homeowners through the provision of loans that are incrementally forgiven over a five-year period. Differences between the two programs are relatively minor, but one innovation in the Loyola plan is particularly relevant to the Houston-Galveston area.

Loyola's EAH program fosters transit-oriented development by making program eligibility contingent upon purchase of a home in a neighborhood near the campus and adjacent to the Chicago Transit Authority's Red Line. In addition to strengthening ties between the University, its employees, and the surrounding community, this stipulation also aligns the twin goals of increasing affordable housing opportunities and alleviating the congestion and pollution associated with commuting.

As transit options expand, it is important to consider the relationship between housing, land use, and transportation patterns. Incorporating location-based bonuses into any EAH program can help provide workers with access to transit, employment centers, and more affordable housing.

We want faculty and staff to be a part of our environmental goals and recognize they don't need a car to work here.

- Jennifer Clark, Loyola University Chicago: Director of Community Relations

Source:
Home Grown: Local Housing Strategies in Action. Rep. Chicago, IL: Metropolitan Planning Council, 2010.

Tax Allocation Districts & Affordable Housing

Several innovative communities have used tax allocation districts to fund affordable housing initiatives, in addition to local infrastructure improvements. While this can be a contentious financing mechanism, it can provide a consistent source of funding.

BeltLine Affordable Housing Trust Fund and Advisory Board
Atlanta, Georgia
Coordinating Infrastructure Improvements & Financing with Affordable Housing Initiatives

At its core, the BeltLine is a rail-trail loop constructed along 22 miles of repurposed railway surrounding the City of Atlanta. The loop provides 45 neighborhoods with access to a system of trails, parks, and regional transit lines.[8] Hoping to mitigate residential displacement stemming from increased land values in neighborhoods adjacent to the BeltLine, the City Council developed a forward-looking plan to create and maintain affordable housing in redeveloping areas.

The City Council created the BeltLine Affordable Housing Trust Fund (BAHTF), which is funded by a large Tax Allocation District (TAD) encompassing neighborhoods near the BeltLine. A TAD is a legislatively-designated district in which property tax revenues are frozen at a certain base value, and local government bonds are sold against the additional property tax revenue created in the district.[9] These bonds are used to fund redevelopment projects within the TAD. In the case of the Atlanta BeltLine, 15% of each TAD bond issuance must be allocated to the BAHTF, and these BAHTF dollars must be spent on the construction of tangible capital projects within the boundaries of the TAD.[10] The TAD boundary was intentionally designed to encompass very few single-family homes, so that BAHTF spending would directly benefit the target population: residents of affordable, multi-family housing developments.

Although TADs have a legislative basis in Georgia state law, the BeltLine TAD has been the subject of multiple legal battles. These lawsuits have all focused on the fact that the TAD encompasses properties in multiple school districts, diverting tax revenue from public schools towards BeltLine projects. According to John Woodham, legal counsel for three separate lawsuits brought against the TAD, this diversion of property tax revenue renders the BeltLine TAD unconstitutional.[11] In 2008, the Supreme Court of Georgia concurred with Woodham; shortly thereafter, the state constitution was amended by referendum to allow such a diversion of property tax revenue with the consent of affected school districts.

Critical to the success of Atlanta's BeltLine affordable housing strategy is the BeltLine Affordable Housing Advisory Board (BAHAB), created by the City Council to help guide and coordinate BAHTF spending. The BAHAB includes representatives from community development corporations, the real estate industry, and Atlanta Public Schools, as well as appointees from the Fulton County Commission. The BAHAB advises the Atlanta Development Board and the City on broad goals and policies relating to the allocation of BAHTF dollars, and is also tasked with monitoring the location and availability of affordable housing throughout the BeltLine area.

BAHAB's overarching goals for BAHTF spending have been established in the Statement of Guiding Principles, a document resulting from a February 2008 meeting of the advisory board. The statement outlines three fundamental guiding principles:

1. Investments should facilitate the creation of affordable housing near jobs to prevent working families from being priced out of desirable neighborhoods
2. Investments should catalyze the revitalization of the communities along the BeltLine
3. Investments should preserve housing assets along the BeltLine, and mitigate the involuntary economic displacement of existing residents

These principles, agreed upon by the diverse advisory board, have helped guide the allocation of BAHTF dollars to three specific purposes:

- Down payment assistance for homebuyers;
- Grants to develop and preserve affordable housing; and
- Funds for property acquisition for future affordable housing.

Lessons Learned: Tax Allocation Districts & Affordable Housing

- Large-scale infrastructure and/or public improvement projects can provide unique opportunities to address issues of affordable housing
- Collaboration between a diverse range of stakeholders is crucial to create an equitable and effective affordable housing strategy
- Tax Allocation Districts near infrastructure and/or public improvement projects can be an effective funding method for affordable housing *as long as legal issues are anticipated and addressed beforehand*
    - Cities in Texas have the legislative capability to designate TADs (although in Texas, these districts are called TIRZ, or Tax Increment finance Reinvestment Zones)

Accessory Dwelling Units

An accessory dwelling unit (ADU) is an additional dwelling located on a single-family lot, independent from the primary residential unit. Each ADU must have its own bathroom and kitchen facility, and may be either attached to, or detached from, the primary unit.

The widespread entrance of ADUs into the rental market has the potential to address several housing-related issues. A comprehensive housing strategy focused on facilitating and incentivizing the construction of ADUs could:

- Foster intergenerational communities;
- Create affordable housing;
- Diversify the housing stock of the region; and
- Provide housing that is well-oriented in relation to transit and the provision of public services.

ADUs have also been called granny flats and in-law units, because the accessory units are often rented to the grandparents of the family occupying the primary residence. From this perspective, ADUs can help foster intergenerational communities by allowing seniors to remain in a generationally-integrated neighborhood at a relatively low cost. Conversely, the prevalence of ADUs can also attract a younger demographic to neighborhoods that may have previously been prohibitively expensive.

Increasing the prevalence of ADUs can diversify existing housing stock. ADUs allow for more efficient use of land by increasing density on previously-developed land and utilizing existing infrastructure.[12] A housing strategy that increases residential density in previously-established neighborhoods makes it easier for local governments to provide public services. Furthermore, such a strategy could foster the creation of socioeconomically diverse, transit-oriented neighborhoods by providing affordable housing options in residential areas served by public transit.

Figure 1: Modern Accessory Dwelling Unit
A modern accessory dwelling unit allows for ground-floor parking and storage.
Source: Coates Design Architects

Figure 2: Garage Apartment (Austin, TX)
An accessory dwelling unit is located atop a garage along a rear alley in Mueller, a New Urbanist redevelopment project. The unit has a private entrance accessible from the alley, and blends in with surrounding homes.
Source: Chris Bradford

Local Context

The results of the 2012 Kinder Houston Area survey demonstrated a shifting preference toward a more urban lifestyle, with 51% of respondents saying they would rather live in a "smaller home in a more urbanized area, within walking distance of shops and workplaces" than in "a single-family home with a big yard." This figure is even more meaningful when juxtaposed with the numbers from 2008 and 2010 (36% and 39%, respectively). This shift in residential preferences could have major implications for the region's future housing market. As demand increases for urban living, ADUs will become a more sought-after affordable housing option.

A recent Pew Center study named Houston the most residentially-segregated city in the nation, based on household income. A housing strategy focused on facilitating the construction and use of ADUs could help remedy this disparity by offering affordable housing options in single-family neighborhoods. ADUs would increase socioeconomic diversity by attracting low- to moderate-income individuals, especially smaller households that want to be close to urban amenities.

The lack of affordable rental housing in the Houston-Galveston region can be at least partially remedied by the widespread market acceptance of ADUs. While a legitimate regional market analysis for ADUs is needed, there is anecdotal evidence to suggest that ADUs would serve a substantial demand for affordable rental housing. The popularity of ADUs in Houston neighborhoods such as the Heights furthers this hypothesis.

For those promoting the construction of ADUs, Houston's lack of zoning, and the lax regulatory atmosphere of the region as a whole, is an advantage. According to a Center for Community Innovation study of ADUs in the California Bay Area, restrictive zoning has been the most substantial barrier to the widespread prevalence of ADUs. Theoretically, the relative lack of zoning regulation in the Houston-Galveston region would promote the construction of ADUs. Allowing single-family homeowners to construct ADUs on their property "by-right," rather than through an onerous permitting process, could spark the construction of ADUs within desirable residential neighborhoods; this strategy would expand private property rights, while addressing the need for affordable housing. Houston's cumbersome parking requirements may present a regulatory barrier, since homeowners would have to provide off-street parking for these units.

NIMBYism could be another barrier to the widespread prevalence of ADUs, especially in expensive residential areas. Deed restrictions in certain neighborhoods may effectively disallow the construction of ADUs. To help assuage neighbors' concerns over decreased property values and altered neighborhood character, planners should establish publicly-available design standards, ensuring that ADUs are aesthetically-consistent with the surrounding neighborhood. Ultimately, ADUs will not be a feasible housing option in all areas, but public, nonprofit and private housing groups should make a collaborative effort to raise awareness of the benefits of ADUs, and facilitate and incentivize construction of these secondary units wherever possible.

Sources:

Klineburg, Stephen L. *The Kinder Houston-Area Survey- 2012: Perspectives on a City in Transition*. Rep. Houston, TX: Rice University, 2012.

Fry, Richard, and Paul Taylor. *The Rise of Residential Segregation by Income*. Rep. Pew Research Center, 01 Aug. 2012. Web. 01 Aug. 2012.

Chapple, Karen, Jake Wegmann, Alison Nemirow, and Colin Dentel-Post. *Yes In My Backyard: Mobilizing the Market for Secondary Units*. Issue brief. Berkley, CA: Center for Community Innovation, 2012.

City of Santa Cruz: Accessory Dwelling Unit (ADU) Program
Santa Cruz, CA
Reducing Regulatory Barriers to the Construction of ADUs

Santa Cruz, California, one of the most expensive cities in the nation, has recently developed a successful ADU program to address substantial demand for affordable housing in the city. The focus of the Santa Cruz program was not only to remove regulatory barriers limiting the use of ADUs, but to actively encourage the construction of ADUs.[13] The city established a public education program to raise awareness of ADUs among homeowners and encourage their construction. As part of this educational effort, the city published two publicly available resources: the *ADU Plan Sets Book* and the *ADU Manual*. The ADU Plan Sets Book contains a collection of designs for ADUs developed by local and regional architects. If a homeowner selects one the designs from the book, they receive expedited permitting on the construction of their ADU. In this way, the Plan Sets Book helps simplify the decision-making process for homeowners and ensures that new ADUs are seamlessly integrated into the surrounding community. The ADU Manual serves a similar purpose, but at a more specialized level. The manual includes information on how to make ADUs architecturally compatible with specific neighborhoods, and helps homeowners understand the permitting process and zoning regulations applicable to ADUs.

Another positive element of Santa Cruz's ADU program is that it incentivizes the provision of affordable ADUs. While ADUs are generally more affordable than typical rental units, not all ADUs are deemed affordable in relation to the Area Median Income (AMI).[14] Santa Cruz's program offers to waive development fees for any ADU established for low- and very-low-income households.

Lessons Learned: Accessory Dwelling Units

- ADU programs must establish an uncomplicated route by which homeowners can construct ADUs
- Fiscal incentives are important in encouraging the widespread prevalence of ADUs
- ADUs have the potential to fulfill a substantial existing market demand for affordable housing near urban cores
- Public education campaigns are necessary to raise awareness about the advantages of ADUs, and to clarify the process of constructing an ADU

Neighborhood Revitalization

Older neighborhoods within inner cities and first-ring suburbs have struggled with decline, disinvestment, and housing deterioration. Many of these neighborhoods are overlooked by today's homebuyers, as older housing stock tends to lack the privacy, space, or amenities that modern Americans want; post-war suburban homes are considered too small by today's standards. While the suburban fringe continues to expand outward, some closer-in communities

are being overlooked and falling into disrepair. Government agencies and preservation groups are encouraging homeowners to update existing homes in these communities; several organizations are offering financial incentives and design guidance for those interested in adapting older housing stock.[15] Although expanding and updating an existing home may be difficult, it has many environmental, economic and social benefits for the owner, surrounding neighborhood, and region.

Kansas City First Suburbs Coalition
Kansas City, Missouri
Promoting the Revitalization of Inner-Ring Suburban Neighborhoods

The Kansas City First Suburbs Coalition promotes the revitalization of the region's inner-ring suburban neighborhoods, encouraging residents to reinvest in aging housing stock. Overseen by the Mid-America Regional Council (MARC), the coalition consists of 19 member cities, which contain a large number of older, post-war housing built between 1940 and 1970. Participating municipalities realized that such a coalition would allow them to more effectively address community development issues. While the coalition does promote the redevelopment of declining commercial corridors and the replacement of aging infrastructure, its more innovative programs help homeowners adapt outdated housing stock to meet current needs. To encourage home renovations, the coalition provides a variety of financing incentives and design-based resources.[16] Many of these incentives have been popular among homeowners.

The MARC Home Remodeling Loan Program helps homeowners modify older residences. The program aims at making older neighborhoods more desirable for today's buyers by providing homeowners with the resources they need to incorporate modern conveniences into their homes. Residents of participating communities may be eligible for low-interest, fixed-rate home equity loans. In partnership with MARC, CommunityAmerica Credit will provide loans valued from $5,000 to $30,000 for home improvements, provided that the tax-assessed value of the home does not exceed $250,000 and the home is owner-occupied. As an added incentive, interest on the loan may be tax-deductible, depending on the circumstances.[17] Between 2007 and 2011, the loan program granted over 150 loans totaling approximately $3 million.[18]

With the help of a local architect, the coalition published a set of design guidelines homeowners can use when planning renovations and additions. Called the *2005 Idea Book: Updating Post-World War II Homes*, the publication describes several different ways homeowners can update or expand their homes, whether they live in a suburban ranch, a split-level, Cape Cod, or two-story home (the four most common housing styles built in the area in the mid-twentieth century). The descriptions include easy-to-understand illustrations and informative captions. Not only does the plan provide homeowners with ideas on how to create additional space, but it also includes guidelines for changing exterior elements, such as windows and doors. The guidebook encourages homeowners to improve energy-efficiency and incorporate universal design concepts into all planned renovations.[19] It also helps homeowners understand the financing and construction process. In its first year of publication, more than 2,000 copies of the book were sold.[20] Other cities nationwide have developed similar design guidebooks, including Norfolk, Virginia.[21]

Chatham Square: Mixed-Income Redevelopment Project
Alexandria, Virginia
Integrating Affordable Housing into an Upscale Community

Chatham Square is a high-density, mixed-income community in historic Alexandria, Virginia, an affluent city across the Potomac River from Washington, D.C. The Alexandria Redevelopment and Housing Authority (ARHA) and other city agencies worked with private developers to redevelop the site of Samuel Madden Homes, an outdated 1940s-era public housing complex containing 100 units.[22] Developers demolished the existing structures and built 152 new units on the four-acre site; 52 low-income rental units are dispersed amongst 100 market-rate, for-sale townhouses. The rental apartments are grouped in a "two-over-two" configuration that allows the units to blend in with the market-rate three- and four-story townhouses. The development's location within a designated historic district required that the buildings be constructed using high-quality materials and architectural features, ensuring its compatibility with the surrounding neighborhood. Although density was increased, more open space is provided than existed in the previous development, with many of the units oriented around formal courtyards. Streetscape improvements and alley-loaded garages promote pedestrian activity and provide linkages to the surrounding neighborhood.[23] Despite their proximity to affordable housing units, some of the market-rate townhouses sold for more than $1 million in the late 2000s.[24]

Decades-old city policies required that all demolished public housing units be replaced, either on- or off-site. The remaining 48 public housing units not reconstructed on-site were disbursed amongst several city neighborhoods accessible to transit, parks, and services; these new units were funded through the sale of the Chatham Square site, state low-income housing tax credits, and Federal HOPE VI grants.[25]

Figure 3: Chatham Square (Alexandria, VA)

Market-rate and affordable housing units blend seamlessly with one another and the surrounding historic neighborhood.

Source: Congress for New Urbanism

In 2005, the City of Alexandria was awarded the 2005 Housing Choice and Affordability Award by the National Capital Area Chapter of the American Planning Association for its involvement with the Chatham Square project.[26] Although the project has received recognition for its design, there have been some issues with the development. There has been tension between low-income residents and some of their wealthier neighbors. In 2008, the City established the Chatham Square Working Group to address local concerns and serve as an intermediary between neighborhood residents and the ARHA. Despite these issues, city officials have noted that there have been dramatic decreases in neighborhood crime since the development's completion.[27]

Context-Sensitive Multi-Family Housing

As older neighborhoods begin redeveloping, many homeowners oppose the construction of multi-family buildings near their homes, fearing it will change the character of the community. Higher-density apartments and condominiums can be compatible with lower-density residential neighborhoods, if designed and built at an appropriate scale. Context-sensitive designs for higher-density residential projects reflect the architectural traditions and character of the surrounding neighborhood. If these designs are successful, passersby will have difficulty differentiating between older single-family homes and new multi-family buildings. Developers using context-sensitive design to blend multi-family development into the community will face less opposition from neighbors, who will be less concerned that a large apartment building will tower over the neighborhood or be an eyesore. Homeowners will benefit from increased investment and high-quality development within their neighborhood, and localities will enjoy higher tax rates, more diverse housing stock, and a more efficient use of existing infrastructure. Below are some examples of multi-family buildings, both affordable and market-rate, that have been successfully integrated into neighborhoods with single-family homes.

Mansion Apartments

This multi-unit condominium building in Norfolk, Virginia looks like a large single-family home from the street, allowing it to blend in with surrounding homes. A large front porch helps the building relate to the street.

Source: Better! Cities & Towns

Triplex

This triplex in Portsmouth, Virginia looks like a traditional single-family home. Not only is the building attractive, but it includes affordable housing units. A picket fence and street lighting help create an attractive streetscape

Source: Better! Cities & Towns/Robert Steuteville

Back-to-Back Duplexes

These back-to-back duplexes in Boulder, Colorado contain two affordably-priced 1,000-square-foot units. Each unit has its own entrance, a sizable porch, and a small garden space. These units can be built at densities of 15 to 20 units per acre, but have the feel of single-family homes.

Source: Better! Cities & Towns/Wolff Lyon Architects

Lessons Learned: Neighborhood Revitalization

- Cities can build cooperative partnerships to address declining neighborhoods, pooling resources to support the revitalization of deteriorating or outdated housing stock.
- Communities can provide affordable financing options, tax incentives, and design assistance to encourage homeowners to improve existing housing stock, making it more attractive to modern homebuyers.
- The redevelopment of deteriorating multi-family developments can provide opportunities for mixed-income communities, where affordable housing intermixed with market-rate units.
- With careful design, affordable housing can be successfully integrated into existing neighborhoods.

Rural Housing

The lack of affordable rental housing in the region's outlying counties is a pressing problem, particularly for low-income elderly residents and young families. 58% of renters in Wharton County are considered cost-burdened, as well as 57% in Walker County and 56% in Matagorda County.[28] These alarmingly high rates are indicative of the market's failure to meet demand for affordable rental housing in rural areas. Developers, non-profit organizations, and public housing agencies can help improve rural housing stock, particularly affordable rental housing, by taking advantage of existing incentives.

Several government programs address housing affordability, and a few specifically address affordability in rural areas. These programs acknowledge that private market forces do not provide the necessary incentive for developers to create affordable rental housing in sparsely populated areas. Absent any outside assistance, these developments are usually not profitable for private developers. Therefore, substantial demand for affordable rental housing in rural areas often goes unmet, either pricing out low-income residents or forcing them to accept heavy housing cost burdens. In Chambers County, the negative implications of this dilemma are evident in the prevalence of mobile homes. Nearly one-third (32%) of the housing stock in Chambers County is comprised of mobile homes, reflecting the absence of other affordable housing options for low-income residents of the county.[29]

Randolph County Housing Authority
Elkins, West Virginia
Building a Diverse Housing Program to Address Local Needs

Specific programs have been created to address rural housing issues, but many of these programs are not well-coordinated with one another. The Randolph County Housing Authority (RCHA), a public housing authority that serves a six-county region in rural West Virginia, provides an exemplary administrative model of the diversification and consolidation necessary to take advantage of multiple housing programs with differing eligibility requirements.

The RHCA serves a largely rural six-county area with housing needs similar to those in the H-GAC region's rural counties. RHCA's service area has a poverty rate of nearly 20%, and a comparable percentage of the population is comprised of elderly residents. 40% of renters in West Virginia are cost-burdened, which actually compares favorably with the rates of some counties in the Houston-Galveston region.[30] Strategies used by the RCHA have transcendent relevance, as they deal with nearly universal issues of an aging population and a lack of affordable housing in rural areas.

RHCA has only 17 full-time staff members, and operates on an annual budget of less than $1 million.[31] Despite these constraints, the agency continues to offer a range of housing programs that effectively address the problems of the service area's residents. To assist in the provision of housing and housing services, RCHA has created three non-profit agencies that allow the agency to take advantage of a diverse array of funding opportunities and government programs otherwise unavailable to a traditional public housing agency:

- *Community Housing Development Organization*

  In order to provide affordable rental housing to the region's sizable low-income population, RCHA created a certified Community Housing Development Organization (CHDO) in 1995. The State of West Virginia had set-aside funds from the HOME program that could only be allocated to CHDOs. In response to these eligibility requirements, RCHA created a CHDO and began the development of 16 rental units scattered throughout Randolph County. The CHDO continues to develop affordable housing throughout the RCHA service area and maintains a connection with the housing agency. The two entities have a contract under which the RCHA provides the CHDO with a part-time executive director.

- *NeighborWorks America HomeOwnership Center*

  RCHA also created a NeighborWorks America HomeOwnership Center to improve the services it provides to low-income homebuyers. RCHA had been using public housing funds to build affordable homes, and putting the proceeds from sales of these homes into a revolving development fund and a homebuyer education and credit-counseling program. The housing authority wished to further this program by becoming part of the national NeighborWorks network, a group of community-based non-profit organizations focused on affordable housing and community development. At the time, housing authorities could not become NeighborWorks members, so RCHA created the HomeOwnership Center in order to join the NeighborWorks network and take advantage of the grant funding, technical support, training and programmatic support that comes with a membership.

- *Highland Community Builders CDC*

  In 2006, RCHA converted its construction crew into a private non-profit community development corporation (CDC) called Highland Community Builders. This conversion was beneficial for a number of reasons. For one, it allowed RCHA to avoid lengthy procurement processes and sidestep superfluous personnel policies, enabling the housing authority to provide affordable housing in a more cost-efficient manner. Additionally, the creation of the non-profit CDC allowed RCHA to raise grant funds, and made the

housing authority eligible to become a Rural Local Initiatives Support Corporation (LISC).[32] Its membership as a Rural LISC provided RCHA with opportunities for increased financing, training and technical assistance.

Bayview Rural Village
Bayview, Virginia
Non-Profits, Local Residents, and Government Agencies Redevelop a Rural Village

In the 1990s, Bayview was one of the most impoverished communities in the Mid-Atlantic. The small, isolated village is located on Virginia's Eastern Shore, and was founded by freed slaves in the 1800s. Despite the community's rich history, most families were living in substandard conditions. Many of the homes lacked indoor plumbing or bathrooms, and poorly-maintained outhouses were falling into severe despair.[33] Residents collected water from hand pumps, which provided water from shallow, contaminated wells, and most homes lacked modern heating systems.[34]

When a maximum-security prison was proposed for the community in the mid-1990s, residents joined together to oppose its construction, forming Bayview Citizens for Social Justice. This grassroots organization partnered with the Nature Conservancy and others to improve the community's substandard conditions. In 1997, the partnership was awarded an Environmental Justice Grant from the U.S. Environmental Protection Agency (EPA), which was used to create a "community-based action plan." Community members, architects, planners, advocacy groups, and a nearby university worked together to develop the plan. A series of workshops were held to learn about local history, record existing conditions, and develop a short- and long-term vision for the community; these workshops were formatted to mimic traditional community gatherings, encouraging resident engagement in a comfortable, familiar setting. The workshops were not only intended to create a planning document, but build local capacity to facilitate long-term, resident-driven change.[35]

The "new" Bayview is being constructed near the old, dilapidated buildings on land purchased by Bayview Citizens for Social Justice. New homes, businesses, and community infrastructure are being built through a combination of federal, state, and private funds. Each new home costs about $70,000 to build, with the U.S. Department of Agriculture's rural poverty program subsidizing rent for low-income households. To date, single- and multi-family residences, offices, a Laundromat, and a community center have been constructed.[36] The village's layout is based on traditional town design, with a compact, interconnected street network. Building designs are inspired by historic buildings in the area, particularly rural farmhouses.[37] Front porches help the buildings relate to the street, and serve as a gathering spot for neighbors; porches have been an important part of family life for generations, so it was important that they be included in the design of the new homes.[38] Members of Bayview Citizens for Social Justice remain active in the community.

Lessons Learned: Rural Housing

- There is a lack of affordable housing options in the region's rural areas.
- Incentives to build affordable housing become more feasible when a comprehensive organizational structure is used to combine disparate funding streams and facilitate coordination between different housing assistance programs.
- Partnerships between local residents, non-profit organizations, and government agencies can result in the revitalization of rural housing stock.

Intergenerational Communities

Like many parts of the country, the Houston-Galveston region is home to an aging population. As residents age, their housing and health needs can change significantly, and can become increasingly interrelated. Housing problems that were once minor and easily remedied, such as leaking pipes, are more likely to go unfixed as the occupant of the house ages. A senior on a fixed income living in a substandard house may have to choose between paying for housing repairs or paying for healthcare. In many cases, the deterioration of housing stock is correlated with a decline in the occupants' health. Conversely, a deterioration of health can also cause or intensify problems with housing, as in the case of a senior with arthritic knees living in a two-story house with an elevated front porch. [39]

Despite changing housing needs and preferences, research shows that many seniors want to remain in their communities as they age. This strong preference reflects a desire to maintain social relationships, retain independence, and avoid the traumatic experience of moving late in life. While some privately-owned retirement homes do a sufficient job meeting the housing needs of seniors, they are often prohibitively expensive for low-income seniors, and typically isolate their residents from surrounding neighborhoods, rather than allowing them to remain socially-integrated within a multigenerational community.[40] Due to Euclidean-style zoning, many suburban communities do not offer housing options that allow seniors to remain nearby as they age.

Mission-based non-profit groups are especially well-suited for integrating the delivery of health and housing services to seniors. These groups are able to specialize in providing services to the elderly. Since they are not restricted by concerns about profit margins, they are able to focus on a subset of the general population, and calibrate their services to the needs of that subset. They are also able to provide these specialized services at a low cost. Partnerships between multiple agencies are crucial to the integrated delivery of housing and health services, because many of the groups involved have specialized skill sets, and cannot unilaterally tackle issues associated with an aging population in an aging housing stock.

Naturally-Occurring Retirement Communities

Regional planning agencies are able to facilitate partnerships between housing groups, various healthcare providers, and community organizations to create an effective delivery system of housing and health services for seniors. They are also able to use GIS analysis on a regional scale

to pinpoint areas where these organizations' services are most needed, based on a variety of factors, including population density of seniors, location of community centers, etc. Various regional groups have used GIS to identify Naturally Occurring Retirement Communities (NORCs). NORCs are neighborhoods or communities that were not originally constructed for seniors, but have become relatively densely populated with seniors as a result of natural residential migration.[41] Organizations that serve NORCs often sponsor senior-friendly programs focused on exercise and wellness, social interaction, home repairs, and healthcare education and prevention services.

Any group or agency applying the NORC concept should look primarily for high densities of seniors. However, other community characteristics must be taken into account when applying the NORC model. Traditionally, the model has worked well for high-density residential areas, such as apartment complexes predominantly inhabited by seniors.[42] With some program modifications, the model can also be successfully applied in regions with varying residential densities. The key to successful application is the functional definition of "community." Sometimes, the community is defined by a geographical unit of analysis, such as a census tract, a specific neighborhood, or a block group. In other cases, the analysis is not based exclusively on geography, but is concerned primarily with connections between neighborhoods and community centers. In these cases, the actual residential location of seniors is of secondary importance to the prevalence of the local community center, which can be a significant draw for seniors from various neighborhoods, and a hub from which to provide an integrated stream of aging services.

Local Context

According to the 2010 Census, there are more than 60 census tracts in the H-GAC region with concentrations of seniors (ages 60+) of 25% or greater.

Jewish Federation of Greater Atlanta
Atlanta, Georgia
Helping Elderly Atlantans Age in Place

The Jewish Federation of Greater Atlanta (JFGA) is a nonprofit organization that acts as the primary community planning and fundraising body for Atlanta's Jewish community. Interested in developing an integrated service delivery model to help elderly residents age in place, the JFGA ultimately decided to apply the NORC model to the Atlanta region.[43] The model has been applied to six communities in the Atlanta region through a network of partnerships between the JFGA, the Atlanta Regional Commission (ARC), local schools and universities, and various nonprofit groups and community organizations.

These partnerships are sought out and formed through a collaborative process between the JFGA and the chosen community's local Area Agency on Aging (AAA). The AAA, through its extensive experience with localized issues affecting the elderly community, is especially well-qualified to select a lead agency or partner to subcontract with the JFGA. This lead agency then recruits local partners, typically aging service providers, businesses, civic organizations, schools, universities, and other stakeholders from the community.

In this early stage of the NORC planning process, it is extremely important to engage elderly residents as community stakeholders. To address this integral need, the JFGA has established a Senior Advisory Council at each of its six NORC sites. These councils involve older adults in the planning process and serve as a recruitment and marketing tool to raise awareness of the program amongst the local seniors.

Once the partnerships have been formed, the partners conduct a community needs assessment. This step engages stakeholders in a collaborative effort to define the issues affecting their neighborhood, helping each individual NORC project address the specific needs of the community it is meant to enhance. In one community, home repairs and renovations could be seniors' primary concern; in another community, healthcare provision and accessible transportation may be a higher priority. Before implementing a NORC program, it is essential to understand the specific needs of the community, as expressed through its residents, with special consideration paid to the needs and preferences of the community's seniors.

Lessons Learned: Intergenerational Communities

- Partnerships are necessary to successfully provide integrated health and housing services to seniors.
- Social capital (networks, norms, and trust) is an important determinant of a community's capacity to institute a successful NORC program.
- It is critical to choose a capable lead organization to assemble stake holders and facilitate partnerships.
- Regional organizations can help direct resources to communities that need them most.

TRANSPORTATION

Transportation infrastructure is a critical part of the built environment, influencing local economies and quality-of-life. A well-connected, multi-modal transportation network is necessary to facilitate goods movement and allow residents to get to work, school, home, shopping, and other everyday destinations. The RPSD for the Houston-Galveston region includes four objectives specifically relating to transportation:

1. Community planning for shorter trips;
2. Improve safety of all transportation systems;
3. Strengthen regional collaboration to increase funding options; and
4. Increase access to commute alternatives.

The best practices presented in this section will address these different objectives, presenting programs implemented by a diverse group of urban, suburban, and rural localities.

While transportation, especially in the Houston-Galveston region, is often stated as an urban problem with congestion and lengthy commute times, it is important to acknowledge the transportation issues that affect rural, suburban and coastal areas as well. Recognizing the multifaceted nature of transportation issues, and the diverse character of the region, is critical. While congestion may be more common in urban areas, issues of freight and goods movement are more relevant to rural and coastal areas. Furthermore, best practices that address street connectivity and residential street design apply most closely to suburban areas. Of course, there are transportation issues that are relevant for many communities, including the safety of transportation systems and the provision of adequate bicycle and pedestrian infrastructure.

Best Practices Related to *Transportation*

Transportation Planning

- Hillsborough County Metropolitan Planning Organization: Corridor-Level Evaluation (Tampa, FL)

Providing Multi-Modal Transportation Options in Urban Areas

- Road Diets
  - City of Orlando, FL: Edgewater Drive
  - City of East Lansing, MI: Burcham Road
  - City of Del Ray Beach, FL: Atlantic Boulevard
- Atlanta BeltLine Emerald Necklace (Atlanta, GA)
- City of Billings, MT: Pedestrian/Bicycle Infrastructure

Rural Transportation

- Sheboyan County, WI: Bike/Walk Pilot Program
- Mendocino County Department of Transportation: Signage along Rural Roads (Mendocino County, CA)

REGIONAL CHALLENGES

According to the 2010 Census, 7.4% of households in the Houston-Galveston region do not own cars; however, the area's automobile-oriented development patterns do not adequately reflect this.[44] The Houston-Galveston area is predominantly car dependent, and transportation alternatives are often limited and inaccessible to many residents. Relying on alternative modes of transportation, such as transit, walking, and biking, can be challenging in areas with inadequate or nonexistent multimodal transportation infrastructure.

Only 1.7% of people in the Houston-Galveston region walk or bike to work, compared with 3.4% nationwide. Similarly low is the percentage of residents in the region who take public transit to work (2.3% compared to 4.9% nationwide).[45] These statistics are an indication of the lack of adequate regional pedestrian/bicycle infrastructure, and the relative inaccessibility of existing transit options. A spatial analysis of the Houston-Galveston region reveals that about 50% of residents live more than a half-mile from the nearest rail or bus stop, rendering transit an inconvenient option for half of the population.[46] The auto-dependency of the region affects social equity, as the lack of viable transit options has a disproportionate impact on the poor, disabled, youth and seniors, groups least likely to have access to an automobile.

Congestion is another major transportation concern, primarily in the more heavily-urbanized areas. The average Harris County resident spends approximately 243 hours each year commuting to work in their automobile, a figure that reflects a significant amount of time spent stuck in traffic. In 2011, congestion cost the average commuter in the Houston-Galveston area $1,090, due to wasted fuel and lost productivity.[47] Providing more transportation choices, including transit and bicycling, would allow residents to move around the region more effectively and safely while spending less time in the car.

BEST PRACTICES

Transportation Planning

As funding continues to decrease, decisionmakers are looking for new, innovative ways to prioritize potential transportation improvements. Communities are looking to fund projects that provide the most congestion relief at the lowest cost. Several transportation agencies have developed tools that use innovative methodology to evaluate local and regional transportation networks.

Hillsborough County Metropolitan Planning Organization (MPO): Corridor-Level Evaluation
Tampa, Florida
Identifying Special Needs and Deficiencies in the Regional Transportation Network

Corridor-Level Evaluation is a conceptual and technical framework through which planners can analyze regional transportation issues along a number of smaller, sub-regional corridors. This closer level of analysis can provide insight into the regional transportation network as a whole, and furnishes detailed information about specific transportation projects. It creates a more responsive model for regional transportation planning, allowing planners and other decision-

makers to identify specific needs and deficiencies, and then construct customized solutions to these problems. This responsive approach to transportation planning can facilitate a more efficient allocation of resources by giving decision-makers a comprehensive and nuanced grasp of the state of transportation in the region. If corridor-level evaluation is done effectively, it has the potential to not only address local transportation issues, but help create a more efficient and accessible regional transportation network.

The Hillsborough County Metropolitan Planning Organization (MPO) (Tampa, Florida) has developed a tiered structure for the analysis of performance measures. This system divides the regional transportation network into different corridors, and applies increasingly specific levels of performance measures to each corridor.[48] The Primary Performance measures applied to all corridors include:

- Basic volume-to-capacity measures for roadways;
- Ridership and frequency measures for transit; and
- The extent of bicycle and pedestrian infrastructure for active transportation modes.

The corridors that perform poorly based on these Primary Performance measures are identified as congested corridors and given special attention through the application of more specific levels of performance measures. These measures analyze data from a number of much more localized sources, such as travel time surveys, pedestrian counts, employer rideshare programs and transit on-time performance.[49]

Providing Multi-Modal Transportation Options in Urban Areas

For decades, the country's transportation network has been designed and built to cater to the needs of the automobile. In recent years, communities have recognized the benefits of offering greater transportation choices. Localities nationwide are improving pedestrian and bicycle facilities and expanding mass transit service. Some communities are using innovative programs and funding mechanisms to develop a well-connected, multi-modal transportation network. Innovative transportation planning tools (such as the program described above) can help decisionmakers determine where multi-modal transportation facilities would be appropriate.

Road Diets

The term *road diet* refers to the slimming of a road, typically through the conversion of a four-lane road to a two- or three-lane road with dedicated bicycle lanes on either side.[50] Implementing a road diet can be a practical application of the corridor-level evaluation (as demonstrated by the Hillsborough County MPO), since certain quantitative data is needed to identify which corridors will be most amenable to a road diet. Road diets are context-sensitive solutions that address a wide range of transportation safety and efficiency issues, while catering to community needs and preferences.

Underlying the practice of road dieting is the belief that certain streets should be designed with special consideration for the surrounding community. As opposed to street designs that cater to the daily thru-commuter, road diets raise awareness of surrounding land uses, typically residential neighborhoods or commercial centers. They have worked as cost-effective traffic-

calming measures, lowering average driving speeds and making the road safer for all transportation modes. A Highway Safety Information Systems study found crash reductions of 47% for converted roads in small urban areas, along with crash reductions of 19% in suburban areas surrounding large urban centers.[51]

Many roads that could potentially benefit from road diets were initially designed to handle projected peak traffic flows. Since peak traffic can be a concern for as little as half an hour each day, many of these roadways are "overbuilt" and are operating well under capacity most of the time. The implementation of road diets in appropriate locations can be a much more efficient use of already-dedicated space, reflecting actual traffic patterns and considering all transportation modes. Clearly, not all roads will be put on road diets, but through an effective monitoring system, it should be possible to select the corridors that would gain the most from such measures.

Once a specific corridor has been selected for a road diet, implementation is often as simple as repainting lanes. For this reason, repaving projects present an ideal opportunity to determine the suitability of a road diet. Typically, a four-lane road is reconfigured to include two lanes going opposite directions, separated by a dedicated turning lane. Bicycle lanes and pedestrian crosswalks are critical components of an inclusive road diet.

City of Orlando, Florida: Edgewater Drive Road Diet
Orlando, Florida
Grassroots Support for a Road Dieting Plan

The road diet for Edgewater Drive in Orlando, FL, was conceived as a part of the City Council's *Neighborhood Horizon Plan*, which identified future improvement projects for the College Park neighborhood. This plan was formulated in collaboration with neighborhood residents, who attended city-sponsored workshops to craft a comprehensive vision for the future of College Park. This vision promoted the transformation of the neighborhood into a pedestrian-friendly commercial center with roadside cafes and shops.

In order to attain the goals set forth in the *Neighborhood Horizon Plan*, the design of Edgewater Drive had to be reassessed. A 1.5-mile stretch of Edgewater Drive serves as College Park's main street, and this corridor was originally built with four lanes. The Florida Department of Transportation (FDOT) had already allocated funds for repaving this section of Edgewater Drive, so the College Park Neighborhood Association asked FDOT to reduce the number of auto traffic lanes from four to three to accommodate the pedestrian and bicycle infrastructure improvements identified in the neighborhood plan.

In a study comparing three years of before-road-diet data with four months (annualized to a year) of after-road-diet data, researchers demonstrated a 34% crash reduction rate on the corridor, as well as an increase in traffic volumes for all travel modes. Volumes for motor vehicles increased from 20,500 autos per day to 21,000 autos per day. In accordance with the goals of the *Neighborhood Horizon Plan*, pedestrian and bicycle volumes increased by 23% and 30%, respectively.[52]

The case of Edgewater Drive is particularly important because it demonstrates a strong community-based preference for road diets. Through a participatory process with the City of Orlando, residents, and business owners, a road diet was identified as a positive solution to local transportation issues. The road diet helped realize the plan's vision for the College Park neighborhood, with experts demonstrating that the project:

- Increased safety,
- Reduced overall speeds; and
- Increased traffic volumes for all modes of transportation.

Edgewater Drive is now seamlessly integrated into the surrounding community, serving as an interactive, multimodal asset to the neighborhood rather than a high-speed channel exclusively designed to facilitate the thru-traffic of motor vehicles.

Figure 4: Edgewater Drive Road Diet (Orlando, FL)

A bicyclist rides on a wide dedicated bicycle lane, which was created by removing one of the vehicular travel lanes.

Source: City of Orlando, Florida

City of East Lansing, Michigan: Burcham Road Road Diet
East Lansing, Michigan
Improving Safety near a School Using Road Diets

Burcham Road, in East Lansing, MI, provides another example of a road diet strategy arising from the preferences and needs of the surrounding community. Burcham Road runs adjacent to primarily residential areas, and is in close proximity to a local high school. After numerous residents filed complaints about inadequate pedestrian safety and excessive noise, a road diet was proposed as a potential solution. Under the technical expertise of the city's traffic engineers, the road was converted into two lanes, with a middle turn lane and bike lanes created from the excess space left over by the conversion. After the improvements, safety on Burcham Road increased for all transportation modes, overall speeds decreased, and people were able to enter and exit adjoining driveways more easily.[53]

City of Del Ray Beach, Florida: Atlantic Boulevard Road Diet
Del Ray Beach, Florida
Using a Road Diet to Revitalize a Downtown Commercial Center

The road diet for Atlantic Boulevard in downtown Del Ray Beach, FL, emphasizes the economic development potential inherent in road diet strategies. Dan Burden and Peter Lagerway, in *Road*

Diets: Fixing the Big Roads, assert that certain road diet projects have been associated with subsequent increases in surrounding property values.[54] Additionally, road diets have been proven to attract increased pedestrian traffic volumes, which can be a boon for retailers and merchants with roadside shops. In downtown Del Ray Beach, a group of retailers requested a road diet for a portion of Atlantic Boulevard running through a downtown commercial center. The retailers, in response to the overall economic decline of downtown Del Ray Beach, worked with the city manager, elected officials, and the local Chamber of Commerce before ultimately deciding that a road diet would be the most effective strategy to attract business to their stores.

The retailers' request marked a shift in perception regarding downtown retail. It was previously thought that increasing the volume of auto traffic flowing past store windows was the best way to attract shoppers. Realizing that this strategy was not working, retailers and government officials began to consider the benefits of increasing *pedestrian* traffic in the downtown area.

Ultimately, Atlantic Boulevard's road diet helped revitalize downtown Del Ray Beach by creating a safe environment for pedestrians to walk and shop. After the road diet was complete, retailers' sales increased significantly, and the city's tax base grew accordingly. The road diet did not deter auto traffic, but slowed traffic to an average speed of 15 miles per hour, improving pedestrian safety.

Possible Community Concerns

Possible opposition to road diet strategies include:

- Increased congestion
- Diversion of traffic onto neighborhood streets
- Impeded exits from driveways

Empirical evidence demonstrates that these concerns are usually unfounded, if the correct roadways are chosen for diets. However, communities must be cognizant of these potential points of concern. To assuage any apprehension, the region's first road diet project should be delegated to a corridor with the highest chance of having a successful outcome. Examples of these corridors are:

- Corridors with average daily traffic (ADT) flows of 8-15,000
- Roads with safety issues (where community concerns have already been identified)
- Transit corridors
- Popular or essential bicycle routes
- Commercial reinvestment areas
- Economic enterprise zones
- Historic streets
- Scenic roads
- Entertainment districts
- Main streets

Source:

Tan, Carol H. *Going on a Road Diet*. Publication. 2nd ed. Vol. 75. Washington, DC: US Department of Transportation: Federal Highway Administration, 2011.

Lessons Learned: Road Diets

- Corridor-Level Evaluation allows MPOs to allocate resources efficiently, and to identify congested corridors of the regional system while still maintaining a system-wide approach
- A tiered structure for analyzing performance measures allows for a wide spectrum of data sources, from general to very specific measures, calibrated to the need of each individual corridor
- Corridor-Level Evaluation can help identify roads consistently operating under capacity that may be ideal for road diet conversions
- Soliciting the input of neighborhood residents and the local business community is a key step in the planning and implementation of a road diet

Multi-Modal Trail Networks

Cities nationwide are building urban trail networks that connect parks, schools, activity centers, and other destinations. These facilities encourage nearby residents to walk or bike to the places they need to go. While some of these trails where constructed along old railroad lines, others were built along waterways or existing highways. Not only are these trail systems a part of the regional transportation network, but they are recreational amenities that improve residents' quality-of-life and cities' desirability.

Atlanta BeltLine Emerald Necklace
Atlanta, Georgia
Converting an Unused Rail Corridor into an Urban Trail Network

The Atlanta BeltLine, while serving a variety of public needs, is primarily a transportation-focused project. When complete, the BeltLine project will transform 22 miles of unused rail corridor into the backbone of a new transportation hub, which will increase local connectivity and make regional destinations more accessible to bicyclists and pedestrians.[55] The rail loop, which is being converted into a rail-trail, encircles inner-city Atlanta and connects 45 different neighborhoods. The trail provides access to transit lines, public parks and other urban destinations. The BeltLine is unique in its comprehensive approach to regional transportation; it provides new recreational opportunities, a network of bicycle and pedestrian infrastructure that encourages active transportation, and transit connections for neighborhoods previously underserved by public transportation.

Figure 5: Historic Fourth Ward Park (Atlanta, GA)
This park along the Atlanta BeltLine includes an outdoor theater overlooking a two-acre pond, which was designed to detain stormwater. Native plants line the pond and surrounding pathways.
Source: Atlanta BeltLine/Christopher Martin

While the BeltLine project is currently experiencing difficulties in the implementation stage (only parts of the project are complete or under construction), it is the collaborative planning effort and the overall vision for the project that make it a best practice. The project was originally the brainchild of a graduate student at the Georgia Institute of Technology, and has since been taken from a thesis project to a near-reality.[56] In this way, the BeltLine provides an encouraging example of a community taking advantage of the intellectual capacity of local universities and students. Other progressive elements of the project, such as the affordable housing trust fund, make the plan for the BeltLine an exemplary best practice.

Although the BeltLine project recently suffered a funding setback due to the defeat of a region-wide proposal to increase sales tax by one cent, the project nevertheless demonstrates the benefits of diversifying funding options. The costs of this massive project have been covered by funds from a variety of sources, including funds raised by the PATH non-profit foundation, incremental tax revenue from TADs, Capital Campaign fundraising money, and contributions from the City of Atlanta and the federal government.[57] Such a diversified funding base not only increases financial support for the project, but demonstrates that a wide range of stakeholders support the initiative, from non-profit groups and private businesses to government officials and residents throughout the region.

Local Context

While the Houston-Galveston region may not have a large unused rail corridor to convert into the hub of an active transportation/transit network, there are numerous bayous, utility easements, and other rights-of-way. These potential active transportation corridors are currently being underutilized, and could be converted into a network of trails to help improve the connectivity of regional pedestrian/bicycle infrastructure. A number of ongoing projects are currently addressing this possibility, including the Houston Bayou Greenways Initiative and Houston's TIGER Grant-funded Regional Multimodal Connections Project, which aims to improve bicycle and pedestrian connections to transit stations. METRO is working on a similar project that connects existing neighborhoods to transit and park-and-ride stations with bicycle and pedestrian pathways.

City of Billings, Montana: Pedestrian/Bicycle Infrastructure
Billings, Montana
Tunneling to Create an Interconnected Regional Trail Network

Recently**,** the Billings Chamber of Commerce (Billings, MT) decided to give its city the official title of "Montana's Trailhead." This decision, while certainly ceremonial, indicates the Chamber's intentions of marketing Billings as an active transportation hub. John Brewer, CEO of the Billings Chamber of Commerce, expounds on the economic impacts of maintaining a high-quality trail system, claiming "talented people move to Billings in large part because of our trail system that creates the quality-of-life they are expecting."[58] Billings' commitment quickly moved from mere rhetoric to tangible action as the city moved to connect their existing system of isolated multi-use trails into one comprehensive, regional network. Through numerous coordinated projects, Billings' trail system quickly became more extensive and interconnected.

The Main Street tunnel, a pedestrian/bicycle underpass constructed beneath seven lanes of automobile traffic, connects several multi-use trails, making it the keystone project in the effort to create regional connectivity. The strategies used in the planning and construction of the Main Street tunnel are of particular relevance to the Houston-Galveston region, as highways and other large thoroughfares often act as barriers to pedestrian and bicycle travel. The construction of underpasses or pedestrian tunnels can provide pedestrians and cyclists with safe passage under busy streets that would otherwise stop the flow of active transportation. In Billings, the Main Street underpass served as a cost-effective way of linking several trails, increasing the connectivity of the region's signature multi-use trail system.

The Main Street tunnel is a 200-foot-long culvert-style underpass that runs perpendicularly beneath Main Street. The concrete trail running through the tunnel is 10 feet wide, allowing for the accommodation of cyclists and pedestrians. The tunnel, adjacent to a 100-year floodplain, was designed to double as a backup drainage outlet in case of floods.[59]

The diversity of funding sources for the Main Street tunnel demonstrates the community's support for the project. The project received $1 million dollars in federal stimulus money, and another $1 million in state and federal transportation funds. The State Department of Fish, Wildlife and Parks also provided funding through its Recreational Trails Program. In addition to funding from St. Vincent Healthcare and the Sample Foundation, BikeNet, a local bike advocacy group, was able to raise $32,000 of financial support for the project. The taxpayers of Billings also voiced support for the Main Street tunnel, approving a $60,000 bond issue to help pay for the project.[60]

The Main Street Tunnel not only provides a safe path for non-motorists across seven lanes of traffic, but helps unify the city by breaking down physical barriers separating different neighborhoods. Allowing freer flow of pedestrian and bicycle travel between two previously-separated parts of the city could have significant implications for social unity, the local economy, public health, and the overall connectivity of the regional trail system.

Lessons Learned: Multi-Modal Trail Networks

- It is important to seek out a wide range of funding sources for large-scale regional transportation projects.
- A comprehensive approach to transportation planning should be utilized when creating regional or other large-scale projects. Such an approach should consider the promotion of active transportation, the proliferation of transit access to underserved neighborhoods, and the integration of outdoor recreation opportunities and parks along bicycle and pedestrian corridors.
- Local colleges and universities can provide technical assistance to communities interested in pursuing innovative programs.
- Building a broad base of support can be important in funding a pedestrian infrastructure project
- Goal-setting mechanisms, even "soft" measures such as bestowing a city or region with a new "nickname," can be crucial to future development goals
- Finding safe ways for pedestrian and bicycle traffic to cross busy streets is key to creating regional connectivity of any trail system.
- Community amenities, such as extensive hiking and bicycling trails, can be used as a marketing tool that contributes to the local sense-of-place and promotes economic development.

Rural Transportation

Rural localities often receive little funding to improve local roadways and enhance bicycle and pedestrian infrastructure. Many rural roadways do not meet current design criteria (narrow lanes, tight curves, narrow bridges, etc.) and cannot safely handle bicyclists and pedestrians.[61] Rural communities nationwide are using innovative techniques to improve transportation safety, while accommodating multiple modes of travel.

Sheboyan County, Wisconsin: Bike/Walk Pilot Program
Sheboyan, Wisconsin
Developing a Countywide Pedestrian/Bicycle Network

Sheboygan County, WI was chosen as one of four communities to participate in a federally-funded Bike/Walk Pilot Program meant to improve the connectivity of regional pedestrian/bicycle networks, and to encourage active transportation. Before the institution of the program, the non-motorized trip share for Sheboygan County was below the national average. Pedestrian and bicycle infrastructure was inadequate for utilitarian travel, unable to accommodate those traveling to work, school, or shopping areas.[62] Strikingly, one year after the pilot program was implemented, bicycling for daily non-recreational trips in Sheboygan County increased 43% (ACS Data). This kind of success, while not necessarily universally replicable,

certainly merits the attention of any planning organization interested in active transportation in rural areas.

- *Comprehensive Plan*

  In 2007, the Sheboygan County Board of Supervisors adopted the county's first Pedestrian and Bicycle Comprehensive Plan. This plan prioritized the completion of a countywide bicycle/pedestrian network, helped ensure safe routes to school, and recommended the implementation of a Complete Streets model for the county. The adoption of such a model would ensure that the needs and preferences of pedestrian/bicycle travelers are considered in the design and construction of new roads countywide.

- *Citizens Advisory and Technical Committee*

  The formation of the Citizens Advisory and Technical Committee was a crucial step to the ongoing success of Sheboygan County's bike/walk program. The committee is made up of 30 volunteer members from throughout the county, representing a wide range of stakeholders. This committee was formed to institutionalize a collaborative approach toward project selection and plan guidance. Currently, the committee is working to create a nonprofit 501(c)(3) organization to ensure the longevity of its vision for a bicycle- and pedestrian-friendly community, and to help raise funds and increase organizational capacity for work on future projects and initiatives.

- *Key Partnerships*

  Sheboygan County officials working on the implementation of the pilot program formed partnerships with the Sheboygan Area School District and the Sheboygan Police Department. The organizations involved worked collaboratively to achieve the community's active transportation goals by utilizing traffic-calming measures on local roadways. These measures are primarily focused on providing safe bicycle and pedestrian access to public elementary and middle schools throughout the City of Sheboygan. Another product of this interagency partnership is the provision of complementary accommodations, such as bicycle parking spaces and racks, at all public facilities in the county.

- *Union Pacific Rail-Trail Conversion*

  The Union Pacific Rail-Trail Conversion is a key element of the county's overall effort to encourage and facilitate active transportation. Not only will the rail-trail provide a major non-motorized north-south thoroughfare through the City of Sheboygan, it will also increase connectivity throughout the county. There are 26 schools, 34 places of worship, and 90 manufacturing employers within a one-mile radius of the planned corridor. Furthermore, nearly a third of the county's population lives within a mile of the rail-trail. This particular infrastructure project highlights the ability of a well-planned rural rail-trail to provide substantial utilitarian connectivity as well as a region-wide recreational facility.

One unique aspect of the Union Pacific Rail-Trail project is that it will ultimately serve as a funding mechanism for maintaining the countywide trail network. Revenue from the sale of excess right-of-way property not needed for the conversion of the rail trail was dedicated to a trail maintenance fund.

- *Public Education Efforts/Events*

  In 2007 and 2008 respectively, Sheboygan County introduced the Countywide Walk to School Day and the Bike and Walk to Work Week. These events not only raise awareness of walking and bicycling initiatives, but are opportunities to involve the business community in efforts to promote active transportation. In 2009, more than 20 major employers were involved in the Bike and Walk to Work Week, and 70 restaurants and merchants participated as well. These participants are typically overlooked players in the arena of active transportation, but it is crucial to engage them, as they embody the majority of the destinations of utilitarian bicycle and pedestrian trips. Additionally, the owners of restaurants, shops, and office buildings can do a great deal to facilitate active transportation by providing bicycle parking facilities and other necessary infrastructure. Having a local business community that is supportive of active transportation can help communities develop a robust multi-modal transportation system.[63]

Mendocino County Department of Transportation: Signage along Rural Roads
Mendocino County, California
Using Signage to Increase Safety of Rural Roads

Perhaps the most pressing transportation issue facing rural communities is the safety of their roads. While rural roads experience less intense traffic demands than urban roads, they typically account for a higher proportion of fatal crashes. In 2001, approximately 60% of the nation's fatal crashes occurred on rural roads.[64] Rural roads can be structurally dangerous for a number of reasons. Primarily, there is typically a lack of funding for secondary roads in low-density rural areas, so many of these roads fall into disrepair. Many rural roadways were originally constructed along the contours of property lines and include sharp turns that are not in accordance with current transportation standards. Compounding these problems is a lack of adequate road signage, shoulders, and lane markings.

In the 1980s, Mendocino County, a largely rural county located north of San Francisco, decided to address the safety of its roads, many of which were subject to the endemic problems mentioned above. Crashes were occurring at an alarming frequency, and many of these crashes were the result of vehicles running off the road on curves. Data was collected on which roads had the highest incidences of crashes, but it was not until 1992 that Mendocino County's newly-hired traffic engineer proposed strategic changes in signage along these dangerous roads.

As a result of this proposal, signage was increased throughout the county and strategically placed along corridors that had been identified as particularly dangerous. Between 1992 and 1998, crashes in Mendocino County were reduced by 42.1%.[65] This impressive reduction provides considerable support for strategic road signage as an effective approach to rural transportation safety. When the program was initiated, each sign only cost about $107 (including labor and

materials). This cost-effective solution is especially well-suited to rural counties, where local transportation departments may not have the financial resources to enact more costly measures.

Lessons Learned: Rural Transportation

- Transportation safety is an especially important issue in rural areas, where roads might not be as well-maintained and/or suffer from geometric deficiencies
- Bicycle and pedestrian infrastructure can be an important, and effective, part of rural transportation networks
- A inclusive planning process is crucial in setting and achieving active transportation goals codified and institutionalized in a bicycle/pedestrian comprehensive plan
- Forming partnerships with public agencies, as well as private businesses, can be very beneficial for encouraging bicycle and pedestrian transportation
- Increasing and strategically placing road signage can be a cost-effective measure for increasing safety on rural roads
- In implementing a signage strategy, it is important to be aware of the latest research on sign effectiveness (the Federal Highway Administration performs ongoing research on this subject)

ENVIRONMENT

The natural environment is a critical part of everyday life. Natural processes influence the economic and physical well-being of rural, suburban, and urban residents, shaping local housing, culture, diet, health, and overall quality-of-life. Not only do natural landscapes affect our everyday lives, they provide a variety of benefits to the surrounding community. The preservation of these features:

- Ensures the long-term protection of critical wildlife habitat;
- Provides economic opportunities for farming and tourism;
- Helps control flooding;
- Helps improve local air and water quality; and
- Provides recreational opportunities.

Communities nationwide are using different ways to protect valuable environmental resources. These programs are focused on:

- Improving local air quality;
- Improving local water quality;
- Conserving limited water resources; and
- Protecting environmentally-sensitive landscapes and farmland.

Environmentally-friendly practices, including recycling, water and energy conservation, weatherization techniques, and the use of alternative energy sources, can be economically advantageous. Government agencies, non-profit organizations, business, and homeowners have already begun implementing many of these programs, recognizing that these environmentally-friendly techniques can result in significant cost savings, while improving local air and water quality.

Best Practices Related to *Environment*

Air Quality

- Victoria Transport Policy Institute: Transportation Demand Measure Encyclopedia (Victoria, BC)
- Capital Area Metropolitan Planning Organization (CAMPO) 2035 Regional Growth Concept (Austin, TX)
- Solarize Portland (Portland, OR)

Water Quality

- Harris County LID Design Guidelines (Harris County, TX)
- Haywood Waterways Association (Haywood County, NC)
- Leadership in Energy & Environmentally-Friendly Design (LEED) (Nationwide)
- City of Columbus, Ohio – Department of Public Utilities: Asset Management Program (Columbus, OH)

Water Conservation

- Metropolitan North Georgia Water Planning District: Water Supply & Water Conservation Management District (Atlanta, GA)

Land Conservation

- Columbia Land Conservancy (Columbia County, NY)
- Prairie Crossing (Grayslake, IL)

REGIONAL CHALLENGES

The Houston-Galveston region contains several diverse ecosystems, ranging from coastal marshes and prairies to cypress swamps and upland forests. These ecosystems provide a range of services, and contribute to the region's unique sense-of-place.

If improperly managed, rapid population growth can strain the region's natural resources. Sprawling development results in habitat fragmentation and increased impervious cover, creating stormwater runoff that can pollute waterways and cause flooding downstream. Existing drinking water supplies may not be able to keep up with growing demand. Aging infrastructure in older communities may release harmful pollutants, including untreated sewage and stormwater. Many parts of the region already fail to meet air and water quality standards. Green building, energy conservation, low-impact development, and the use of best management practices will help minimize the impact population growth has on the natural environment and help improve degraded ecosystems.

BEST PRACTICES

Air Quality

Poor air quality can cause serious health problems for vulnerable populations. Emissions from automobiles, industrial operations, and other sources all contribute to local air pollution. The

United States Environmental Protection Agency (EPA) indicates that much of the Houston-Galveston region is currently below the national air quality standard for ground-level ozone. Major metropolitan areas nationwide suffer from poor air quality, and some have implemented innovative policies aimed at reducing airborne pollutants.

Victoria Transport Policy Institute: Transportation Demand Measure Encyclopedia
Victoria, British Columbia
Developing Strategies that Promote Efficient, Environmentally-Friendly Transportation Options

The transportation sector produces over 30 percent of carbon dioxide emissions in the United States. These emissions create significant air pollution, posing serious environmental and health risks.[66] Communities nationwide have implemented transportation-related programs intended to improve air quality. These strategies, known as transportation control measures (TCMs), aim to improve transportation efficiency, reduce vehicle miles traveled (VMT), and encourage the use of alternate modes of transportation by:"[67]

- Improving public transportation options;
- Building congestion relief projects;
- Using incentives to encourage bicycling and walking;
- Expanding commuter choices;
- Encouraging workplace flexibility to reduce commuting; and
- Utilizing value pricing.

In addition to TCMs documented by U.S. EPA, the Victoria Transport Policy Institute has compiled a *Transportation Demand Measure Encyclopedia* that includes similar cost-effective, market-based strategies ("win-win strategies") that promote more efficient, environmentally-friendly transportation options.[68] These strategies aim to increase consumer options and provide economic, environmental, and social benefits.

Understanding how vehicle costs are externalized (or internalized) is important when developing transportation efficiency strategies; strategies that only address some of these costs, while increasing others, are not effective. Win-win strategies are comprehensive solutions that correct market distortions and provide incentives for those who drive less. Win-win strategies incentivize environmentally-friendly transportation alternatives by:

- Increasing travel options;
- Providing more efficient pricing;
- Correcting biases that favor automobile transport over other modes; and
- Correcting land use biases that encourage sprawl and auto-dependency.

Various win-win strategies are described below (Table 1).

Table 1: Victoria Transport Institute Win-Win Strategies

Win-Win Strategy	Explanation	Total Trip Reductions
Least-Cost Transportation Planning	Comprehensive, neutral planning that considers all significant impacts, including indirect effects. Demand management is considered equally with facility capacity solutions.	10-20%
Mobility Management Programs (TDM)	Provide services that encourage more efficient travel behavior, including rideshare matching, transit improvements, bicycle and pedestrian facility improvements, parking management, and promotion of alternative modes.	4-8%
Commute Trip Reduction Programs	Programs that encourage employees to use efficient commute options	1-3%
Commuter Financial Incentives	Several types of incentives that encourage alternative commute modes	1-6%
Fuel Taxes: Tax Shifting	Tax shifting to reduce taxes on employment and commercial transactions, and increasing taxes on consumption of pollution, non-renewable resources	5-15%
Pay-As-You-Drive Pricing	Vehicle insurance or other fees based directly on how much the vehicle is driven	7-13% (Avg. Annual Mileage Reduction)
Road Pricing	Motorists pay directly for driving on a particular roadway	1-3%
Parking Management	Strategies that encourage more efficient use of existing parking facilities	2-8
Transit Service Improvements & Ridesharing	Improvements to public transit services and encourage transit use by increasing service area and increasing transit speed. In addition to the use of carpooling or vanpooling	2-12%
HOV Priority	Strategies that give High Occupant Vehicles priority over general traffic	1-2%
Walking and Cycling Improvements	Strategies that support the substitution of some motor vehicle trips directly and supports other alternative modes (public transit and ridesharing)	1-4%
Smart Growth Land Use Policies	Smart Growth policies reduce vehicle travel and provide other benefits	3-15%
Location Efficient Development	Development patterns that reflect Smart Growth principles	1-6%

Many local governments are implementing TCM strategies to conjunction with Smart Growth and energy-efficient affordable housing strategies, hoping to reduce air pollution and energy use. Addressing transportation and land use issues together builds a more comprehensive program that creates greater social and environmental benefits than if each was implemented separately.[69] Coupling TCM programs with Smart Growth strategies and affordable housing initiatives will result in well-placed development accessible by foot, bicycle, car, and mass transit. Ultimately, coordinated land use and transportation planning may reduce vehicle miles traveled and air pollution, while building a transportation network accessible to all.

Capital Area Metropolitan Planning Organization (CAMPO) 2035 Regional Growth Concept
Austin, Texas
Using Smart Growth Policies to Improve Air Quality

The Capital Area Metropolitan Planning Organization (CAMPO) is the Metropolitan Planning Organization (MPO) for Bastrop, Caldwell, Hays, Travis and Williamson counties in Central Texas. Between 1980 and 2000, the region's population increased by 115 percent, from 538,000 to 1,160,000.[70] Most of this growth occurred in low-density suburban developments outside existing cities. Exurban land was converted into sprawling subdivisions at a very high rate. CAMPO predicts that if development were to continue in this sprawling manner, congestion in the region will continue to worsen, despite over $23 billion spent on roadway, transit, bicycle, and pedestrian improvements by 2030. This "Business As Usual" scenario would result in adverse impacts to the region, including degradation of sensitive environmental areas and rural land, increased infrastructure costs, limited housing options, and longer commute times.[71]

The CAMPO 2035 Regional Growth Concept is a guide for integrating land use and transportation planning in Central Texas and creating a vision of an alternative, more sustainable future for the region. The CAMPO Regional Growth Concept melds aspects of Envision Central Texas with existing local plans that have already been adopted. The growth concept proposes that CAMPO, local governments, and other regional partners employ strategies that create regional "activity centers," where development and transportation nodes can be concentrated.[72] CAMPO recognizes the need for concentrating growth in desired locations that can be served by an array of transportation options. Without such efforts, CAMPO fears that market conditions and other factors will continue to promote sprawling development. By concentrating growth within mixed-use nodes, housing, employment, and retail options can be planned and developed alongside transit and roadway investments.

Within the Regional Growth Concept, activity centers are planned to have more intense development that is compact, connected, and provides a mix of employment, retail and housing options. Activity centers vary in size depending on the number of jobs, amount of housing, and available recreational opportunities. These activity centers are classified as large, medium, or small. The Regional Growth Concept includes one large activity center, which is Downtown Austin; the activity center is roughly 2 miles in radius and is expected to house 125,000 residents and 200,000 employees by 2035. Medium activity centers are designed to have a large, well-defined regional core concentrating employment and housing within a one-mile radius; between 9,000 and 75,000 residents and 9,000 and 40,000 employees are expected within each medium activity center by 2035. Lastly, small activity centers support medium-sized communities served

by mass transit. The small activity centers will be roughly a half-mile in radius and are expected to absorb a 2035 population of 2,000 to 10,000 residents and employees, respectively.[73]

Solarize Portland
Portland, Oregon
Resident-Based Efforts at Making Alternative Energy Affordable

According to the U.S. Environmental Protection Agency, electricity generation is one of the biggest sources of air pollution. Most energy comes from non-renewable resources, many of which spew significant pollution into the air when converted to electricity.[74] By increasing the use of alternative forms of energy, such as solar and wind, communities can reduce air pollution, while enjoying other environmental benefits.

Recognizing the benefits of solar energy, a group of neighbors in Southeast Portland worked together to make the installation of solar panels more affordable. Southeast Uplift, a non-profit coalition of neighborhood associations, helped those interested in renewable energy buy solar panels at a reduced rate; by buying the panels in bulk, the prices were cheaper. Energy Trust of Oregon helped Southeast Uplift develop the purchasing program, and sponsored workshops educating the community about solar power.[75] Southeast Uplift worked with a single contractor to keep installation costs low, making solar panels even more affordable. This bulk purchasing and "job grouping" resulted in cost savings of 30 percent, and state tax incentives provided significant additional savings.[76]

The Solarize Portland program has expanded into other neighborhoods. The City of Portland and Solar Oregon have teamed up with the Energy Trust of Oregon to provide technical assistance to neighborhood organizations interested in creating their own Solarize projects. Each Solarize campaign lasts a few months; the initial program in Southeast Portland lasted six months, from June 2009 to September 2009.[77] Even as neighborhood-based Solarize programs are ending, independent solar installations are increasing throughout the city. Additional financing options are now available, including leasing options and prepaid power purchase agreements (PPAs).

Planning Jargon

A *power purchase agreement (PPA)* is a contract between an electricity provider and a property owner. The electricity provider installs solar panels atop a building, if the property owner agrees to buy the power generated by the system at a set price over a pre-determined period (usually 10 to 20 years). The electricity provider owns the solar panels, and is responsible for their repair and maintenance.

Not only has Solarize Portland help improve air quality, it has produced economic benefits for the surrounding community. The program is credited with creating 50 permanent "green jobs." One neighborhood required its contractor to work with local apprenticeship programs that teach participants various construction trades, and some neighborhoods encouraged participants to buy locally-produced solar panels.[78] As interest in solar energy continues to grow, more "green jobs" will likely be created.

Local Context

Several public agencies and private entities in the Houston-Galveston area have installed solar panels at their facilities. Pasadena Independent School District (ISD) has installed solar panels at Sam Rayburn High School and South Houston High School. At its Houston store, IKEA has installed solar panels on its 116,000-square-foot roof.

Lessons Learned: Air Quality

- Improving transportation efficiency, reducing vehicle miles traveled (VMT), and encouraging the use of alternative modes of transportation can reduce air pollution throughout the region.
- To make renewable energy more affordable, communities can form cooperative purchasing programs that allow them to buy and install solar panels (or other renewable energy devices) at a reduced group rate. These programs, along with tax credits and other financial incentives, make solar panels attractive to many homeowners.

Water Quality

Rivers, lakes, streams and wetlands are an important part of the landscape, as they provide many economic, environmental, and health benefits to surrounding communities. Unfortunately, pollution from a variety of sources (properly-planned development, wastewater treatment plants, failing septic systems, illegal dumping, etc.) threatens the health of these waterways, compromising their economic, ecological, and recreational value. Communities nationwide are recognizing the value of their water resources and taking steps to protect the environmental integrity aquatic ecosystems.

Most waterways in the region currently have water quality problems. Runoff from non-point sources and wastewater effluent are two major contributors to water pollution in the Houston-Galveston region. Multiple reports assert that the maintenance of status-quo development patterns will result in increasingly deteriorating water quality. Recent water quality measurements have demonstrated a concerning upward trend in bacterial concentrations throughout Texas watersheds.[79] These concentrations are especially prevalent in the tidal segments of bayous, making them a pertinent issue for coastal portions of the Houston-Galveston region.

Water quality is a multifaceted issue, with implications for public health, the economy, ecological systems, and environmental resources. Particularly egregious examples, such as the outbreak of cholera in the Brazoria County community of Demi-John, demonstrate the potentially devastating public health effects of declining water quality. [80] Similarly disturbing is the prevalence of rashes and respiratory infections contracted by residents who have come into contact with the waters of Dickinson Bayou through recreational activity.[81]

The health of local waterways has a substantial impact on the region's fishing and ecotourism industries. Poor water quality decreases opportunities for recreation, such as water skiing, boating, and swimming. From this perspective, the multitude of waterways running through the region represent drastically underutilized recreational and economic opportunities, rendered unsafe by low water quality. These same issues also have dire consequences for the natural inhabitants of these waterways. In many cases, the increasing contamination of local waterways has resulted in hypoxia, or an extremely low concentration of oxygen in bodies of water that can decimate aquatic species.

Local Context

The core area covered by H-GAC's Clean Rivers Program includes more than 16,000 miles of streams and shorelines and 51 major stream segments or bays. Of the waterways tested, 90% have been deemed impaired (by either bacteria or other contaminants) and do not fully meet state water quality standards.

Source: Texas Clean Rivers Program

Just as watersheds transcend political boundaries, issues related to water quality are not bound by jurisdictional borders. Sources of water pollution are diverse and widespread, and the effects of diminished water quality are felt throughout the region. Acknowledging the regional nature of water quality issues, best practices aimed at improving water quality should be regional in scope. The exemplary practices described demonstrate that coordinated land use decisions, innovative development and construction techniques, and infrastructure planning can improve water quality throughout the region.

Stormwater Runoff

Scientific research has established a clear relationship between the intensification of development and impairment of water quality.[82] This correlation is partially due to an increase in impervious surface, which ultimately results in polluted stormwater runoff reaching local waterways. It is inevitable that, as the region's population continues to grow, physical infrastructure and development will increase accordingly. If left unmanaged, this development could threaten the water quality of the region's rivers, streams, bays, and bayous.

A number of Low Impact Development (LID) practices have been developed to address various concerns about flooding, water quality, and outdated or overburdened urban infrastructure. These practices decrease and decentralize runoff, and provide for the filtration of stormwater before it enters local waterways or aquifers. LID practices generally decrease the amount of impervious surface associated with conventional development patterns, maintaining a closer approximation of the land's pre-development hydrologic cycle.[83]

Many LID features and practices are already being used throughout our region. For example, The Woodlands in Montgomery County is known nationally for its innovative use of green infrastructure. On a regional level, fractured jurisdictional authority, inadequate incentives, and a general lack of knowledge and technical expertise render the widespread implementation of LID practices difficult. Best practices for regional water quality would allow for the integration of

LID principles into stormwater ordinances, and would create consistency between city and county guidelines.

Low-Impact Development (LID) Stormwater Management Techniques

There are many different LID techniques that can be used to manage stormwater runoff generated by new and existing development. These practices can be adapted to meet local conditions, site constraints, and aesthetic preferences. Examples of LID practices include:

- *Bioswales*

  Bioswales are linear, vegetated stormwater conveyance and treatment systems that divert stormwater from critical infrastructure, such as roads and surface parking. Bioswales can help mitigate flood risks, improve water quality, and increase infiltration and groundwater recharge. Since bioswales rely on ecological processes to filter and treat stormwater runoff, they are typically more cost effective than the traditional stormwater treatment and conveyance systems. Bioswales not only detain and treat stormwater runoff, but they can also be an aesthetically-pleasing landscape feature, containing a mix of native grasses, shrubs, and trees.

- *Pervious Pavement*

  Many water quality issues are caused by polluted runoff from impervious surfaces, such as parking lots and roadways. Porous cement concrete, porous asphalt concrete, gravel pavers, and paving grids and blocks are all options that allow for increased infiltration of stormwater, decreasing runoff. The pervious nature of these materials allows rainwater to seep directly into the underlying soil, reducing (or eliminating) the amount of runoff flowing across paved areas. While pervious pavement alternatives may not be appropriate in high-traffic areas, they have been used in roadways and parking lots with low to moderate traffic volumes.

- *Rain Barrels & Cisterns*

  Rain barrels and cisterns are both examples of LID techniques that can easily be integrated into residential lots. Both receptacles are used to store excessive runoff from the roof of commercial and residential structures. Rain barrels and cisterns collect water from the gutter system and downspout, converting potentially wasted runoff to usable water. The major difference between rain barrels and cisterns is their storage capacity. Rain barrels are smaller (typically 55-75 gallons), and are therefore more suitable for residential use than cisterns, which can hold up to 10,000 gallons.

Source: *Florida Field Guide to Low Impact Development*. Rep. Gainesville, FL: University of Florida IFAS Extension, 2008.

Harris County LID Design Guidelines
Harris County, Texas
Incentivizing the Use of Environmentally-Friendly Stormwater Management Practices

In April 2011, the Harris County Commissioner's Court adopted the Harris County LID Design Guidelines. This document helped establish an expedited permitting process to incentivize development projects integrating LID practices. It also provides a comprehensive resource to assist developers in effectively complying with LID guidelines. The adoption of these design guidelines does not mandate compliance with LID principles, but provides developers with an opportunity to use LID practices to attain regulatory requirements for storm water drainage and quality.

Another important aspect of the Harris County LID Design Guidelines is that it lays the groundwork for the Texas Commission on Environmental Quality (TCEQ) to begin providing municipal utility districts (MUDs) reimbursement for green infrastructure projects. This will increase the financial feasibility of LID practices in MUDs, which have accounted for a substantial portion of the region's recent population growth. Assuming development in MUDs continues to increase, the widespread use of green infrastructure and LID practices in these districts could have significant positive impacts on local water quality.

Figure 6: Streetside Bioswale

A bioswale in High Point, a New Urbanist redevelopment project in Seattle, successfully handles stormwater runoff from a 25-year event. Amended soils allow rainwater infiltration, and a mixture of plant types slow and absorb runoff. A sidewalk constructed with porous pavement (right side) allows rainwater to infiltrate as well.

Source: King County, Washington

The adoption of the Harris County LID Design Guidelines highlights the importance of cooperation between city and county governments. Guidelines allowing the expedited review of developments using LID practices apply only to unincorporated areas over which the county has sole authority, and special districts that are not under the jurisdiction of a city. However, the City of Houston (Harris County's largest city) recently incorporated a similar provision into its Code of Ordinances, allowing properties to receive a discounted drainage fee for the use of approved stormwater management techniques described in the City's Infrastructure Design Manual. LID practices approved for use include infiltration trenches, green roofs, porous pavement, rain barrels, and bioretention features, among others.

Hands-On Experience

Catherine Elliott: Manager of Stormwater Water Quality Department
Harris County Flood Control District

Catherine Elliott, the manager of Harris County Flood Control District's Stormwater Water Quality Department, offers insight into the process use to create the Harris County LID Design Guidelines, as well as the successes and challenges associated with the project. The design guidelines were created after a series of three workshops, in which Harris County Flood Control District (HCFCD) employees worked with engineers and developers to learn firsthand the technical, administrative and financial challenges of integrating LID techniques and green infrastructure into new projects.

Through the workshops, Elliott and other staff learned that developers, engineering firms, and landscape architects were already interested in incorporating LID practices into new projects. Elliott mentioned that, while these innovative stormwater management practices are currently optional, many developers expect that the use of these techniques will be mandated in the future. These workshops, and the resulting design manual, may be valuable resources when the use of LID techniques is the norm. Until then, HCFCD is attempting to simplify and incentivize the use of these practices by offering expedited permitting to projects that utilize LID techniques and/or green infrastructure, in accordance with the County's design manual.

According to Elliott, at least six large engineering and landscape architecture firms have consulted the manual when designing new projects. Of course, interest in LID and green infrastructure is not confined to the private sector. Both Harris County and the City of Houston were actively pursuing grant funding opportunities for green infrastructure projects.

While the Harris County LID Design Guidelines have successfully promoted the use of LID practices, there have been challenges that make the use of these techniques difficult. Elliott identified three main difficulties the HCFCD has faced throughout the process:

1. *Texas Commission on Environmental Quality*

   One major problem is in the process of being resolved. TCEQ is currently revising its policy of withholding infrastructure reimbursements from MUDs using green infrastructure practices.

2. *Poorly-Draining Soils in Harris County:*

   According to a USDA Soil Conservation Service report, 39% of Harris County's soil is characterized as one of the following: Nearly Level, Clayey and Loamy, or Prairie Soils. Generally, soils in these associations are not conducive to infiltration, making them an ill-fitting base for many LID and green infrastructure practices that are dependent on good soil drainage and natural infiltration. HCFCD and private-sector engineers are experimenting with the use of different engineered soils, which allow for greater infiltration than native soils.

3. *Difficulty Monitoring Performance of Green Infrastructure*

   Partly due to its disconnected nature, it is difficult to quantify the flood mitigation and water quality improvements attributable to green infrastructure. The lack of a standard performance tracking system makes it challenging to support the use of green infrastructure over traditional curb and gutter systems. HCFCD is working on methods to accurately measure the performance of these innovative practices.

Haywood Waterways Association
Haywood County, North Carolina
Increasing Awareness of the Benefits of Utilizing LID Techniques

As previously discussed, it is important to deal with issues of water quality from a regional perspective. However, it is also crucial to build capacity and knowledge of water quality issues at sub-regional levels. The geographic scope of a watershed is a logical unit for water quality planning initiatives, and watershed protection groups have been effective agents for positive change nationwide.[84] One of the most prominent watershed protection groups in the country is the Haywood Waterways Association, which focuses primarily on water quality issues in Haywood County's Pigeon River Watershed.[85]

In 2007, the Haywood Waterways Association convened a diverse group of stakeholders to discuss the potential impacts of future development in Haywood County. Members of conservation groups, realtors, developers and citizens all participated in a facilitated dialogue about strategies for mitigating the impact of rapid development on the county's natural resources. The Center for Watershed Protection's *Better Site Design Guidebook* was available at the meeting, allowing representatives of different jurisdictions a convenient opportunity to review relevant ordinances. One of the most important outcomes of this meeting was a general awareness of the benefits of LID practices, and the beginnings of a broad-based, supportive coalition for the implementation of these practices throughout the county.

Local Context

Six watersheds within the H-GAC region have adopted their own Watershed Protection Plans, following a participatory process similar to that used by the Haywood Waterways Association. These plans were drafted by local partnerships of stakeholders from each of the watersheds, and they represent the culmination of scientific expertise, local government capacity, and public preferences. The Watershed Protection Plans also provide special attention to smaller ecosystems that could be glossed over by a larger-scale regional water quality plan.

Leadership in Energy & Environmental Design (LEED)
Nationwide Program
Using the Success of an Existing Program to Incentivize LID Techniques

The Leadership in Energy and Environmental Design (LEED) system of green building certification is a popular, voluntary strategy to incentivize sustainable construction practices. LEED is especially popular in the Houston-Galveston region, with Houston placing fourth on the list of U.S. cities ranked by number of LEED projects.[86] LEED's certification process is relatively flexible, allowing projects to earn credits in 13 different environmental impact categories. The United States Green Building Council (USGBC) also allows for the creation of regional priority credits, which are meant to integrate local conditions and priorities into the certification process. Once designated, these priority credits are weighted more heavily toward achieving certification than the other credits.

The popularity of LEED in the region affords LID advocates with an excellent opportunity to increase adoption of LID practices. If certain LEED credits, such as the *rainwater management* credit under the Sustainable Sites category, were designated as regional priority credits, many developers wishing to attain LEED certification may also incidentally integrate LID practices. This strategy of "piggy-backing" off the success of LEED is especially well-suited to the political atmosphere of our region, as it does not require a mandate, but takes advantage of an already-popular voluntary program.

Lessons Learned: Stormwater Runoff

- LID practices that decrease impervious surface area are important for improving water quality and decreasing nonpoint source runoff pollution;
- Coordination between City and County governments is crucial in effectively incentivizing and facilitating the use of LID practices;
- Watersheds are ideal sub-regional geographies for water quality planning;
- Greater integration of LID practices with the LEED system of certification could increase the prevalence of LID practices throughout the region

Local Context

Developers throughout the Houston-Galveston region are building exemplary LEED-certified projects. Houston ranks fourth in the nation in the number of LEED-certified projects. BP's Helios Plaza, located in the city's Energy Corridor area, is LEED-NC (Leadership in Energy and Environmental Design for New Construction) Platinum certified, the highest level of certification available through the program. Opened in 2010, the building is not only environmentally-friendly, but able to withstand natural disasters common in the region, including flooding and hurricanes. The 350,000-square foot office building and parking structure include many environmentally-friendly features, including:

- Water-efficient toilets and faucets;
- A 400,000-gallon cistern that collects rainwater and air-conditioning condensation to use for toilets, irrigation, outdoor water features, and cooling systems;
- High-performance glass able to withstand hurricane-force winds;
- Porous block paving;
- Native, drought-tolerant landscaping; and
- Connections to bicycle and pedestrian infrastructure and mass transit.

Source: Taylor, Rives. "Engineered Resilience." *Urban Land* 71.5/6 (2012): 82-85.

Regionalization of Wastewater Infrastructure

In addition to non-point sources of water pollution, the release of inadequately treated wastewater effluent into local waterways is another significant contributor to our region's water quality issues. A 2009 H-GAC report explicitly addresses the correlation between wastewater release points and water quality, demonstrating that many of the region's most severely impacted waterways are also the ones with the densest concentrations of wastewater outfalls.[87]

The diffuse nature of the region's wastewater infrastructure system is inherently problematic. The system is composed of many small, non-adjacent treatment facilities and dischargers. Many of these small treatment plants have unmanned operations, inadequate financial capacity for repairs and maintenance, and a general lack of responsiveness to issues affecting local water quality.[88] This system also poses a regulatory problem, due to the large number of small plants scattered throughout this region; it is nearly impossible to effectively monitor each facility and identify those that are non-compliant.

Consolidation of this diffuse network of small plants into a more centralized system of larger, regional plants would simplify regulation, improve quality assurance, and allow for more efficient allocation of resources. A number of studies have shown that metropolitan regions can achieve significant cost savings through the regional consolidation of wastewater treatment plants by taking advantage of the economies of scale offered by fewer larger plants.[89] While regional consolidation could have beneficial effects for water quality and financial solvency, there are a number of factors at play in our region that undermine the logic of this strategy, including political opposition.

Opposition to the consolidation of wastewater infrastructure in the Houston-Galveston region comes from a number of different sources. Financing mechanisms such as Municipal Utility Districts (MUDs) have encouraged a pattern of unpredictable leapfrog development, rendering useless any centralized attempt at infrastructure or utilities planning. Under the current system, developers are more likely to take advantage of front-end cost savings by setting up a small plant for a single community rather than dealing with the coordination and negotiation issues of connecting to a regional facility.[90] Over time, this uncoordinated pattern of growth has culminated in today's unwieldy, costly, and ineffective system of diffuse wastewater infrastructure.

The following strategies could be used to promote the regionalization of wastewater infrastructure in the Houston-Galveston region:

- *Selective Targeting*

  Every form of infrastructure has a useful lifespan, and wastewater treatment plants are certainly no exception. By using a GIS database with data on each wastewater treatment facility in the region, it would be possible to identify failing plants, old plants, or plants operating above intended capacity. These plants would be prime candidates for retroactive consolidation. One disincentive to regionalization of wastewater infrastructure is the necessity of destroying small plants with remaining capacity in order to set up larger regional plants. Using a method of selective targeting, it would be possible to

gradually phase in regionalization, without the wasteful practice of destroying new, well-functioning plants with remaining capacity.

This method of selective targeting could easily be inserted into required planning activities, including a local Capital Improvements Plan (CIP). In the preparation of these CIPs, jurisdictions conduct capital needs studies, meant to assess the need for new or reinforced infrastructure based on projected growth trends and the physical condition of existing infrastructure. Ideally, the capital needs study would include an inventory of existing facilities, an assessment of their condition, a repair and replacement schedule, and identification of need for new facilities.[91]

- *Establishing a Regional Wastewater Authority*

  A regional wastewater authority would provide a framework of regional coordination, and could provide incentives for the regionalization of wastewater infrastructure. Absent such a body, it would be extremely difficult to incentivize consolidation of infrastructure. The regional body could be modeled after regional water authorities from around the nation. Given the political infeasibility of creating a new authority with mandating power, the regional wastewater authority could offer a number of voluntary options for compliance. However, it is important to create a potential mandate, triggered only if voluntary measures do not prove effective in maintaining or improving measurable water quality standard.

  Such a regional authority could offer funding sources for consolidation. These funds could come from:

  - Contributions from member entities
  - Development impact fees
  - Discharge fees
  - Coordination of grant funding from other sources

City of Columbus, Ohio – Department of Public Utilities: Asset Management Program
Columbus, Ohio
Using Selective Targeting to Improve Wastewater Infrastructure

In order to comply with two consent orders from the Ohio Environmental Protection Agency, the City of Columbus, Ohio launched a comprehensive asset management approach towards its wastewater operations. Due to the success of this new approach, the city decided in 2008 to apply a similar comprehensive program to its water division as well. In both cases, the Department of Public Utilities (DPU) used the asset management program to make data-driven decisions on infrastructure investments and repairs.

The comprehensive asset management program informs the decision-making process with a vast collection of data on water and wastewater infrastructure, including information on age, materials, and pipe thickness. This wealth of information has helped the DPU make more systematic decisions on infrastructure repair, which have ultimately proved more strategic and

cost-effective than past methods. For example, the DPU used to allocate $5 million per year to replace the worst performing pipes. By monitoring extensive data on water pipes in 30 different asset classes, the department has been able to move from a reactionary approach to a proactive approach that targets infrastructure in the greatest need of repair.[92]

While Columbus DPU has not used its asset management program specifically for the purpose of regionalizing its wastewater infrastructure, it is possible to imagine how such a system could serve this purpose. When the data shows that a repair is needed, agencies could decide whether it makes more economical and operational sense to restore the faulty pipe to its original condition or connect it to a new regional infrastructure system.

Lessons Learned: Regionalization of Wastewater Infrastructure

- Maintaining an extensive database on infrastructure condition, age, and performance helps inform decisions on capital improvements
- A comprehensive asset management program could be integrated into the capital needs assessment portion of the Capital Improvements Plan
- Establishing a Regional Wastewater Authority is key to providing a framework for regional infrastructure coordination

Water Conservation

The management and protection of regional water supplies has been recognized as one of the most critical issues facing the state of Texas.[93] Many Texas rivers, streams and aquifers are already under stress, and the state population projections suggest demand for water will continue to increase. The 2011 Texas drought proved that water is a prized resource that requires effective conservation in the future. As population growth continues, localities will be forced to implement some of these conservation measures to ensure their long-term economic vitality and high quality-of-life. Several public agencies and non-profit organizations have already begun looking at different tools communities can use to reduce water usage. Localities may use a variety of tools to promote water conservation, including:

- Pricing structures;
- Goal-setting, replacement of older toilets;
- Dedicated conservation funding;
- Outdoor watering ordinances;
- Non-toilet retrofit programs;
- Educational outreach;
- Rainwater harvesting;
- Development ordinances; and

- Reducing water loss in the distribution system.

The Sierra Club (Lone Star Chapter) and National Wildlife Federation describe some of these programs, and how Texas cities have begun implementing them, in their 2010 report *Drop by Drop*.[94] Promising water conservation measures already implemented by communities nationwide include:

- *Using Pricing to Encourage Water Conservation*

  Economists argue that water conservation measures are most effective when strict water pricing structures are in place. Water rate structures aimed at efficiency charge lower rates for less consumptive users and higher rates for more consumptive users. An example of this tiered water structure is found in Tucson, Arizona; water consumers who use 11,000 gallons or less are charged $1.39 per 1,000 gallons, while consumers using more than 34,000 gallons are charged $10.00 per 1,000 gallons.[95] Water planners encourage conservation-oriented rate structures; however, few Texas cities have implemented similar programs. The Sierra Club and National Wildlife Federation's *Drop by Drop* report recommends that water utilities implement rate structures that charge affordable prices to efficient water users and substantially higher rates for excessive water users. In addition, the revenue generated by charging higher rates for highly-consumptive water users should be appropriated to fund the municipality's water conservation program.[96]

- *Setting Water Efficiency Goals*

  Water efficiency goals can play an important in conserving water. In 2004, the Texas State Legislature created a state water conservation task force, which recommended that water utilities reduce per capita water use by a minimum of one percent per year until municipal water use reached 140 gallons per capita per day (gpcd).[97] This benchmark was a compromise among the regions in Texas that have highly-variant rainfall and water supply and demand conditions. Ongoing efforts to reduce per capita water use are being implemented; a 2009 state law requires that all new toilets sold after 2014 be "high-efficiency toilets," which use roughly 20 percent less water.[98] In addition, federal law now requires all new washing machines to be more water efficient. The use of new appliances and fixtures can help municipalities more easily achieve the one percent annual reduction goal. Despite some efforts, there has been limited success throughout Texas in achieving the anticipated water use reductions; it remains uncertain if the one percent annual reduction and 140 gpcd efficiency goals will be reached without a firm commitment from water utilities to do so.[99] Water utilities with moderate water rate structures are recommended to set five- and ten-year goals aimed at meeting the annual reduction and efficiency goals set by the task force.[100] In addition, the establishment of appropriate conservation goals should be required before any new state water rights or access to state funding for new water supplies is granted.[101]

- *Replacing Older, Inefficient Toilets*

  Significant advances in toilet technology have drastically reduced water consumption. Toilets made before 1950 used close to 7 gallons of water per flush. Today, the "high efficiency" or "dual flush" toilets use on average 1.28 gallons per flush. The lifespan of toilets is roughly 25 years; therefore, older toilets that consume a significant amount of

water are still functional and in use. To address this issue, municipalities have begun to speed up their replacement of older toilets through more rigorous replacement incentive programs. Toilet replacement programs result in savings of roughly 12,000 gallons annually per household. The 2004 Water Conservation Implementation Task Force (a body created by the Texas state legislature) recommends water utilities retrofit at least five percent of eligible toilets per year. Various forms of replacement programs exist, including some that provide high-efficiency toilets for free or at a reduced price or make toilet retrofits mandatory upon resale.[102]

- *Providing a Dedicated Funding Source for Water Conservation Projects*

  Conservation is one of the most cost-effective strategies for achieving efficient water use; however, successful water conservation programs require a dedicated funding stream, as well as staff management. In the last five years, Austin, Fort Worth, and Dallas have focused more attention on their municipal conservation efforts; however, Houston, the largest city in the state, still does not adequately address conservation. Currently, Houston does not have a water conservation department or any staff that is devoted to water conservation programming.[103] The Sierra Club and National Wildlife Federation's *Drop by Drop* report recommends that all major water utilities in the state establish and appropriately fund a water conservation department.

Local Context

The Texas Water Development Board: Region H Water Planning Groups, whose jurisdiction includes most of the Houston-Galveston region, projects that, by 2040, available water supply will decrease to 2.58 million acre-feet with a demand of 3.04 million acre-feet.

Metropolitan North Georgia Water Planning District:
Water Supply & Water Conservation Management District
Atlanta, Georgia
Regional Plan for Water Conservation

In 2001, Georgia lawmakers created the Metropolitan North Georgia Water Planning District (Metro Water District) to serve as the water planning organization for the metro Atlanta region, which includes 15 counties, 91 cities, and 61 water systems. The Metro Water District was tasked with preparing a regional plan to address stormwater management, wastewater treatment, and water supply and conservation issues. Environmental planners from the Atlanta Regional Commission were recruited by the Metro Water District to create the document, one of the nation's most comprehensive water conservation plans. No other water plan in the country has brought as many local governments and utilities together to plan and implement the same set of conservation strategies. The first series of plans were adopted in 2003, with updates to these plans occurring in 2009. The 2009 Water Conservation Plan includes a range of mandatory conservation strategies, including low-flow toilets in new development and rain sensors on new irrigation lines.[104] The mandatory aspect of this conservation plan sets it apart from other states that have created similar plans. Key to the plan's success is that compliance is required to qualify for water withdrawal permits, as well as state grants and loans.[105]

According to Pat Stevens (Atlanta Regional Commission: Director of Environmental Planning), the most effective aspect of the plan is the establishment of tiered water rates throughout the region, which ultimately requires heavier water users to pay substantially more for water. Financial incentives (and disincentives) have been a major component of water conservation policies throughout the region. The implementation of the water conservation plan has been met with complaints; however, it implementation continues because it is a state requirement. Between 2000 and 2010, per capita water use declined roughly 35%, from 149 gallons per day in 2000 to 110 gallons per day in 2010. These water conservation strategies are having a significant impact in the Atlanta region; from 2000 to 2009, the population increased 28 percent, while the region's total water use decreased by 13 percent. While some of the decrease can be attributed to water bans and the recent recession, the region still made considerable progress towards becoming more water efficient.[106]

Public education is another important part of the plan. An education plan outlines strategies for increasing public awareness of water supply and conservation issues. The Metropolitan North Georgia Water Planning District's website showcases some of the educational tools available, including an interactive Household Water Assessment tool. The website also includes a conservation pledge to "Make Your Drop Count." This simple pledge requires participants to share some identifying information, including their name, email and zip code, and which water conservation measure they are willing to commit to. The list of water conservation measures are related to water savings, which are calculated as the "Pledge's Daily and Annual Savings." Outreach strategies like the conservation pledge play an important role in educating citizens and demonstrating the role each resident plays in reducing regional water use.

While Atlanta's regional water conservation plan has made water conservation a mandatory activity, there is still more progress to be made. Chattahoochee Riverkeeper, a regional environmental advocacy group, generated a report documenting the state's progress toward reducing water waste. The report documented that the largest reductions in water waste were by companies subjected to the highest water rates. Similarly-sized companies paying lower water rates were doing less to decrease their water footprint.[107]

The Metropolitan River Protection Act, created in 1973 in response to concerns about the health of the Chattahoochee River, also plays an important role in preserving the region's primary source of drinking water. The Chattahoochee River Corridor Protection District is an overlay distract that protects a 2,000-foot corridor along the banks of the Chattahooche, as well as the 48-mile-long impoundment between the Buford Dam and Peach Tree Creek. The 1998 amendment to the act extended the corridor an additional 36 miles to the downstream limits of Fulton and Douglas counties. The protection of the Chattahooche is important to the Atlanta region, since the river is the main source of drinking water and a major recreational asset.[108]

The Metropolitan River Protection Act requires the Atlanta Regional Commission (ARC) to adopt a plan aimed at protecting the Chattahooche River Corridor, and to review development proposals for consistency with the plan. Under the act, local governments that fall within the corridor are required to implement ARC's plan by issuing permits based upon ARC findings, monitoring land use activities that adversely impact the corridor, and enforcing the act and

provisions of the plan. In particular, any land use activity that disturbs the corridor must be in compliance with the adopted plan.[109]

Lessons Learned: Water Conservation

- Financial incentives and public education programs can effectively promote water conservation
- Development regulations can be used to help improve water quality and promote water conservation

Land Conservation

Communities nationwide are recognizing the economic and environmental benefits of preserving productive agricultural lands and sensitive ecological features. Public agencies and private organizations are using a variety of techniques to protect locally-important landscapes from development. These techniques are tailored to address local needs, community preferences, and available resources.

Local Context

In the Think 2040 Survey (part of the *Regional Plan for Sustainable Development*), 95.3% of respondents throughout the Houston-Galveston region agreed that steps should be taken to preserve the region's wetlands, forests, prairies, and shorelines.

Land Trusts

Across the country, local non-profit land trusts are working to protect critical ecosystems, productive farmland, historic sites, or other locally-important landscape features. While some of these programs only focus on the acquisition of land or conservation easements, others provide educational programs aimed at increasing community awareness or providing landowners with the resources they need to be good stewards of their land. These organizations vary in size and effectiveness, and most rely heavily on private funding sources. Nationwide, approximately 1,200 land trusts have preserved 50 million acres of land.[110]

Columbia Land Conservancy
Columbia County, New York
Using Land Acquisition Initiatives and Educational Programs to Preserve Agricultural Lands

The Columbia Land Conservancy (CLC) was founded in 1986 to protect open space throughout Columbia County, New York, a largely-rural community in eastern New York. Due to its proximity to Albany and New York City, the community has become a popular second-home destination. The group not only uses legal tools to conserve land, but provides several outreach programs that educate the public and help farmers build economically-viable operations.

The CLC is governed by a volunteer Board of Trustees, which is supported by 15 staff members. Staff members oversee land acquisition efforts and plan a variety of educational programs. To date, the CLC:

- Has protected approximately 23,500 acres of land using conservation easements;
- Manages 10 natural areas, totaling 2,300 acres; and
- Has helped establish 5,750 acres of publicly-accessible parkland.

Each year, the organization hosts more than 150 educational programs, reaching thousands of residents. In 2011, the CLC's operating revenues totaled more than $1.6 million; about 60 percent of this funding came from local contributions, with the remainder coming from public and private grants, public events, and other sources.

The group uses a variety of initiatives to protect Columbia County's rural lands, including:

- Acquisition of Conservation Easements

  The CLC uses conservation easements to preserve land throughout Columbia County. Some of the easements are donated, while others are purchased. State-supported grants have been used to fund the acquisition of some of these easements.

- Farmer/Landowner Match Program

  The Farmer/Landowner Match Program connects property owners with farmers looking for affordable land. Because of rising land prices, a large percentage of farmland in the area is leased; farmers need assistance locating available land, and property owners may need help finding potential lessees. Interested participants fill out an application, and their information is entered into a database free-of-charge; staff members review the database for any possible farmer/landowner matches. Once a match is made, a group of CLC volunteers helps those involved prepare a lease.

- Agricultural Assessment Program

  As part of the Agricultural Assessment Program, a group of trained volunteers help landowners determine the agricultural potential of their properties.

- Tradelands Program

  Under the Tradelands Program, interested landowners donate their properties to the CLC. Staff members study the land's ecological and agricultural importance; if the land has significant conservation value, an easement is placed on the property. Once the easement is in place, the property is sold to a conservation-minded buyer. The revenue generated by the Tradelands Program is used to fund other CLC projects.

- Educational & Recreational Programs

  The CLC offers a variety of educational and recreational programs that local residents may enjoy free-of-charge. In 2011, 181 of these programs were held, with 3,170 participants. The CLC plans field trips and workshops for schoolchildren, and a variety of outdoor recreational programs are offered, including hikes, stream explorations, canoe trips, and fishing trips. For landowners, the CLC has several land management programs, including forestry workshops.

More than 25 years after its founding, the CLC remains a robust land trust that provides a multitude of services and programs to local farmers and community members. [111]

Local Context

There are several established land trusts in the Houston-Galveston region, each with a particular area of focus. The Bayou Land Conservancy and Katy Prairie Conservancy are two locally-based land trusts that are active in the Houston region, protecting thousands of acres of environmentally-sensitive land from future development.

Lessons Learned: Land Trusts

- Private organizations can work cooperatively with local governments and area residents to preserve agriculturally-productive and environmentally-sensitive lands.
- Educational programs can use professional expertise to help landowners make financially-sustainable conservation plans for their properties.
- Public outreach events can provide local residents with greater access to open space and encourage environmental stewardship.

Conservation Development

For decades, suburban sprawl has encroached upon rural lands on the urban periphery. New construction in previously-rural areas destroys productive farmland and leads to the fragmentation of valuable wildlife habitat. Newcomers, who move to rural areas in search of a peaceful lifestyle, generate increased traffic and pollution, while straining public facilities ill-equipped to handle rapid population growth.[112] Many times, these newcomers live in suburban-style developments that were not designed to protect the site's unique environmental and cultural features.

Innovative communities nationwide are realizing that conservation development can be a more context-sensitive design approach that accommodates new growth, while permanently protecting valuable open space. Conservation developments are designed, built, and managed to protect landscapes or other resources valued for their aesthetic, environmental, cultural, agricultural, or historic value. These projects protect productive farmland, wildlife habitat, and locally-significant landscapes, directing growth to areas best suited for development. The property's existing assets, both environmental and cultural, are carefully inventoried; new development is planned around these unique resources. Generally, at least 50 percent of the site's buildable area is set aside as permanent open space.[113] Designers consider the impact the planned development will have on neighboring parcels and public lands, connecting the project's open space with a local (or regional) greenway network. The permanently-protected open space becomes an integral part of the community, increasing home values and opportunities for recreation.

Although large swaths of open space are protected, the overall building density of a conservation development is equal to that if the site were developed conventionally. To preserve at least half

of the site's buildable area as open space, homes are grouped in a more compact fashion. Most of the homes are sited to have direct access to the community's open space, allowing residents to enjoy views of the surrounding landscape from inside their homes, making smaller lots seem much larger.[114] In some instances, these communities are modeled after rural villages, with an interconnected street system connecting single-family homes and townhouses to a mixed-use core.

Prairie Crossing
Grayslake, Illinois
A Mixed-Use Conservation Development near Transit

Prairie Crossing is a conservation development in Grayslake, Illinois, one of Chicago's far northern suburbs. Unlike conventional suburban subdivisions, this community protects valuable habitat, supports local agriculture, and provides residents with the opportunity to interact with the natural environment. More than 60 percent of the 677-acre site is permanently protected as open space, preserving farmland, native prairies, ponds, and wetlands; conservation easements guarantee the long-term protection of these areas. Approximately 360 single-family homes, 36 condominiums, shops, restaurants, and a charter school are located on the remaining acreage. Homes were clustered in small neighborhoods and villages, and were positioned behind hedgerows and hills to protect views from adjacent roadways and other housing clusters. Residents have access to more than 10 miles of trails that meander through the open space, and connect the community to the nearby Liberty Prairie Reserve, a 3,200-acre natural area.[115] The project was one of the nation's first conservation developments.[116]

Architects designed Prairie Crossing's buildings to reflect historic styles common throughout the Midwest, contributing to the community's sense-of-place. All of the homes were built using construction techniques promoted by the U.S. Department of Energy's Building America program, making these homes approximately 50 percent more energy-efficient than comparable homes in the region. Surrounding naturalistic landscapes use biological process to cleanse stormwater runoff. Vegetated swales carry water to wetlands and grasslands, where deep-rooted prairie grasses absorb water, removing pollutants and preventing erosion.[117] Homeowners are required to plant at least 20 percent of the landscaped areas surrounding their homes using native prairie plants; recognizing the benefits of using native plants, many homeowners have exceeded the minimum requirement.[118]

Residents have embraced the conservation principles promoted by the developers in other ways. The homeowners' association conducts annual prairie burns, ensuring that the ecosystem functions as it did pre-development. Residents created Illinois' first endangered and threatened fish refuge; the community was an ideal location for such a use, due to its high water quality, biodiversity, and established limits to land use and fertilizer use.[119]

A 100-acre organic farm is located on the western edge of the community, within the protected open space. Several educational programs are offered at the farm:

- The *Farm Business Development Center* serves as a business incubator for local farmers, providing the training, financing, and resources needed to build a successful agricultural operation; and

- The *Prairie Crossing Learning Farm* teaches local youth about operating a farm, hosting the Summary Farm Camp, the After-School Farm Camp, and the Prairie Farm Corps, a paid training program for teenagers.

Farmers lease some of the open space at Prairie Crossing. Some farmers sell produce through a local CSA (Community Supported Agriculture) program, and serve as a mentor for those participating in the various educational programs.[120]

Figure 7: Single-Family Home in Prairie Crossing (Grayslake, IL)

Homes in Prairie Crossing incorporate traditional architectural features common to the Midwest. Native landscaping surrounds the home, providing wildlife habitat.

Source: City of Ozaukee, Wisconsin

Local Context

Several Texas localities have incorporated conservation design principles into their subdivision regulations. These regulations provide developers with the option of subdividing in accordance with conservation development standards, in exchange for some type of incentive (increased density, expedited review, reduced subdivision review fees, etc.). Travis County (County Code: Chapter 82, Subchapter C) and the City of Dripping Springs (Code of Ordinances: Article 28.05) have specific standards for conservation development.

Benefits of Conservation Development

Utilizing conservation development principles provides many environmental, social, and economic benefits. Developers, local governments, and homebuyers nationwide are recognizing the benefits of conservation development.

Benefits for Developers

- Clustering development results in lower infrastructure costs, since roads, utilities, and other infrastructure do not have to be extended throughout the site.
- Reducing the amount of impervious cover and protecting natural wetlands results in lower stormwater management costs.
- Siting development in areas best-suited for development can result in lower construction costs, since the amount of grading required is reduced.
- Homes within conservation developments sell at higher prices than similar homes in conventional subdivisions. Some studies have found that homes within conservation development sell at prices 33 percent higher than comparable homes in other communities.
- Some communities (including Calvert County, Maryland and Sarasota County, Florida) have expedited subdivision review for conservation developments.

Benefits for Localities

- Conservation developments permanently protect important landscapes without placing a financial strain on municipalities.
- Protecting historic sites or aesthetically-pleasing landscapes can increase tourism and the general appeal of communities.
- A smaller, more compact road and utility network results in lower long-term maintenance costs.
- Protected landscapes filter stormwater runoff, reduce water pollution and the likelihood of flooding along nearby waterways.
- Protected landscapes provide wildlife habitat.

Benefits for Residents

- Many homes within conservation development enjoy views of protected open space.
- Protected open space provides recreational opportunities.
- Clustering allows residents to view and enjoy rural landscapes, without having to maintain a large lot.

Source:

Arendt, Randall, and Holly Harper. *Conservation Design for Subdivisions: A Practical Guide to Creating Open Space Networks.* Washington, D.C.: Island Press, 1996 (Chapters 1 – 3).

McMahon, Edward. *Conservation Communities: Creating Value with Nature, Open Space, and Agriculture.* Washington, DC: Urban Land Institute, 2010 (Chapters 1 and 2).

Lessons Learned: Conservation Development

- Conservation developments can accommodate new, mixed-use development, while protecting important environmental features and productive agricultural lands.
- By providing easy access to natural landscapes, conservation development can improve residents' health and awareness of environmental processes.
- Agricultural operations can be an integral part of a conservation development, providing residents with locally-grown process and a greater understanding of food systems.

HEALTHY COMMUNITIES

To build prosperous communities with a high quality-of-life, residents must have access to adequate healthcare, nutritious foods, and active recreational opportunities. Healthy residents are more productive, and more likely to be economically self-sufficient. A variety of affordable healthcare services should be available, and tailored to address local needs. Low-income and rural communities have historically had limited access to adequate healthcare and healthy food options; many communities have been identified as "food deserts," due to their lack of access to nutritious foods. Public agencies and private organizations can work collaboratively to address local healthcare needs. Communities nationwide have used a variety of regulatory tools and private initiatives to improve local health.

Best Practices Related to *Healthy Communities*

Improving Access to Healthy Foods

- Public & Private Initiatives to Improve Local Food Access in Food Deserts (South Los Angeles, CA)
- Pathmark Supermarket (New York City, NY)
- Healthy Foods, Healthy Communities Initiative (New York State)
- FRESH Program (New York City, NY)
- Fresh Moves Mobile Produce Market (Chicago, IL)
- New York City: Green Carts Program (New York City, NY)
- New Milford Hospital: Local Food Blitz (New Milford, CT)

Managing Fast-Food Restaurants

- Regulating Fast-Food Restaurants (South Los Angeles, CA)
- Colorado Department of Public Health: Smart Meal Colorado (Colorado)

Improving Healthcare in Underserved Communities

- Community Health Workers (CHWs) (Nationwide)

Building Healthy Communities

- Nashville Area MPO: Health Impact Assessment (HIA) (Nashville, TN)

REGIONAL CHALLENGES

Although the Houston-Galveston region benefits from world-class medical and recreational opportunities, many populations do not have access to adequate healthcare options. Many residents lack health insurance or do not live near healthcare clinics. In some neighborhoods, there is limited access to fresh food and active recreational opportunities, such as walking and biking. Large segments of the population have been diagnosed with chronic diseases, including asthma, diabetes, and obesity. Access to healthcare varies throughout the region, with many rural areas suffering from a shortage of primary care physicians. Communities nationwide have

adopted policies that improve access to healthcare and promote healthy lifestyles, recognizing the economic and social benefits these programs provide.

BEST PRACTICES

Improving Access to Healthy Foods

Millions of Americans, particularly those in low-income communities, have limited access to healthy foods. In the 1960s and 1970s, access to healthy foods became a major issue in urban neighborhoods, as supermarkets followed the middle class to the suburbs. Supermarket retailers were attracted to larger and less expensive tracts of land; business-friendly and flexible zoning schemes; more homogenous and higher-income consumers; and less crime.[121] "White Flight" resulted in reduced lending for supermarkets in urban neighborhoods with high concentrations of low-income residents. Currently, many inner-city, low-income neighborhoods lack access to full-service grocery stores that offer high-quality, fresh food. As obesity becomes a national concern, governmental entities and non-profit organizations across the country have worked to improve access to healthy foods.

Supermarkets are not the only venues used to provide healthy food to the surrounding community. Across the country, schools, hospitals, and other institutions have begun incorporating locally-grown foods into their programs. Schools and universities nationwide have planted vegetable gardens on their campuses and begun serving locally-grown foods in their cafeterias. Recognizing the health benefits associated with locally-grown produce, hospitals have begun serving local foods to patients and visitors, and some have on-site gardens and farmers' markets.

Public & Private Initiatives to Improve Local Food Access in Food Deserts
South Los Angeles, California
Attracting Mixed-Use Developments Anchored by Full-Service Grocery Stores

In a report generated by Community Health Councils (CHC) called *Food Deserts to Food Oasis: Promoting Grocery Store Development in South Los Angeles* (2010), planners looked at ways community members and local politicians in South Los Angeles can increase access to high-quality, full-service grocery stores in designated food deserts. A food desert describes a community that has a significant lack of fresh food within reasonable access; most communities designated as food deserts are low-income, minority neighborhoods. A full-service grocery store is defined to have at least 10,000 square feet of space, and offers a variety of healthy food and beverages, such as produce, lean meats, whole grains, 100% fruit juice, non-fat/low-fat milk, and other dairy products. Ultimately, the ability for communities to eat healthfully is determined by the community's food resources.

The report aims to improve local health by increasing access to full-service grocery stores. Land use patterns have been partly to blame for the concentration of low-income residents with very limited access to grocery stores. In addition, South Los Angeles has suffered from a significant lack of private investment and inequitable distribution of public resources. Roughly 1.3 million residents of South Los Angeles lack access to full-service grocery stores, where they can purchase fresh and affordable food. Planners in South Los Angeles established a multi-prong

approach to confront the issue of poor community-based food choices. The first approach is the creation of Fresh and Healthy Food Enterprise zones within high-need neighborhoods. The Fresh and Healthy Food Enterprise zones include:

- A package of zoning and financial incentives for the development of new full-service grocery stores;
- An aggressive marketing campaign that includes research into the unmet market demand in these neighborhoods;
- Assistance identifying opportunity sites for grocery store development and creating a strategy for recovering vacant and under-utilized land from absent owners; and
- Expedited review of permit requests and a single point of access for information.

In addition, there has been a public education campaign teaching residents about nutrition and healthy eating. (Food Desert)

To improve access to fresh, healthy foods, the City of Los Angeles, in partnership with Community Redevelopment Agency LA (CRA/LA), created the *Grocery Store and Sit-Down Restaurant Incentive Package* in October 2006. The initiative, designed specifically for South Los Angeles, seeks to attract:

- New grocery stores of at least 12,000 square feet;
- Produce marts that dedicate at least 80 percent of floor space to the sale of fresh fruits and vegetables; and
- Restaurants with seating capacity for at least 30 patrons.

CRA/LA leads the initiative's marketing campaign, serving as a point of contact for food retailers and developers interested in investing in South Los Angeles. CRA/LA helps developers determine which financial incentives they may be eligible for, including loans, grants, tax credits and breaks on utility services.[122] In addition, CRA/LA can provide redevelopment funding for the construction of a supermarket in one of its nine South Los Angles Redevelopment Project Areas, which are located along major commercial corridors. The program also provides assistance with the identification and assembly of potential sites, as well as expedited review by the City Planning Department and Building and Safety Department.

CRA/LA has used brochures, advertising in trade publications, participation in outreach events, and one-on-on meetings with specifically-targeted retailers to promote the program. Four grocery store development projects have already been brought to the project area through this initiative. One such project is the Central Village Apartments mixed-use project, which includes a Superior grocery store that opened in 2009. The project cost $26 million, which included a $3 million investment from the City. Another mixed-use development containing a Fresh & Easy Neighborhood Market was also constructed, with the City investing $5 million in the $42 million project.[123]

While South Los Angeles has been successful in funneling investment towards grocery store development, its efforts have not occurred without challenges. The main barriers to grocery store development include:

- Difficulty identifying viable sites;
- Costly infrastructure requirements;
- Lengthy approval process;
- Lack of skilled workers;
- Presumed lack of spending power; and
- Negative perception of the neighborhoods.

Recommended policies are described that can improve food access in the targeted areas. These recommendations include:

- Prioritizing grocery store development;
- Establishing Fresh and Healthy Food Enterprise Zones;
- Developing a food hub to facilitate food distribution;
- Supporting the creation of new funding initiatives;
- Promoting public education;
- Maximizing food assistance;
- Integrating access to full-service grocery stores into other policies;
- Assessing city policies for their impact on grocery store sustainability;
- Preventing displacement of low-income households;
- Conversion of corner stores to provide more fresh food options; and
- Promoting farmers markets and mobile produce vendors.

The proposed Fresh and Health Food Enterprise Zones would direct investment in food infrastructure to areas with the greatest needs. Within these zones, a package of regulatory and financial incentives should promote grocery store development. The city and county governments should work together to strengthen marketing efforts and help residents and community-based organizations assess the business models, store layouts, and product mix desired by future customers. Government agencies could also assist in site identification and acquisition, identifying vacant and underutilized land within the Healthy Food Enterprise Zones that are adequate for a full-service grocery store. Once site acquisition is complete, the city and county can expedite the approval and permitting process.

Pathmark Supermarket
New York City, New York
Attracting New Grocery Stores to Spur Economic Development

In 1996, New York City partnered with Local Initiatives Support Corporation (LISC) and local developers to bring a supermarket to the East Harlem neighborhood. The three-year process resulted in the opening of the Pathmark Supermarket, which was made possible by $2.4 million in stop-gap financing and the acquisition of a 53,000-square-foot lot.[124] After six years, the Pathmark Supermarket has become one of the chain's highest-grossing grocery stores, and roughly 85% of the store's employees are local East Harlem residents. The success of the supermarket has led to the development of Harlem Center, an $85 million commercial and retail

complex, which has catalyzed the reinvigoration of local businesses and drawn additional development attention to the community.[125]

Pennsylvania Fresh Food Financing Initiative (FFFI)
Pennsylvania
Using Public and Private Funding to Finance the Development of Grocery Stores

In 2004, Pennsylvania established the first statewide program to increase supermarket development in low-income, underserved neighborhoods as a part of an economic stimulus package. The FFFI initiative is managed through a partnership with three nonprofit organizations:

- The Food Trust (a national nutrition advocacy organization);
- The Reinvestment Fund (a community development financial institution); and
- The Greater Philadelphia Urban Affairs Coalition (GPUAC) (a community-based organization in Philadelphia).

The Reinvestment Fund provided an additional $90 million in private funding and New Market Tax Credits to supplement the state's pledge of $30 million over three years, resulting in a $120 million financing pool that provides several financing options to supermarkets and fresh food retailers willing to locate to high-need neighborhoods.[126] The combination of grants and loans help mitigate high startup costs, reduce investment risk, and improve a new store's odds of succeeding. The Food Trust provides outreach, coordination, and technical assistance to retailers and developers, while GPUAC works with communities in Philadelphia to generate support for these supermarkets and provide local residents (especially women and minorities) with information on employment and contracting opportunities.[127] In 2001, the Food Trust gained support from the public and the Philadelphia City Council, which led to the establishment of the Food Marketing Task Force. This group identified specific policy changes aimed at increasing the number of supermarkets in the City. Participation by experts in city planning, economic development, and the supermarket industry, as well as the involvement of state representatives, led to the state's incremental investment of $30 million to create FFFI.

This initiative has had a significant impact on improving food access statewide. 83 full-service grocery store projects, ranging in size from 900 to 69,000 square feet, have been financed in 34 urban and rural counties. In all, 1.6 million square feet of space for grocers has been created, providing nearly 500,000 residents with better access to healthy food and creating approximately 5,000 new jobs, the majority of which have been filled by local residents. In 2009, Illinois, Louisiana and New York worked to create their own FFFI-based initiatives; these programs include a public-private partnership structure, a focus on fresh-food retail development, and a flexible program structure. The City of New Orleans created its own Fresh Food Retail Incentive Program and invested $7 million in Federal Community Development Block Grant recovery funds.[128]

Healthy Foods, Healthy Communities Initiative
New York State
Providing Financing for the Development of Grocery Stores

In 2009, New York State announced a new Healthy Food, Healthy Communities Initiative. The program's initial $10 million investment was used to establish a revolving loan program that may leverage up to $20 million of private funding to provide grants and loans to construct full-service grocery stores statewide. The program is administered by the Low Income Investment Fund, a community development financial institution, and The Reinvestment Fund. The Food Trust will also be consulted to analyze market opportunities; recruit retailers and developers; provide information on available incentives; and research and evaluate program outcomes.[129]

FRESH Program
New York City, New York
Providing Zoning and Financial Incentives for the Development of Grocery Stores

In addition to the statewide Healthy Food, Healthy Communities initiative, New York City has developed the FRESH Program as a part of the City's Five Borough Economic Opportunity Plan. FRESH was passed in 2009 and combines zoning and financial incentives to attract grocery stores to underserved neighborhoods. The zoning incentives include:

- Density bonuses for developers constructing a grocery store on the ground floor of their building;
- Relaxed parking requirements for stores smaller than 40,000 square feet; and
- Permitting large grocery stores in light manufacturing districts as a "by-right" use, expediting land use and environmental reviews.

The financial incentives for this project are developed by the New York City Industrial Development Agency (NYCIDA) within the City's Economic Development Corporation. Incentives offered include real estate tax abatements, mortgage recording tax waivers, sales tax exemptions, and existing financial incentive programs. The FRESH program and its incentives have been funneled into a citywide comprehensive strategy that has already led to a ban on trans fats in restaurants; the deployment of mobile produce vendors to underserved neighborhoods; and the encouragement of corner bodegas to sell fresh produce and low-fat milk. The unified response to providing healthy foods on the state and local level builds further upon neighboring Pennsylvania's FFFI program.[130]

Fresh Moves Mobile Produce Market
Chicago, Illinois
Bussing Fresh Foods into Food Deserts

Steve Casey, resident of a Chicago neighborhood designated a food desert by a local survey in 2006, made it his mission to bring fresh food to his neighbors and to make his community healthier. Casey, a grant administrator, teamed up with local investors to raise roughly $40,000 to purchase an old municipal bus from the City of Chicago (for $1) and transform it into a "farmers' market on a bus." Casey wants residents to be as excited about fresh food as they are about the fast- and fried-food alternatives currently available in their community. His dreams are

being realized, as residents have been clamoring to buy fresh and organic produce. A partnership with a local organic food distributor allows Casey to sell fresh produce at affordable prices. There are plans to add five more buses to specifically target schools, health clinics, and senior homes. For Casey, accessibility to food, especially fresh food, is a matter of social justice. He believes the availability and accessibility of fresh food should be a right available to everyone, and that more can be done to improve access to healthy foods in urban neighborhoods.[131]

Figure 8: Fresh Moves Mobile Produce Market (Chicago, IL)

The Fresh Moves Mobile Produce Market is housed within a repurposed bus.

Source: American Institute of Architects/Architecture for Humanity

New York City: Green Carts Program
New York City, New York
Bringing Fresh Foods to Underserved Urban Neighborhoods

Initiated in 2008, New York City's Green Carts program aims to improve access to healthy food in an innovative, low-cost way. The city will issue up to 1,000 permits to vendors interested in selling fresh fruits and vegetables from mobile carts in low-income, underserved communities. While there was significant support for the initiative, planners worried that vendors would cause congestion on city sidewalks, and small grocers were concerned that street vendors would be unfair competitors (due to their low overhead costs). To help launch the program, the Laurie M. Tisch Illumination Fund, a local foundation, provided $1.5 million in grants to help locals launch their own vendor cart operations. Low start-up costs (about $3,000) have encouraged entry into the market. Some vendors have equipped their carts with handheld devices that allow customers to pay using federal food-assistance programs; these vendors have seen sales increase up to 20 percent after purchasing these devices.[132]

By 2011, there were 500 carts selling produce on city streets. Inspired by New York City's success, communities nationwide have created similar programs. Philadelphia launched its Healthy Carts Initiative, and Oakland (California) legalized street food vending.

Figure 9: Green Carts

Busy Green Carts are selling fresh produce along a city street in New York, NY.

Source: Fair Food Network

New Milford Hospital: Local Food Blitz
New Milford, Connecticut
Promoting Fresh, Locally-Grown Produce

Recognizing the health benefits associated with eating fresh, locally-grown food, Connecticut's New Milford Hospital whole-heartedly embraced the Local Food Movement, and its staff members were able to convince the entire town to do so. Beginning in 2005, a two-track system was developed to incorporate local foods into the hospital's programming and promote its benefits to the surrounding community. The hospital revamped its dining practices and developed a program of community education and learning. Several years after their inception, these programs remain popular and effective.

To incorporate more local foods into their programming, the hospital decided to change food vendors. The newly-selected vendor agreed not to serve fried foods, processed foods, or foods containing high-fructose syrup.[133] Kitchen employees were taught how to prepare unique, nutritional meals derived from local ingredients. Fruits, vegetables, meats, and dairy products are purchased from several farms in the region, and some foods come from the hospital's own garden.

Since some locally-grown foods can be more costly than conventional products, kitchen staff had to make their operations more cost-effective. Instead of spending money on large quantities of processed foods, the hospital decided to use its limited funds to purchase high-quality ingredients. Due to budgetary constraints, the hospital simplified its menu. While the cafeteria used to provide an overabundance of food, now only a few meal options are offered. Expensive meat products have been replaced with other, more affordable forms of protein.

Because of the hospital's innovative marketing efforts, the Local Food Movement was embraced by many of New Milford's 52,749 residents. Businessmen, government workers, and even the mayor regularly eat lunch at the hospital; the mayor raved about the hospital's chicken salad in an article published in the *New York Times*. The meals served at the hospital are not only healthy and fresh, but affordable as well.[134] Several marketing initiatives brought attention to the hospital's locally-oriented menu and its health benefits:

- The hospital hosts a series of cooking classes co-taught by a local farmer, a physician, a dietician, and a chef;
- The Youth Chef Advocates program teaches local teenagers the process of growing and preparing local foods;
- Physicians teach families that are at high-risk for obesity and diabetes how to prepare healthy meals;
- Staff members worked with the town to create a farmers' market;
- Information is distributed with patients' meals telling them where their food comes from;
- Festivals and film screenings celebrating local foods were held; and
- Artwork and posters throughout the hospital advertise the hospital's local food program.[135]

These programs have captured the interest of much of the town. One local family was so interested in the project that they awarded the hospital with a grant to renovate its cafeteria. The logo of the hospital's "Plow-to-Plate" program is displayed prominently on New Milford's welcome sign. The hospital's ability to win-over the surrounding community is unprecedented, and should serve as a model for other hospital systems hoping to improve their area's health and well-being.

Community Gardens and Schools

Schools nationwide are recognizing the benefits of having their own community gardens on-site. These gardens are used as a tool to educate students about healthy eating habits and the origin of their food. Schoolchildren are able to participate in the planting, growth, and harvesting of food in their school's garden, providing them with a hands-on learning experience, and a greater understanding of where their food comes from. Some schools and universities are serving locally-grown foods (produced on- or off-site) in their cafeterias. Many schools in the Houston area have their own community gardens.

Lessons Learned: Improving Access to Healthy Foods

- Financial incentives and zoning regulations can be used to encourage grocery store development in underserved communities. In addition, some municipalities assist developers with site identification and/or acquisition.
- Communities can quickly improve access to healthy foods by permitting the use of mobile vendors in underserved communities, provided that they sell only fresh, nutritious products.
- Schools, hospitals, and other institutions can improve community health by serving access to nutritious, locally-grown foods.

Managing Fast-Food Restaurants

In 2010, *Dietary Guidelines for Americans* (a report by the U.S. Department of Agriculture and U.S. Department of Health and Human Services) included studies examining the relationship between the food environment and BMI (body mass index). The study found that communities with a large concentration of fast-food or quick-service restaurants have higher BMIs. This problem becomes more challenging when vulnerable populations lack private transportation and are even more dependent on their neighborhood food environment.[136] Municipalities can improve community health by using land use regulations to manage the local food environment; states have been granted the power to regulate private individuals in the interest of the public's health, safety, morals, and general welfare under police power established to states in the Tenth Amendment of the U.S. Constitution. In accordance with those provisions, zoning has been used to regulate fast-food restaurants and create healthier food environments.

Managing the Placement of Fast-Food Restaurants
South Los Angeles, California
Directing Fast-Food Restaurants to Appropriate Locations

In addition to incentivizing grocery store development, the City of Los Angeles' *Grocery Store and Sit-Down Restaurant Initiative* aims to bring healthy food retailers to South Los Angeles. The program not only promotes available financial incentives, but helps eligible business owners identify potential sites, navigate the City's permitting process, and find qualified employees. Initially, the City passed an interim control ordinance (ICO), which placed a moratorium on permits for new stand-alone fast-food restaurants in South Los Angeles, allowing officials to assess the existing inventory of these establishments.[137] In 2010, the City replaced the temporary policy with an amendment to the City's General Plan, which requires new restaurants to locate at least a half-mile from existing ones.

Prepared by Community Health Councils in 2012, the *Fast Food Restaurant Report*: *Promoting Healthy Dining in South Los Angeles* recommends several strategies for limiting the density of fast-food restaurants, while encouraging the location of healthy restaurants. The following recommendations have been proposed for the City of Los Angeles:

- Extend the criteria to obtain a construction permit to all fast-food restaurants;
- Require new fast-food restaurants in South Los Angeles to locate at least a half-mile from schools, parks, playgrounds, child care centers, recreation facilities, and other children-oriented facilities;
- Require new fast-food restaurants in South Los Angeles to locate at least 750 feet from bus, rail, and other transit stops;
- Define a healthy restaurant using criteria based on the Dietary Guidelines for Americans;
- Provide an exemption from distance requirements for fast-food restaurants meeting the healthy restaurant definition;
- Strengthen the City's Grocery Store and Sit-Down Restaurant Incentive Program and extend incentives to healthy food restaurants; and
- Monitor healthy restaurants that receive zoning and/or financial incentives for continued compliance with the healthy restaurant criteria and establish penalties for non-compliance.

The zoning tools proposed to manage fast-food restaurants in South Los Angeles include:

- Conditional zoning;
- Incentive zoning;
- Performance zoning; and
- Overlay zoning.

Any implementation policies should be carefully considered to prevent unintentional consequences, such as increasing food insecurity. There should be specific attention paid to the number and location of restaurants that accept food stamps. In addition, officials should work to prevent the displacement of low-income residents and local businesses, due to new development driving up property values and rents. If displacement seems likely, cities should consider

strengthening their eviction and vacancy controls, as well as targeting small business development and homeownership assistance to residents most at risk for displacement.[138]

Regulating Fast-Food Using Zoning Ordinances & Building Regulations

Communities nationwide have used different strategies to manage the development of fast-food restaurants. While some have used the methods proposed for South Los Angeles, other communities are using other health-related criteria to protect local health.

Regulations Based on Distance from Other Uses

In 1978, the City of Detroit passed a zoning ordinance that established a minimum distance of 500 feet between carry-out, fast-food and drive-in restaurants and the nearest part of an elementary, junior high, or senior high school. The policy was intended to address concerns about school delinquency, litter, noise, air pollution, and the overexposure of youth to the marketing of unhealthy foods.

Regulations Based on Healthy Menu Criteria

In 2010, the City of Watsonville, California approved an ordinance requiring restaurants to offer healthy options in order to obtain a building permit. Watsonville's Healthy Eating Ordinance uses a point system to evaluate construction proposals. The system is based on the City's Green Building Ordinance, which establishes minimum environmental standards for obtaining building permits, as well as a reward system. The Healthy Eating Ordinance requires restaurants to earn at least six out of 18 available points to obtain a permit to build or remodel. Restaurants earning nine points or greater are awarded a certificate, which comes with promotional benefits.

Colorado Department of Public Health: Smart Meal Colorado
Colorado
Evaluating the Health Value of Restaurant-Prepared Meals

The Colorado Department of Public Health's Physical Activity and Nutrition Program established the Smart Meal Colorado initiative, which highlights healthy menu items at restaurants.[139] In order to participate, restaurants must offer at least two meals that qualify for a Smart Meal Deal. The initiative coordinates with an independent service to evaluate the nutritional value and content of meals offered at restaurants, determining if they meet minimum serving requirements for beans, whole grains, fruits, and vegetables, and do not exceed maximum thresholds for calories from fat, saturated fat, trans fat, and sodium. The initiative has been successful at increasing purchases of healthy meals and decreasing purchases of soft drinks, fries, and desserts. In 2009, 20 restaurants with 200 locations were participating in the program; 100 of them were McDonald's restaurants.[140]

Figure 10: Smart Meal Colorado Logo
Source: Smart Meal Colorado

Similar programs have been launched nationwide. In North Carolina, Winner's Circle is a healthy dining partnership between North Carolina Prevention Partners and local communities, restaurants, schools, worksites, and other food service providers. The program denotes healthy food options with a special logo (a purple star with a gold fork) for participating eating establishments. Drawing many similarities from Smart Meal Colorado, the food options, including full meals and side items, that were designated with logos had to meet strict nutritional standards.[141]

Smart Meal Guidelines

To receive the Smart Meal logo, a restaurant-prepared meal must have:

- A minimum of two servings of beans, whole grains, fruits, or vegetables (Only 1 serving for a side dish);
- A maximum of 700 calories (300 calories for a side dish);
- No more than 30% of total calories from fat;
- No more than 15% of calories from saturated fat;
- No more than 0.5 grams of added/artificial trans fat; and
- No more than 1500 milligrams of sodium (650 milligrams for a side dish).

Lessons Learned: Managing Fast-Food Restaurants

- Various zoning tools can be used to limit fast food development in communities
- Initiatives that highlight nutritious food options at restaurants are voluntary measures that can encourage healthy eating habits and provide restaurants with a low-cost marketing tool

Improving Healthcare in Underserved Communities

Rising healthcare costs limit many people's ability to obtain adequate treatment and preventative care, especially in low-income communities. Some groups are unable to receive adequate healthcare because they are do not have clinics in their community, and they do not have access to transportation that would allow them to travel longer distances. In the Houston-Galveston region, approximately 25% of the population does not have health insurance, and eight of the region's 13 counties have a health professional shortage.[142] Communities nationwide have implemented programs that improve access to healthcare among underserved populations.

Community Health Workers (CHWs)
Nationwide
Using Personal Connections to Improve Neighborhood Health

Community health workers (CHWs) play a large role in conducting community-level activities and interventions that promote health and prevent diseases and disability. CHWs help build individual and community capacity by increasing health knowledge among community

members, while also educating health care providers about the community's health needs and cultural relevancy of health interventions. These professionals connect participating communities with health care providers, strengthening existing ties. CHWs are uniquely qualified as connectors because they:

- Usually live in the communities in which they work;
- Understand what is meaningful to those communities;
- Communicate in the language of local residents; and
- Recognize and incorporate local traditions and practices such as cultural identity, spiritual coping, and traditional health practices.[143]

By using their unique position, knowledge and skill set, CHWs have the ability to help reduce healthcare costs.[144]

CHWs are particularly effective at addressing chronic disease within their communities. Hypertension, diabetes, and cancer are all major illnesses CHWs work to treat and prevent. Using their connections and knowledge of the community, these workers are able to address issues that limit communities' abilities to control chronic disease, such as:

- Inadequate intensity of treatment;
- Lack of family support;
- Failure to adhere to treatment;
- Lack of access to care and being uninsured; and
- Varying culture perceptions of health and health care.[145]

CHWs overcome these barriers by:

- Bridging community and health care systems;
- Providing culturally-appropriate and accessible health education and information;
- Ensuring people get services they need;
- Providing informal counseling and social support;
- Advocating for individuals and communities;
- Providing direct services, such as basic first aid and administering health screening tools; and
- Building individual and community capacity.

Local Context

Nearly 28% of Houston-area deaths are attributed to cardiovascular diseases, compared to 25% nationally (Existing Conditions Report).

In addition, CHWs support multidisciplinary health care teams by:

- Providing outreach to individuals in a community setting;
- Measuring and monitoring blood pressure;
- Educating patients and families on importance of lifestyle changes and adherence to medication regimes and recommended treatments; and
- Helping patients navigating health care systems.[146]

CHWs are recognized by the Patient Protection and Affordable Care Act of 2010, which authorizes U.S. Centers for Disease Control (CDC), in collaboration with the Secretary of Health and Human Services, to award grants to "eligible entities to promote positive health behaviors and outcomes for populations in medically-underserved communities through the use of community health workers."[147] Some states, such as Minnesota and Massachusetts, have developed comprehensive approaches to building capacity for CHWs in their health care systems.[148] Through legislation passed in 2008, Minnesota created payment compensation for trained CHWs who complete a standard curriculum and receive a certification under Minnesota Health Care Plans authorizing them to provide services.

In Massachusetts, the long-time cooperation between the Massachusetts Department of Public Health, CHWs, community-based health care providers, and health policy advocates resulted in the creation of the Massachusetts Association of CHWs in 2000, and the inclusion of CHWs in Massachusetts health care reform.[149] Massachusetts's health care reform required the Massachusetts Department of Public Health to conduct a study of the CHW workforce to develop a legislative report containing recommendations for increasing sustainability of CHWs within the state.[150] In addition, CHWs secured a seat on Massachusetts's Public Health Council. Both Minnesota and Massachusetts reached success in comprehensively approaching the issue of CHW incorporation into their state's health care systems.

As part of the CDC's Division of Diabetes Translation, CHWs, also known as *Promotores de Salud*, work in communities with a high prevalence of diabetes. As with many other chronic diseases, diabetes prevention and self-care relies less on "high-tech" clinical approaches and more on "high-talk" efforts that provide social support, outreach, consistent follow-up, preventive care, community and family education, and community mobilization.[151] Ultimately, CHWs play a crucial role in the success of medical interventions for chronic disease. While chronic disease remains a major health care focus, the role of CHWs should be further incorporated and invested in. Comprehensive policies implemented by Minnesota and Massachusetts are models that can be adapted by the State of Texas to promote CHWs and improve their effectiveness. These policies include:

- Financing mechanisms for sustainable employment, workforce development, and occupational regulation; and
- Standards and guidelines for publicly-funded research and program evaluations of CHWs.

Lessons Learned: Improving Healthcare in Underserved Communities

- Community Health Workers (CHWs) can work directly with underserved communities to provide convenient healthcare that is tailored to address local traditions and needs.
- Community Health Workers (CHWs) can be used to provide preventive care to underserved communities, lowering healthcare costs systemwide.

Building Healthy Communities

The built environment has a significant impact on the health of its inhabitants. Opportunities for walking, biking, and recreation encourage physical activity, decreasing residents' likelihood of becoming obese or suffering from diabetes, heart diseases, and other chronic illnesses. Poorly-designed buildings and transportation infrastructure can negatively impact health by making exercise unsafe or undesirable, or by introducing harmful pollutants into the environment.

Health Impact Assessments (HIAs) are tools decisionmakers can use to help ensure that communities remain healthy as the built environment changes or new policies are introduced. As part of a HIA, a combination of procedures, methods and tools are used to judge a proposal's potential effects on the community's health.[152] HIAs are useful tools for developers and planners to focus on the health implications of potential projects. Potential development projects are assessed for key health outcomes, such as obesity, physical activity, asthma, injuries, and social equity. When conducting an HIA, practitioners comprehensively assess the impacts a proposal has on the surrounding community, considering all elements of the built environment that influence community health. While no formal rubric defines the HIA process, the five general steps include:

- *Screening*

  Determine whether the completion of a HIA is appropriate.
- *Scoping*

  Determine the health issues, neighborhood, and time period to be analyzed and the research methods that will be used.
- *Risk Assessment*

  Consult health professionals to determine the scale and likelihood of potential health impacts, identifying who will be affected and how. Identify appropriate mitigation techniques and design alternatives that would better protect (or promote) the health of the surrounding community.
- *Dissemination*

  Share the findings of the assessment with decisionmakers and affected individuals.
- *Monitoring and Evaluation*

  Study the impact of the final decision and implementation on the health status of the affected community.[153]

With this methodical, scientific analysis complete, decisionmakers can make an informed decision regarding a proposed project and its potential health impacts.

Nashville Area Metropolitan Planning Organization (MPO): Health Impact Assessment (HIA)
Nashville, Tennessee
Using a HIA to Determine the Health Impacts of Transit-Oriented Development

The Nashville Area MPO used a HIA to assess a potential transit-oriented development (TOD) site. Planners for the Nashville Area MPO wanted to analyze how the built environment either creates opportunities for healthy living or amplifies health disparities.[154] A "pilot" HIA was completed for Nashville's Northeast Corridor, a 30-mile corridor between downtown Nashville and Gallatin, Tennessee. The study looked at factors that would promote or hinder community members from engaging in active transportation, such as walking or biking. Other key issues analyzed include:

- Access to healthy food destinations;
- Street connectivity;
- Green space;
- Air quality;
- Housing; and
- Safety.

This assessment addressed a variety of issues that are not typically considered in other types of assessments.

Completing a HIA for the Northeast Corridor aligned with many of the region's goals for increasing mobility and community health. Over the next 25 years, the area is projected to receive an influx of nearly one million people. To accommodate the community's growing transportation needs, the Nashville Area MPO established a goal of expanding the region's mass transit network. In addition, the Nashville Area MPO has made a pledge to increase active transportation options to create healthier, more walkable, interconnected communities. The MPO has chosen three locations in outlying areas for potential TOD development. Community outreach, including focus groups and surveys, helped identify variables that inhibit or encourage healthy behaviors. In addition, HIA surveys were distributed to community members around the three potential TOD sites.[155]

The pilot study recommended that various design elements be used to promote health activities supported by area residents. HIAs have been conducted for other major capital projects, and the results have been incorporated into the decision-making process. While environmental impact assessments (EIAs) describe the least environmentally-impactful alternatives for federally-funded projects, HIAs should carry equal weight in determining the alternatives with the least negative impact on community health. The careful consideration of HIAs during the planning process will result in more holistically-beneficial projects.

Lessons Learned: Building Healthy Communities

- HIAs can be used to provide a more holistic analysis of the impacts a project or policy will have on surrounding communities.
- HIAs provide decisionmakers with a science-based analysis that allows them to make an informed decision regarding a proposed project and its potential health impacts.

ECONOMIC DEVELOPMENT

Maintaining a diverse, vibrant economy is a goal of every community. Having a healthy economy supported by a skilled workforce will improve local quality-of-life and prosperity. Communities nationwide are working to create a diverse economic base able to withstand changing economic conditions and disruptions. These communities are promoting local assets, such as productive agricultural lands or natural resources, to support existing industries and create new opportunities. Others are supporting innovative workforce development initiatives, hoping to build a highly-skilled workforce able to support lucrative industries. The economic development tools used by rural, suburban, and urban localities nationwide can be adapted to meet the diverse needs of the Houston-Galveston region.

Best Practices Related to *Economic Development*

Encouraging Reinvestment & Mixed-Use Development within Existing Communities

- Metropolitan Council: Livable Communities Demonstration Account (Minneapolis/St. Paul, MN)

Promoting Tourism

- Golden Gate Recreation Center & Gulf Island National Seashore (San Francisco, CA & Bon Secour, AL)

Promoting Local Agriculture

- Wholesome Wave & Grasshoppers Distribution (Louisville, KY)
- Loudoun County, Virginia: Rural Economic Development Division (Leesburg, VA)

Rural Entrepreneurship

- Appalachian Regional Commission (ARC): Entrepreneurial Initiative (Eastern U.S.)
- Supporting Local Breweries Statewide (State of North Carolina)

Workforce Development

- King County, Washington: Workforce Development Initiatives (Seattle, WA)

REGIONAL CHALLENGES

The region's economy is driven by a variety of businesses and industries, including the petrochemical, medical, and agricultural sectors. Four of the nation's busiest ports are located in the Houston-Galveston area, and the region is home to the world's largest medical campus. The diversity of business types helped the region withstand the recent economic downturn better than many other places. However, unemployment is still higher than in previous years, and not all job sectors are recovering equally. To ensure the region's economic health, the region must focus on recruiting and retaining a diverse suite of industries, especially those that provide high-quality jobs. Communities and businesses must work together to build a competitive, highly-educated workforce that has the skills necessary to enter a dynamic, ever-changing economy.

BEST PRACTICES

Encouraging Reinvestment & Mixed-Use Development within Existing Communities

Compact, mixed-use development is being promoted as a more sustainable alternative to the single-use, automobile-oriented growth prevalent since World War II. Proponents see compact, mixed-use development as a tool to accommodate growth, while reducing sprawl and providing access to alternative transportation options, such as walking, biking, and mass transit. While the automobile is credited with enabling low-density, sprawling development outside of cities, more compact, land-efficient development will likely occur within established communities, on vacant or underused properties (infill development). Infill development can be difficult, due to economic, environmental, and political challenges, but it is fiscally advantageous for existing communities, increasing the local tax base.[156] Successful infill projects must overcome the following challenges:

- Land assembly (accumulating enough parcels of land with the appropriate zoning);
- Financial feasibility;
- Cost of upgrading utilities; and
- Market support.

Recognizing the benefits of reinvestment and revitalization, localities nationwide have used regulatory and financial incentives to promote infill development. Some of the policies and tools localities have used include:

- Creating flexible mixed-use zoning districts in areas targeted for redevelopment;
- Providing specific land use and design guidelines for infill development;
- Developing a master plan for targeted areas;
- Streamlining and expediting the development review process;
- Using public funds (grants, tax increment financing, etc.) for land acquisition and infrastructure improvements;
- Building a public landmark in desired development areas, such as a new city hall, library, museum, performing arts venue, or similar feature;
- Providing financing for desired projects using a combination of local, state, and federal funds; and
- Assisting developers with marketing and promotion.[157]

These tools can be easily adapted to meet local needs and resources. Texas cities and counties have the power to use some types of incentives to promote economic development. Some of these tools address more traditional economic development activities, such as manufacturing and industrial-based businesses that create primary jobs in the community. Other tools play a role in community development activities, such as affordable housing development; however, few existing programs in the state support compact, mixed-use development. In general, the use of economic development incentives by localities is dictated by state law. A potential step towards making appropriate incentives available is to identify how state law can be modified to expand the use of economic development incentives to support Smart Growth policy.

Municipal Grants

Municipal grants can be used to help finance compact, mixed-use development in target areas. These grants can support land acquisition, infrastructure improvement, and other construction costs. Financial incentives reduce the risks associated with infill development, making such projects more lucrative to developers.

Metropolitan Council: Livable Communities Demonstration Account
Minneapolis/St. Paul, Minnesota
Using Local & Regional Funding Sources to Support Compact, Mixed-Use Development

Minnesota's Twin Cities have used local and regional funding sources to provide financial assistance to developers building compact, mixed-use projects. These cities provide grants for infrastructure, transportation, parking and land assembly, which are used to fund the development of compact, mixed-use nodes. The Metropolitan Council's Livable Communities Demonstration Account (LCDA) funds public infrastructure and land assembly activities by proceeds from a regional property tax, rather than from federal funding. In 2009, $4 million was made available from the regional property tax pool. This regional property tax levy has been beneficial, as no new annual appropriation has been required to sustain the program. Funding is made available for all cities within the region; the Metropolitan Council allows no more than 40 percent of the funding to be awarded to Minneapolis and St. Paul, so that smaller suburban cities in the region are able to participate in the program. To date, more than 196 grants (totaling more than $98 million) have funded projects in 57 cities.[158]

Figure 11: Gateway Lofts (Minneapolis, MN)
LCDA funding was used to construct Gateway Lofts, an affordable housing development, on the site of a vacant gas station.
Source: City of Minneapolis, MN

Hands-On Experience

Paul Burns: Manager, Livable Communities Program
Metropolitan Council: Livable Communities Demonstration Account

Created as part of the 1995 Livable Communities Act, the Livable Communities Demonstration Account (LCDA) provides funding for projects that demonstrate innovative and new ways to achieve the statutory objectives of the program. LCDA *Development* grants help implement community development and comprehensive plans in ways that promote economic development. Projects funded help realize the following goals of the *2030 Regional Development Framework*:

- Develop land use centers linked to local and regional transit systems;
- Efficiently connect housing, jobs, retail centers and civic uses;
- Develop a range of housing densities, types and costs; and
- Conserve, protect, and enhance natural resources by means of development that integrate and intensify land uses

Connecting new development with transit systems will reduce air pollution, mitigate congestion, and reduce infrastructure costs.

Over the years, a range of projects have been funded by the LCDA. While some have been more successful than others, there are exemplary projects that can serve not only as a model for other communities, but can also be scalable to work in different settings. To date, the Metropolitan Council notes two challenges:

- Encouraging communities and partner developers to consider using innovative techniques and designs; and
- Encouraging developers to use available financing to offset any risk associated with utilizing innovative practices, not just as an additional funding source to make a conventional project more profitable.

Tax Increment Financing

Another tool used to incentivize economic development within urban cores is tax increment financing (TIF). TIF is a public financing method that subsidizes redevelopment, infrastructure, and other community improvement projects in specified districts. This financing method utilizes anticipated increases in property tax revenues (a result of reinvestment and redevelopment) to subsidize current community improvements. While rising property values are welcomed by cities that benefit from an expanded tax base, higher property taxes increase the likelihood of gentrification and displacement of current residents. Cities that use TIF districts for infrastructure improvements must balance the benefits of higher tax revenues with the potential for displacement.

Atlantic Station: A Mixed-Use Redevelopment Project
Atlanta, Georgia
Using Tax-Increment Financing to Providing Funding for Redevelopment

In 1997, Georgia-based Jacoby Development, Inc. purchased the abandoned Atlantic Steel mill near downtown Atlanta and began redeveloping the 138-acre site into a mixed-use community. This redevelopment project, dubbed Atlantic Station, has become a vibrant urban neighborhood, complete with shops, restaurants, offices, theaters, hotels, and residences.[159] During its construction, Atlantic Station was the largest brownfield redevelopment project in the nation.

Upon completion, Atlantic Station will be a regional employment and entertainment hub. The mixed-use, urban-style development will include:

- 6,000,000 square feet of Class A office space;
- 5,000 residential units in a mix of styles and price ranges;
- 2,000,000 square feet of retail and entertainment space;
- 1,000 hotel rooms; and
- 11 acres of publicly-accessible open space.[160]

These different uses are connected by an interconnected, pedestrian-friendly street network, which accommodates multi-modal travel. A public bus provides easy access to a nearby subway station; a light rail or trolley system may provide additional connections in the future.

Figure 12: Mixed-Use Development in Atlantic Station (Atlanta, GA)
Source: Matt Britt

This project was made possible by significant public and private investment. Due to the site's 100-year history as a steel mill, dangerous contaminants posed significant health hazards. Because costly environmental remediation was necessary before new construction would begin,

large amounts of funding were required early in the development process. To help make the project financially feasible, some funding came from tax-increment financing (TIF), which was authorized by the 1985 Georgia Redevelopment Act. The additional property tax revenue generated by the site's redevelopment will be used to pay off government-issued bonds; these bonds will be used to pay for the infrastructure necessary for redevelopment to occur.[161] These bonds total $110 million, and will be used for environmental remediation and to build roads, utilities, and other infrastructure. Repayment will take place over a 25-year period, and will be overseen by the Atlanta Redevelopment Authority.[162]

When complete, Atlantic Station will provide a boost to the local tax base. Atlantic Station currently pays about $30 million in property taxes; before its redevelopment, the site only paid $300,000 in property taxes. The commercial uses generate millions in sales taxes, and thousands of new jobs were created on-site.[163] Once the TIF bonds are repaid, these additional property tax revenues will go directly into city coffers.

Incorporating Environmentally-Friendly Features into Redevelopment Projects

Not only did Atlantic Station reduce sprawl by accommodating compact development on an underdeveloped site, but its design included environmentally-friendly features aimed at improving energy-efficiency and local water quality:

- Construction waste was recycled when possible.
- Some material from demolished buildings was reused on-site.
- Several buildings within the development are LEED-certified.
- An energy-efficient central cooling system was constructed on-site, serving most of the development's commercial buildings.
- There are charging stations for electric cars in certain areas.
- Some of the stormwater runoff captured on-site is used for irrigation.

Source:

Pouncey, Gerald L. "Reurbanization: A Case Study of the Atlantic Steel Redevelopment." *Natural Resources & Environment* Spring 2001: 248-51.

Sarni, William. *Greening Brownfields: Remediation through Sustainable Development*. New York: McGraw-Hill, 2010.

Local Context

The Houston-Galveston Area Council's (H-GAC) Livable Centers program promotes the creation of mixed-use communities that provide multimodal transportation options, improve environmental quality, and promote economic development. With the help of sponsors, planning studies are created for areas targeted for redevelopment. These studies apply the goals of the Livable Centers program to a specific neighborhood. Many of these plans have been in previously-developed areas that could accommodate higher-density, mixed-use redevelopment.

Lessons Learned: Encouraging Redevelopment within Existing Communities

- Localities nationwide have used a variety of financial and regulatory incentives to promote compact, mixed-use redevelopment projects
- The review of state laws that govern the use of economic development incentives will help decisionmakers understand which incentives should be expanded to better promote livable, compact cities

Promoting Tourism

Tourism is a major industry in Texas, and in the United States as a whole. Each year, tourists pump billions of dollars into the state economy, creating hundreds of thousands of jobs. In 2011, 208 million domestic travelers visited the state of Texas, more than any other state except California and Florida; these tourists spent $63.2 billion, supporting 545,000 jobs.[164] In the Houston-Baytown-Suger Land Metropolitan Statistical Area (MSA), tourists spent nearly $15.6 billion.[165] By promoting its cultural and environmental assets, the Houston-Galveston region could increase the number of tourists that visit the region, boosting the region's economy while promoting environmental stewardship and historic preservation.

National Recreational Areas

A National Recreational Area (NRA) is an area designated by the U.S. Congress to protect a nationally-significant outdoor recreational feature. The 18 existing NRAs range in size, purpose, and administrative structure. Most NRAs are managed by the National Park Service, but some are administered by the U.S. Forest Service or Bureau of Land Management. This designation aims to promote interjurisdictional coordination of conservation and land management efforts, helping galvanize partnerships among state and local governments, NPOs, and private land owners.[166]

Coastal sections of the Houston-Galveston region have the potential to receive federal designation as a National Recreational Area (NRA). The Upper Texas Coast contains a multitude of recreational activities that are not effectively marketed to outdoor recreational enthusiasts. If created, the Upper Texas Coast Lone Star NRA would be built around a core of existing sites that could provide water-focused national recreation opportunities, as well as historical and cultural recreational experiences.[167] The NRA proposed for the Upper Texas Coast would play an important role in providing coastal protection and furthering coastal resiliency. The Upper Texas Coast Lone Star NRA would preserve the coast's natural landscape from sea level to 15 feet elevation, providing a critical long-term, non-structural flood mitigation system.

In addition to coastal protection, the recreational aspect of the NRA designation would provide an economic benefit to the entire region. To understand these economic benefits, the National Park Service performed a preliminary analysis to understand the potential economic impact of the NRA in a four-county area. The analysis predicts that by its tenth year, the NRA could attract roughly 1.5 million annual visitors, $192 million local sales, $69.4 million in personal

income, and 5,200 jobs. The National Park Service highlights three factors that will attract visitors to the area:

- The national and international drawing power of the National Park Service;
- The development of new or expanded recreational sites, visitor facilities, services, and programs; and
- Regional coordination that would connect scattered sites into a more cohesive offering for visitors.

Recognizing these benefits, organizations nationwide are promoting the creation of the Upper Texas Coast Lone Star NRA. [168]

Birdwatching & Ecotourism in the Houston-Galveston Area

Birdwatching attracts thousands of tourists to the Houston-Galveston area each year. Birdwatching is the fast-growing sector of ecotourism, with communities nationwide working to attract birders to their area. A 2006 survey found that the average birder tends to have a higher income and education level than most Americans, and are willing to spend a significant amount of money to see desirable birds in their natural habitat.

The Houston-Galveston area has several world-renowned birdwatching sites along the Great Texas Coastal Birding Trail. The region's diverse ecosystems attract numerous migrating songbirds, shorebirds, and waterfowl; the species present vary from season to season. Promoting birdwatching regionally can spark economic development and encourage conservation. Some communities are already attracting birders with festivals and other bird-centric events. To help this industry grow, particularly in rural locations, communities must ensure there are adequate accommodations and facilities (including restaurants) for birders. Travel between sites should be easy for those unfamiliar to the area.

Source:

George, Holly, and Ellen L. Rilla. "Chapter 1: Consider the Possibilities." *Agritourism and Nature Tourism in California*. Davis, CA: University of California, Division of Agriculture and Natural Resources, 2011. 2-14.

White, Mel, and Paul E. Lehman. *National Geographic Guide to Birding Hot Spots of the United States*. Washington, D.C.: National Geographic, 2006. 116 – 118.

Golden Gate Recreation Center & Gulf Island National Seashore
San Francisco, California & Bon Secour, Alabama
National Recreation Areas as a Tourist Destination

NRAs have proven successful elsewhere in the U.S., coupling land and water conservation with economic development. San Francisco's Golden Gate National Recreational Area is one of the most visited units of the national park system, with roughly 13 million visitors per year. Despite being surrounded by a population of roughly 7.4 million people, the Golden Gate National Recreational Area is one of the largest urban parks in the world, containing a collection of areas that stretch from northern San Mateo County to southern Marin County, and into San Francisco proper.

The Gulf Island National Seashore is another example of a successful National Recreational Area. Gulf Island National Seashore includes barrier islands along the Gulf of Mexico in Florida and Mississippi. The population surrounding the Gulf Island National Seashore is roughly 800,000; however, approximately two million visitors are attracted to the NRA each year. Like the areas proposed for inclusion within the Texas Coast Lone Star NRA, the barrier islands within the Gulf Island National Seashore help protect the Gulf Coast region from hurricanes.

Lessons Learned: National Recreational Areas

- Localities can use existing state and federal programs to promote tourism, while protecting the area's unique cultural and environmental assets.
- Regional cooperation can enhance local tourism opportunities.

Promoting Local Agriculture

An underdeveloped opportunity for the region, especially for coastal counties, is the marketing of locally-produced agricultural and seafood products. Promoting coastal communities' food resources can provide new economic development opportunities, while encouraging the protection of fragile ecosystems that produce bountiful harvests. This expansion of local food systems would allow residents to purchase more of their food from local sources, which would both directly and positively impact the local economy.[169]

Increasing demand for local foods, evidenced by the growing prevalence of farmers' markets, has proven that local, economically-viable food systems are easily incorporated into urban and suburban areas. In 2005, it was estimated that each dollar spent at farmers' markets in Iowa generated 58 cents in indirect and induced sales, and each dollar of personal income earned at a farmers' market generated an additional 47 cents in indirect and induced incomes. These estimates are based upon the *Input-Output* model and the *Multiplier Effect* for jobs. The *Input-Output* model is based upon thorough accounting of regional industries, taking into consideration the amounts and types of inputs industrial operations purchase from local suppliers and imported sources. These inputs and outputs are the basis for the *Multiplier* effect, which accounts for the impact that changing production has on the region. For example, if production in sector A increases, production in sector B and sector C (suppliers to sector A) will also rise.[170] Therefore, integrated local food systems will see collective benefits from the demand for local food. In general, the growth in local food production will link regional transects and increase the accessibility of fresh food, which plays a large role in the health of the region.

Buying locally-grown foods produces social, environmental, and health benefits for the entire region. Restoring regional food systems reconnects consumers with their food; they are better able to interact with the farmer, and they can identify the landscape from which the food came. Reducing the distance food must be shipped results in lower energy consumption and greenhouse gas emissions. Since the amount of time between harvesting and consumption is minimized, foods do not have to be sprayed with preservatives to prevent spoilage. Interest in healthy diets and sustainability have spawned interest in locally-grown foods in metropolitan areas nationwide.

What is Local Food?

There is no concrete definition of "local food." Organizations and agencies define local food differently; a national standard has not been established. The 2008 Food Conservation and Energy Act states that, to be considered locally-grown, food must be produced within 400 miles of the point-of-sale or sold within the state of origin. Others say that locally-grown food should be sold in a more limited area, with some "locavores" promoting a 100-mile diet. Despite these variations, proponents of local food believe that food should be grown as close to the place of consumption as possible, and its marketing should reflect regional climatic and cultural differences.

Wholesome Wave & Grasshoppers Distribution
Louisville, Kentucky
Supporting Local Farmers by Increasing Access to Fresh Foods

Wholesome Wave, a national 501(c)3 organization dedicated to supporting small and midsize farms, has partnered with the Commonwealth of Kentucky and local investors to bring local, fresh food to high-need public school students through a Louisville-based "food hub."[171] The partnership allows Grasshoppers Distribution to expand its service to schools, while supporting of local farmers and businesses.

Grasshoppers Distribution, based in Louisville, Kentucky, is committed to building a vibrant local food economy that serves the entire community, while ensuring the survival of family farms and promoting good stewardship of the land. By creating a model for food systems development, Grasshoppers Distribution offers consumers a year-round, online grocery service that provides a wide variety of locally-grown foods. The company offers fresh produce, meats, baked goods, and other products from over 60 Kentucky and Southern Indiana family farms and businesses.

Grasshoppers Distribution also focuses on increasing access to, and the affordability of, healthy, local foods. The organization serves low-income families through local schools and churches. In addition to its individual customers, Grasshoppers Distributions serves roughly 17,000 public school students, 90% of which qualify for free and reduced-price lunch. To make the project possible, Wholesome Wave's initial $50,000 investment was combined with $350,000 in funding from the Kentucky Agricultural Development Board, the Kentucky Agricultural Finance Corporation, and a private investor. This joint financing supports small Kentucky farms (including former tobacco farms), increases access to healthy foods, and promotes healthy eating habits among the city's youth.[172]

Other "food hubs" have opened nationwide, following a model similar to that used by Wholesome Wave and Grasshoppers Distribution. The Local Food Hub in Charlottesville, Virginia and GrowFood Carolina in Charleston, South Carolina are successful programs in small- and mid-sized cities.

Hands-On Experience

Victoria Foster: Healthy Food Commerce Investments (HFCI) Representative
Wholesome Wave

Wholesome Wave aims to improve access to affordable, locally-grown food in underserved communities, while supporting local farmers. Based in Bridgeport, Connecticut, Wholesome Wave realizes its mission through partnerships with farm-to-retail venues, community leaders, healthcare providers, like-minded nonprofits, and government entities. The organization has three main programs:

- The *Double Value Coupon Program* doubles the value of federal Supplemental Nutrition Assistance Program (SNAP) dollars by providing consumers with a match when they shop at farmers markets, farm stands, and mobile markets or participate in CSA programs.
- The *Fruit and Vegetable Prescription Program* ™ works with community health centers and community food providers to highlight the connection between eating fresh fruits and vegetables and improved health. Education is targeted specifically at vulnerable community members that do not regularly eat fresh, healthful food.
- The *Healthy Food Commerce Investments* (HFCI) program, the newest addition to Wholesome Wave, focuses on strengthening regional agriculture by consolidating investments dedicated towards the development of regional food infrastructure. The program focuses on providing early-stage capital and business development assistance to food hubs, which distribute and process locally-grown foods. Usually, HFCI's role is performing the initial due diligence for these organizations to get them connected to investors and ultimately seed capital. In some situations, HFCI has distributed funding directly to partnering organizations, including Grasshoppers Distribution. Grasshoppers Distribution needed funding to launch its food hub, but did not garner interest from investors; Wholesome Wave filled this funding void by providing Grasshopper Distribution with crucial early-stage investment money.

Since its inception in 2008, Wholesome Wave has had many opportunities to support farm-to-school business initiatives and connect them with investors. Victoria Foster, Wholesome Wave's HFCI representative, indicates a growing number of enterprises are interested in improving access to affordable, fresh food through farm-to-schools programs. Besides funding challenges, Foster notes that these businesses face other obstacles when launching farm-to-school initiatives:

- Many schools have contracts with food service contractors, who buy specifically from regional or national food providers; these schools have less control on what portion of the food provided is local. In some cases, businesses working with national food providers find it difficult to convince them to buy locally.
- Fresh fruit and vegetables require "light processing," and not all kitchen staff working in public schools know how to prepare fresh foods. For instance, kitchen employees are not necessarily trained to prepare (wash, peel, cut) vegetables, such as butternut squash.

These obstacles should be considered when creating successful farm-to-school initiatives.

Loudoun County, Virginia: Rural Economic Development Division
Leesburg, Virginia
Local Government Promoting the Development of Rural Industries

Loudoun County, Virginia is a rapidly-developing community located twenty-five miles west of Washington, D.C. Although Loudoun County is becoming a major technology hub and bedroom community, agriculture has traditionally been an important part of the local economy. To promote farming and retain the county's rural character, the Loudoun County Department of Economic Development created the Rural Economic Development Division. The county's first Agricultural Development Officer was hired in the mid-1980s.[173] Since then, the Rural Economic Development Division has worked to make agriculture economically-viable throughout Loudoun County.

Table 2: Major Duties of Loudoun County's Agricultural Development Officer

Oversee Program Development for Loudoun County's Agricultural Industry	Plan and implement agricultural development programs
	Research and analyze the strengthens and weaknesses of the county's agriculture industry
	Manage a database of the county's farms and agricultural production
Promote Local Agriculture	Develop a marketing plan
	Create and distribute promotional materials
	Coordinate activities between public agencies and private interest groups
	Plan public events that highlight the county's agriculture industry
Serve as a Staff Liaison between Public and Private Groups	Serve as a liaison between the county's Agricultural Advisory Committee, the Loudoun County Board of Supervisors, the Virginia Department of Forestry, the Loudoun Soil and Water Conservation District, the Virginia Cooperative Extension, and other farming-related organizations
Oversee the Implementation of Loudoun County's Agricultural Policies	Manage the Rural Economic Development Division
	Encourage agribusiness operations to move their operations to Loudoun County
	Encourage the expansion of existing agribusiness operations within Loudoun County

The Agricultural Development Officer (ADO) helps farmers:

- Develop sound business plans;
- Navigate local regulations; and

- Market their products locally.

Most of these services are provided free-of-charge to the county's farmers. To promote agritourism, the agency plans several farm and winery tours throughout the year. The ADO serves as a liaison between the Board of Supervisors (the county's governing body), the appointed Rural Economic Development Council (REDC); the Virginia Department of Forestry; the Loudoun Soil and Water Conservation District; the Virginia Cooperative Extension; and other farming-related organizations.

Over the past few decades, there has been a shift in agriculture throughout Loudoun County. To make agricultural operations more profitable, the ADO has encouraged farmers to produce value-added products, which can be purchased directly by the consumer. Instead of growing wheat, corn, and hay, the county's traditional staples, farms are producing higher-value goods, such as wine and organic produce. Wineries are sprouting up across the county, attracting thousands of visitors from the nearby Washington, D.C. suburbs; one winery reported 20,000 visitors in one year. Several pick-your-own operations have opened, catering to those interested in visiting working farms. Thoroughbred horse farms, Christmas tree farms, and sod farms are becoming increasingly common in the countryside. Even polo fields have been constructed as money-making endeavors.[174]

Today, agriculture remains one of Loudoun County's largest industries. The county's Rural Economic Development Division has helped farmers adapt to changing economic, social, and political conditions within the county. Innovative farmers have been able to build profitable businesses on the end of the sprawling Washington, D.C. metropolitan area. By helping farmers find economically-viable ways to use their properties, the agency is successfully preserving Loudoun County's centuries-old agricultural traditions.

Agriculture in Suburbia: Farmers Co-Existing with Suburban Newcomers

Jim Mitchell is a seventh-generation farmer. Mitchell's Woodside Farm has been in his family since 1796. Over the past few decades, suburban-style development has surrounded most of the farm, which is located in suburban Hockessin, Delaware. Today, the farm covers 75 acres and is bisected by two major roads. Mitchell uses environmentally-friendly practices to protect the productivity of his pastures and the cows themselves.

Surrounding suburban development prevented Mitchell from expanding his herd. To increase the farm's income, Mitchell decided to build an on-site creamery in 1998. Woodside Farm Creamery is dedicated to ice cream production. Twenty percent of the milk produced on the farm goes to the creamery, which produces thousands of gallons of ice cream each year; by 2004, the facility was making 25,000 gallons of ice cream annually. Most of the ice cream is sold on-site, at the farm's seasonally-operated on-site store. About ¼ of the ice cream produced is sold wholesale, to restaurants and other ice cream shops. The ice cream sells for $9 per gallon wholesale, and up to $21 per gallon in the farm's store. The store is very popular among nearby residents, who enjoy visiting the farm. To deal with the large summer crowds, Mitchell hires up to 25 seasonal employees. Mitchell credits the ice cream business with making Woodside Farm a profitable endeavor.

Source:
Benton, Valerie, ed. *The New American Farmer: Profiles of Agricultural Innovation*. 2nd ed. Beltsville, MD: Sustainable Agriculture Network, 2005.

Lessons Learned: Promoting Local Agriculture

- Promoting local agriculture can promote economic development and farmland preservation.
- Local farmers can partner with large institutions, such as schools and hospitals, to build a sustainable business model, while improving access to healthy foods.
- Innovative agricultural operations can take advantage of changing demographics and proximity to major population centers to create thriving businesses.

Rural Entrepreneurship

Rural communities can use their existing strengthens to create unique economic development opportunities. Rural farmlands, natural landscapes, and small towns can support innovative agricultural operations, tourism-related businesses, or other unique business opportunities. Communities nationwide have helped residents establish new business that create new jobs, but help protect the area's rural character.

Appalachian Regional Commission (ARC): Entrepreneurial Initiative
Eastern United States
Providing Funding & Training Opportunities for Rural Entrepreneurs

In 1997, the Appalachian Regional Commission (ARC) began a multi-year program to invest in projects that provided new economic development opportunities or supported existing healthy industries. Through its *Entrepreneurial Initiative*, ARC provided equity capital funds that spawned a developmental venture capital industry in the region. Over a ten-year period, ARC invested $43 million in various entrepreneurial development projects, creating new jobs and businesses that support further regional partnerships and collaboration.[175] Ultimately, the Entrepreneurial Initiative has impacted the region by creating more well-informed, skilled entrepreneurs and building stronger job-creating businesses. The specific tools used by ARC included:

- Targeting technical assistance to entrepreneurs;
- Seeding local equity funds;
- Funding local incubators; and
- Providing summer youth entrepreneurship programs.

ARC investments have sparked a cultural change throughout the Appalachian region, with local decisionmakers recognizing the importance of entrepreneurship as an economic development strategy.[176]

Supporting Local Breweries Statewide
North Carolina
Making Legislative Changes to Promote Innovative Industries

Cities across the nation are encouraging the growth and development of macro- and microbreweries. There are currently 350 breweries in the U.S., which is an all-time high. Cities nationwide have launched large campaigning efforts to attract breweries. Mesa, Arizona was able to attract its first local brewery as a result of a concerted effort to revitalize its downtown. Like other communities, the City of Mesa believed a microbrewery would attract both visitors and residents to the city, spurring further economic development.

Some cities and states have changed their regulations to attract breweries and provide these cities with the operating autonomy they require. In Asheville, North Carolina, changes in state legislation are partially credited with attracting Sierra Nevada (a major brewing company) to the city. The "Pop the Cap" campaign resulted in the 2005 legislation that raised the allowable amount of alcohol by volume in malt beverages from 6% to 15%; this allowed many more varieties of beer to be sold and brewed statewide. In 2009, a law was passed authorizing the North Carolina Alcoholic Beverage Control Commission

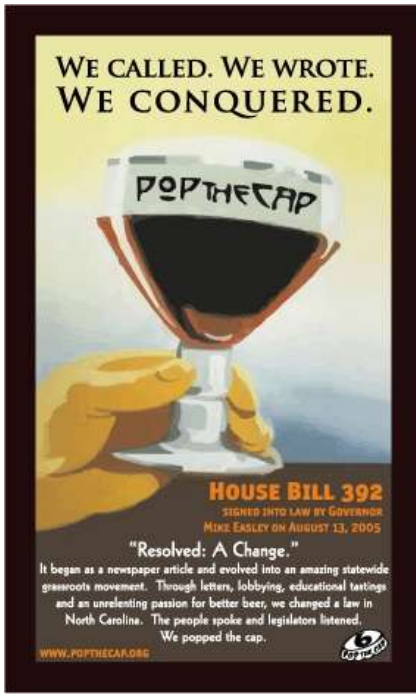

Figure 13: "Pop the Cap" Poster
Poster celebrating North Carolina's passing of the 2005 "Pop the Cap" legislation.
Source: popthecap.org

to issue malt beverage special event permits and malt beverage tasting permits in a similar manner as wine. This legislation also allowed North Carolina breweries to sell their brews on-site and gain self-distribution rights by entering franchise agreements.

These legislative changes also created additional funding streams that North Carolina's cities can use to attract new breweries. The North Carolina Department of Commerce's One North Carolina Fund provides financial assistance to localities promoting the recruitment, expansion, or retention of breweries (matching local funding is required). Sierra Nevada received over $1 million from this fund during Asheville's courting efforts. Cities can easily justify these economic development investments, as breweries provide a strong vehicle for placemaking and local identity.[177] Ultimately, the changes made to state legislation played a significant role in the growth of the brewing industry and local economic development efforts.

Lessons Learned: Rural Entrepreneurship

- Innovative funding and training programs can help businesses create new jobs and successful operations, while improving the skills of the local workforce.
- State and local legislation can be used to encourage the location and expansion of targeted industries.

Workforce Development

A highly-skilled workforce can be a region's greatest asset, attracting a diversity of businesses to the area and improving overall quality-of-life. Teaching residents the skills necessary to succeed in emerging economic sectors can help the region maintain its position as one of the most prosperous areas in the country. While some workforce development programs are already available, more could be done to teach disadvantaged populations the skills necessary to become economically independent. Of the 6,253 people that responded to the *Think 2040* survey, 21.6% stated that vocational training should be the region's top educational priority; respondents in rural communities believed that such training programs were an even greater priority than the region as a whole.

Local Context

Some community colleges in the region offer industry-specific training programs that can help lead to immediate employment upon degree completion, such as:

- San Jacinto Community College's Maritime Industry Program;
- Houston Community College's workforce program, which includes training in specific areas, such as accounting, business administration, drafting, emergency medical services, marketing, sales, and service; and
- Lone Star College's Career and Technical Education program, which provides training targeted toward several sectors, including architecture, energy and manufacturing, finance, health science, information technology (IT), law and public safety, and transportation.

Source: Existing Conditions Report

King County, Washington: Workforce Development Initiatives
King County, Washington (Seattle area)
Working with Local Community Colleges to Provide Workforce Development Opportunities

King County, Washington has implemented several workforce development initiatives aimed at improving the economic well-being of local residents. These programs focus on:

- Returning ex-criminals to work;
- Training disadvantaged youth; and
- Educating underserved minorities on entrepreneurial opportunities.

The *King County Jobs Initiative* helps those who have been incarcerated move beyond the stigma of jail time into living-wage "green jobs" related to environmental cleanup. The program received the 2011 Governor's Workforce and Economic Development Best Practices Award and was lauded as a successful example of a workforce development strategy that supports "green jobs." Initially, the program served low-income residents in South King County, helping them become certified workers in toxic and hazardous clean-up work. With funding from the Environmental Job Training Grant (from the U.S. E.P.A.), the workforce program development has placed over 1,200 low-income residents in full-time work since 1998. In 2007, the program began focusing exclusively on those with criminal records, as that population has limited job opportunities. To improve the program's effectiveness, the King County Jobs Initiative has developed relationships with Work Release, the Department of Corrections, and the King County Community Center for Alternative Programs. Overall, King County Jobs Initiative has been successful in overcoming employer hesitation to hiring workers with criminal records. This success can be attributed to the program's ability to provide valuable job training and build close relationships with willing employers.[178]

King County's *SODO: Seeking Opportunities Developing Occupations* program was designated a "Program to Watch" by the Governor's Best Practices in Workforce and Economic Development initiative. SODO works to recruit and train disadvantaged youth (ages 18 to 24) for manufacturing and apprenticeship opportunities, and place them with local companies. As

part of the program, students take a four-week introductory course at South Seattle Community College; this course prepares them for "green jobs" in industrial sectors, teaching them work readiness and math skills. Students are paid for the training and receive professional treatment. The Manufacturing Industrial Council uses its industry relationships to place student interns with companies who partner with the program. The county assumes liability for students while they are enrolled in the program. Wage subsidies come from a mix of federal funding streams. Roughly 30 employers have participated in placing interns. Since 2009, 108 youth have been placed in internships, with 67 of them completing the program.[179]

StartZone helps disadvantaged residents from south King County start and grow businesses with no-cost training, technical assistance, and other business support. Since its launch in 2008, StartZone has helped clients open 32 new businesses, create 71 new jobs, and access nearly $234,000 in business startup and financing expansion funds. StartZone combines basic business training, intensive one-on-one business consulting, and other support programs to help low-income entrepreneurs access the resources needed to become successful business owners.[180] StartZone's location on a community college campus provides access to additional resources, such as the Highline Small Business Development Center.

Lessons Learned: Workforce Development

- Workforce training programs can help vulnerable populations achieve economic independence
- Workforce training programs can take advantage of existing resources, such as local community colleges, to provide services to the surrounding community
- Workforce training programs can be tailored to meet the needs of local businesses and growing industries, to help build a diversified economy and a well-trained workforce

RESILIENCY

Vulnerability has been described as the interplay between natural geophysical forces and human decisions. Vulnerability occurs when humans decide to place themselves in harm's way. Human decisions continue to play a large role in furthering coastal vulnerability. To date, most planning and development along the coast has continued with "limited understanding of the long-term (or even short term) risks and dangers of living in coastal environment."[181] The occupation of flood risk zones with critical infrastructure reflects the mentality that we, as a modern society, can build anywhere on the coast. Population growth, coupled with historic development patterns, has placed the built environment in areas of high flood risk. Existing infrastructure is increasingly vulnerable to a changing climate, which is predicted to bring increased rainfall and severe storm events. While population continues to increase along the coast, there are specific mitigation measures that can be used to improve the region's *resiliency*, allowing communities to quickly recover after natural events.

Best Practices Related to *Resiliency*

- Louisiana Comprehensive Plan for a Sustainable Coast (Louisiana)
- *Manatee County, Florida: Non-Structural Mitigation Techniques* (Manatee County, FL)

REGIONAL CHALLENGES

The region's location along the Gulf of Mexico provides many valuable advantages, but presents significant challenges as well. Hurricanes, flooding, drought, wildfire, and extreme heat all threaten the region.

- *Hurricanes* cause major disruptions throughout the region, with high winds and flooding threatening life and property.
- *Flooding* threatens many existing communities, with nearly 35 percent of the region's population living within a 100-year floodplain.[182]
- *Drought* hurts local agriculture and significantly impacts drinking water supplies.
- *Wildfire* can damage development on the rural-urban interface, where forests and prairies intermix with suburban communities.
- *Extreme heat* affects vulnerable populations, especially low-income residents and the elderly.

To ensure the region's long-term vitality, steps should be taken to reduce the potential impact these disasters may have on existing residents and newcomers.

BEST PRACTICES

Communities nationwide have developed tools to protect existing residents from natural hazards, while discouraging (or prohibiting) new development in vulnerable areas.

Louisiana Comprehensive Plan for a Sustainable Coast
Louisiana
Developing a Statewide Plan for Improving Coastal Resiliency

As severe storms have hit the Gulf Coast, there has been a long standing debate on how best to restore Louisiana's coastal wetlands. After Hurricane Katrina and Hurricane Rita hit the state in 2005, Louisiana changed its approach to shoreline restoration and the protection of coastal populations. The Coastal Protection and Restoration Authority (CPRA), established under Act 8 of the 2005 First Extraordinary Session of the Louisiana Legislature, was responsible for coordinating the efforts of local, state and federal agencies to accomplish coastal restoration and flood control.[183] The *Louisiana Comprehensive Master Plan for a Sustainable Coast* acts as the vehicle for coordination among these agencies. The Master Plan includes recommendations for comprehensive hurricane protection and coastal restoration measures, which are based upon best practices.[184] A prominent goal of the Master Plan is integrating flood control and coastal restoration measures to promote sustainable protection of the coast and its inhabitants. To achieve this, the Master Plan balances the use of structural flood protection measures with nonstructural strategies. This balanced approach is necessitated by the fact that structural flood protection solutions, such as levees, are not necessarily compatible with restoring or maintaining healthy wetland ecosystems. For example, poorly-placed levees have isolated tidal wetlands from the rest of the estuary.

The strategy of combining structural mitigation measures and nonstructural and ecological techniques has been coined the "Multiple Lines of Defense Strategy" (MLODS) by the Lake Pontchartrain Basin Foundation.[185] The Master Plan acknowledges that Louisiana's coastal zones are too large and too complex to be solved by any one mitigation strategy other than full coastal retreat, which is unrealistic both politically and socially.[186] Therefore, the MLODS aims to reduce hazard risk by deterring human settlements in the most vulnerable areas, while restoring ecosystems that provide protection. Both zoning and comprehensive planning are lauded as important tools to provide protection to human populations along the coast.

Zoning: The Master Plan encourages the use of low- and no-density zoning to minimize development in high-hazard areas, or ensure that new construction is built to withstand storm events. These specific zoning types include:

- Open Space
- Conservation (if protection of natural resources is a priority)
- Preservation (specifically for areas where there should be minimal change)
- Hazard (if detailed mapping of hazard zones is conducted, a zoning scheme for certain hazards can be created)

These zoning categories help conserve resources, protect the environment, and enhance scenic and social utility, while limiting risk to infrastructure and coastal inhabitants.[187] Within the Master Plan, Louisiana parishes are provided with different implementation options. Some parishes have chosen to create specific hazard designation zones, while others amended existing zoning districts to better address the presence of natural hazards, such as flooding.[188] Ultimately, these hazard-based zoning regulations provide landowners and homeowners with additional information and notice regarding potential risk to their property.

Land Use Planning: Comprehensive planning plays an important role in reducing risk and providing greater consistency amongst coastal developments. When hazard risk is ignored in the development process, subsequent mitigation efforts become more difficult and expensive. The Master Plan showcases land use policies that acknowledge natural hazards and better protect life and property; in St. Mary's Parish, setbacks, hazard buffer zones, green zones, open space buffers and other land use management techniques are used to improve coastal resiliency. Ultimately, local comprehensive plans should address hazard mitigation design and planning. Amendments or updates to the comprehensive plan, as well as any subsequent stages to the development process, should consider hazard mitigation planning principles.[189]

Manatee County, Florida: Non-Structural Mitigation Techniques
Manatee County, Florida (Bradenton/Sarasota area)
Using Growth Management Tools & Educational Programs to Reduce Flood Risk

Manatee County is located on the west coast of Florida, south of Tampa and St. Petersburg. The county's coastal location and shallow bathymetry make it particularly vulnerable to flooding, particularly from hurricanes that come from the Gulf of Mexico and Atlantic Ocean. In recent years, the county has experienced significant population growth and development. From 2000 to 2005, 24,000 building permits for new single-family homes and 150 wetland alteration permits were granted. Despite this rapid growth, Manatee County has been able to keep its flood losses relatively low, due to its strong commitment to flood mitigation. Manatee County extensively employs nonstructural flood mitigation techniques to reduce flood risk, including zoning, land preservation, setbacks, and educational programs.[190] Manatee County has continued to establish regulatory standards that exceed the National Flood Insurance Program's (NFIP) minimum requirements; these higher standards place a strong emphasis on protecting floodplain storage capacity through regulations that require new development to provide compensatory floodwater storage.[191]

Flood mitigation and preparedness efforts for Manatee County are established within the county's comprehensive plan. In Florida, comprehensive planning acts as the cornerstone for land use decisions at the local level; "comprehensive planning is where the so-called 'rubber meets the road' when it comes to flood mitigation activities, and unless other plans and programs are folded into this central document, they may not be implemented."[192] Manatee County's careful incorporation of flood mitigation and preparedness int0 its comprehensive plan ensures that these efforts are carried out. The first comprehensive plan in Manatee County was adopted in 1989; as the plan has undergone a series of updates, the current version highlights an avoidance strategy for flood impact reduction, guiding development away from vulnerable, flood-prone areas. The plan aims to limit development within the county's Coastal Planning Area and direct future growth to areas outside of the designated Coastal High Hazard Area. Other policies found within the county's most updated comprehensive plan include:

- Maintaining construction setbacks;
- Minimizing disturbance of natural shorelines; and
- Directing public infrastructure to areas outside of flood prone areas. [193]

These regulatory tools are supplemented by educational programs that encourage development outside of high-hazard areas. Information dissemination, assistance, and public outreach are other key elements of the locality's flood mitigation program.[194] By encouraging community engagement and implementing strong growth management tools, Manatee County has been able to successfully limit the exposure of people and infrastructure to flood risk.

Other Non-Structural Mitigation Measures Used in Florida

Due to the state's extensive shorelines and low elevations, Florida's communities have already had to implement policies aimed at improving their resiliency to coastal flooding and potential sea level rise. Coastal localities may consider adapting these strategies to address local needs and reduce vulnerability to flooding and storms.

Punta Gorda Adaptation Plan

In its adaptation plan (2009), the City of Punta Gorda identifies several measures that can improve resiliency as sea level is expected to rise. One of the primary measures proposed to improve resiliency is *managed retreat*, with gradual disinvestment in areas at high-risk for inundation. The plan suggests that public investment in infrastructure be minimized in these areas, and that the city consider development disincentives to direct construction to other neighborhoods. Other possible strategies include purchasing property or development rights from willing owners, or obtain *rolling easements* along shorelines. These rolling easements would be obtained by the city, and would prevent shoreline hardening; as sea level rises, the easements would move inland accordingly, and homeowners would be prevented from constructing protection features, forcing any structure to be relocated or abandoned. These measures aim to discourage investment in vulnerable areas, provide existing landowners with financial incentives to relocate, and allow natural ecosystems to move inland as sea levels rise.

Sea-Level Rise Impact Assessment: Collier County, Florida

Collier County, Florida requires that all shoreline development proposals submit an analysis demonstrating the impact sea level would have on the proposed project (Collier County Land Development Code: Section 3.03.05). The analysis must prove that the development will remain fully-functional for its intended use after a six-inch rise in sea level. If the analysis shows the development will not remain viable after a rise in sea level, the developer must submit a list of improvements that would be necessary for the project to withstand rising seas. This program requires developers to consider future conditions, lessening the likelihood that government aid will be needed to relocate or repair the project in the future.

Lessons Learned: Resiliency

- A combination of structural and non-structural mitigation measures can effectively reduce the risk of flooding and other natural hazards
- Public education and outreach can play an important role in reducing risk in high-hazard areas

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