

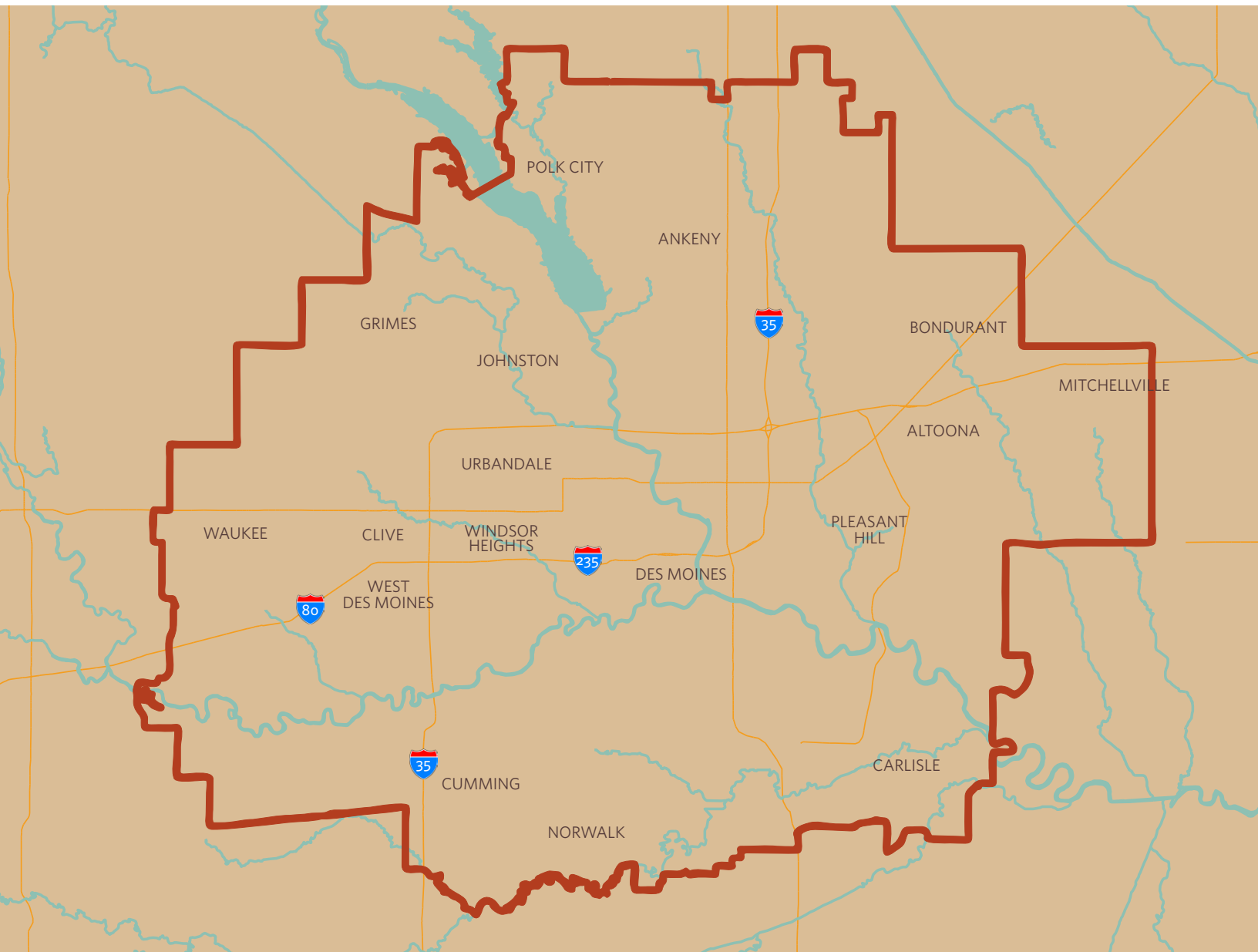
STATE OF THE REGION GREATER DES MOINES



The Tomorrow Plan is a regional planning effort focused on the sustainable development of Greater Des Moines. It involves residents and local leaders in identifying visions and aspirations for the region, exploring potential scenarios for its future, and setting a preferred direction for sustainable future development.

The Tomorrow Plan is supported by a \$2 million grant from the Partnership for Sustainable Communities – a joint effort among the Department of Housing and Urban Development, the Department of Transportation, and the Environmental Protection Agency that seeks to help communities nationwide take an integrated approach to improving livability – and with nearly \$1.1 million from leveraged local funds.

THE TOMORROW PLAN STUDY AREA



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for The Tomorrow Plan (Economy and Population)

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INTRODUCTION

At important junctures in time, there is a need to reflect on current conditions and what they may mean for the future. The *State of the Region* report is a synthesis of material developed over the course of six months of data gathering and analysis, presenting existing conditions in The Tomorrow Plan study area. This report first covers regional development trends in seven major categories, then summarizes and analyzes a suite of sustainability indicators, and finally introduces a number of best practices in sustainable planning and development.

Within the past two years, Greater Des Moines has been named the Best Place for Young Professionals, Best Place to Raise a Family, and among the Best Mid-Sized Cities for Jobs—all indicators that the region is doing well. As discussed in the report, regional highlights include:

- A well-educated workforce—35 percent of adults have a bachelor's or advanced college degree
- Strong employment growth—over the past 20 years annual employment growth has been 1.5 percent, well above the state's average annual rate of 0.9 percent and the national rate of 0.8 percent
- A recreational trail system with over 115 miles of trails

However, a number of regional trends threaten the high quality of life currently enjoyed by residents:

- Cars are the dominant mode of transportation, with 92 percent of person trips made using a personal vehicle
- Centuries of land clearing and development have drastically reduced the region's core natural habitat—90 percent of natural habitat existing in the 1800s is now gone
- Economic activity is concentrated in professional services and financial activities; these industries have accounted for approximately half of all new jobs created over the past 20 years

The challenge for Greater Des Moines is to leverage its many assets while strategically addressing threats to the region's long-term sustainability. The remainder of this report goes into further detail about these assets and threats, as well as the challenges and the opportunities they present. The report also provides some best practices from around the county. While it is not possible to list every best practice, this selection offers a range of possibilities and aspirations for Greater Des Moines.

LAND USE

REGIONAL DEVELOPMENT TRENDS, OPPORTUNITIES & CHALLENGES

Existing land use in Greater Des Moines follows a roughly radial pattern, with denser uses clustered centrally, and less dense uses spreading outwards, particularly to the north, west, and south. The further edges of the study area remain primarily agricultural but are punctuated by several smaller urban centers.

Current land use patterns in the seventeen incorporated municipalities and four counties that make up The Tomorrow Plan study area (see map, p. 7) also reflect the following:

- The Commercial category is broadly defined, including retail, office, and light industrial business park locations. The Industrial category includes manufacturing uses. After Agriculture and Suburban Residential, the Commercial category is the largest category at 8 percent of the total area.
- Transportation and land use are closely tied. For instance, commercial areas along major interstates allow easy access to businesses for both customers and employees.

Opportunities and challenges that arise from the current land use pattern include:

- Maximizing the efficiency of the development pattern, with respect to infrastructure access/cost, contiguity of development, and impact on travel times.
- Ensuring an appropriate range of housing opportunities throughout the project area, especially in proximity to regional employment centers.
- Understanding the impact of the substantial amount of rural residential development in unincorporated areas adjacent to municipalities.
- Providing adequate regional and subregional recreation facilities, and sharing facilities between communities.

The land use pattern just discussed reflects an overall trend of urbanization in Greater Des Moines, as seen around the country. Urbanization over the past 20 years has primarily

Presently, agriculture is the dominant land use in Greater Des Moines,

(46% of land in the study area is used for agriculture)

and approximately one-quarter of the region is urbanized.

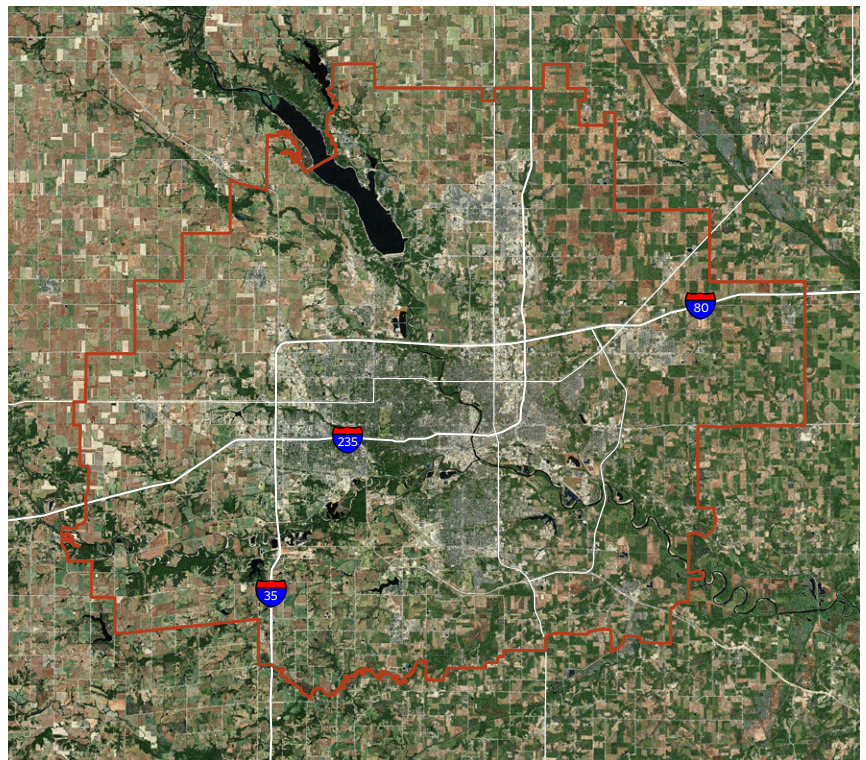
(4% of land is commercial/industrial and 19% is residential)

If current land use trends continue,

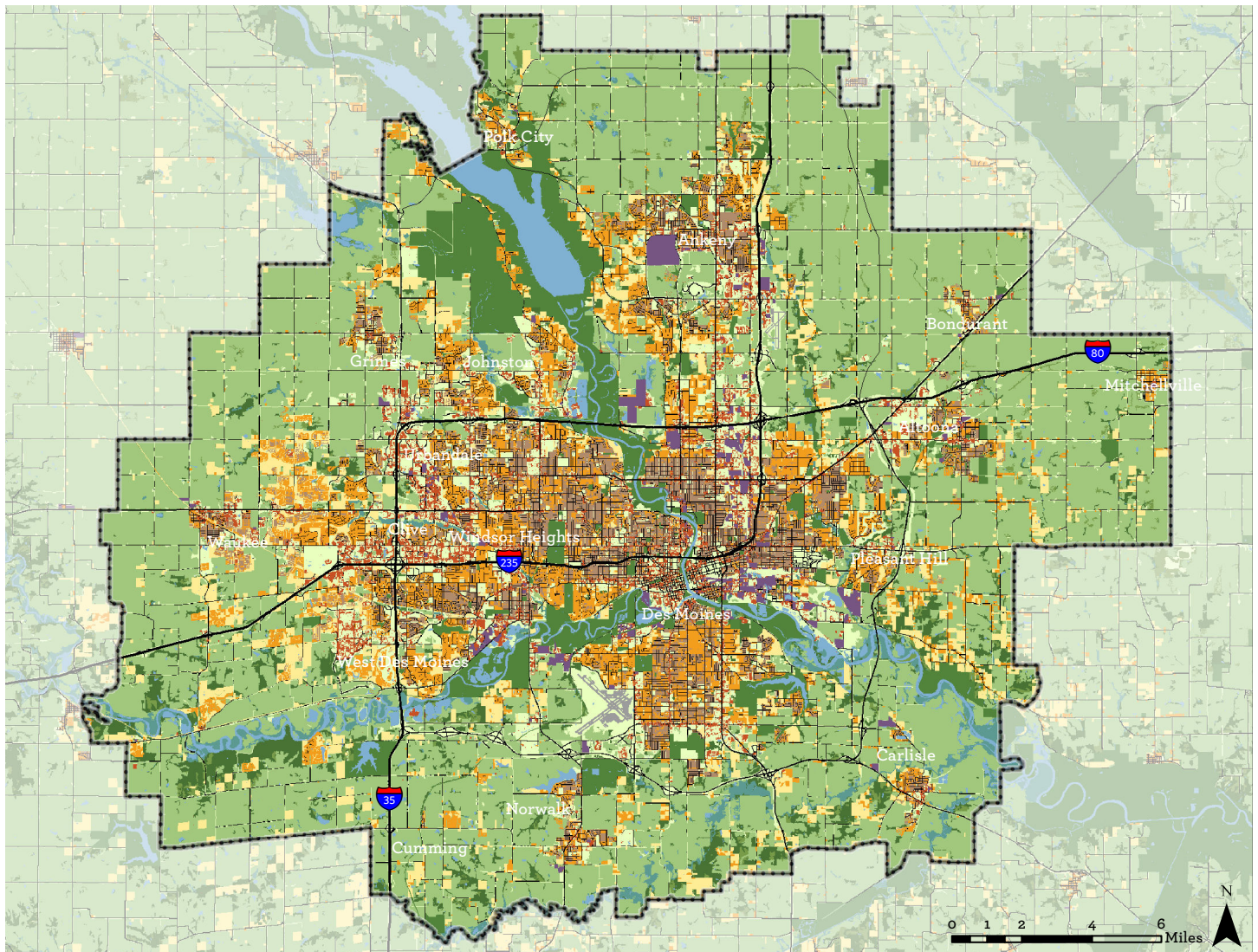
(14,000 acres were urbanized from 2006 to 2011)

about two-thirds of existing agricultural land would be urbanized over the next 40 years.

Aerial image of study area (2011)



Regional land use (2011)



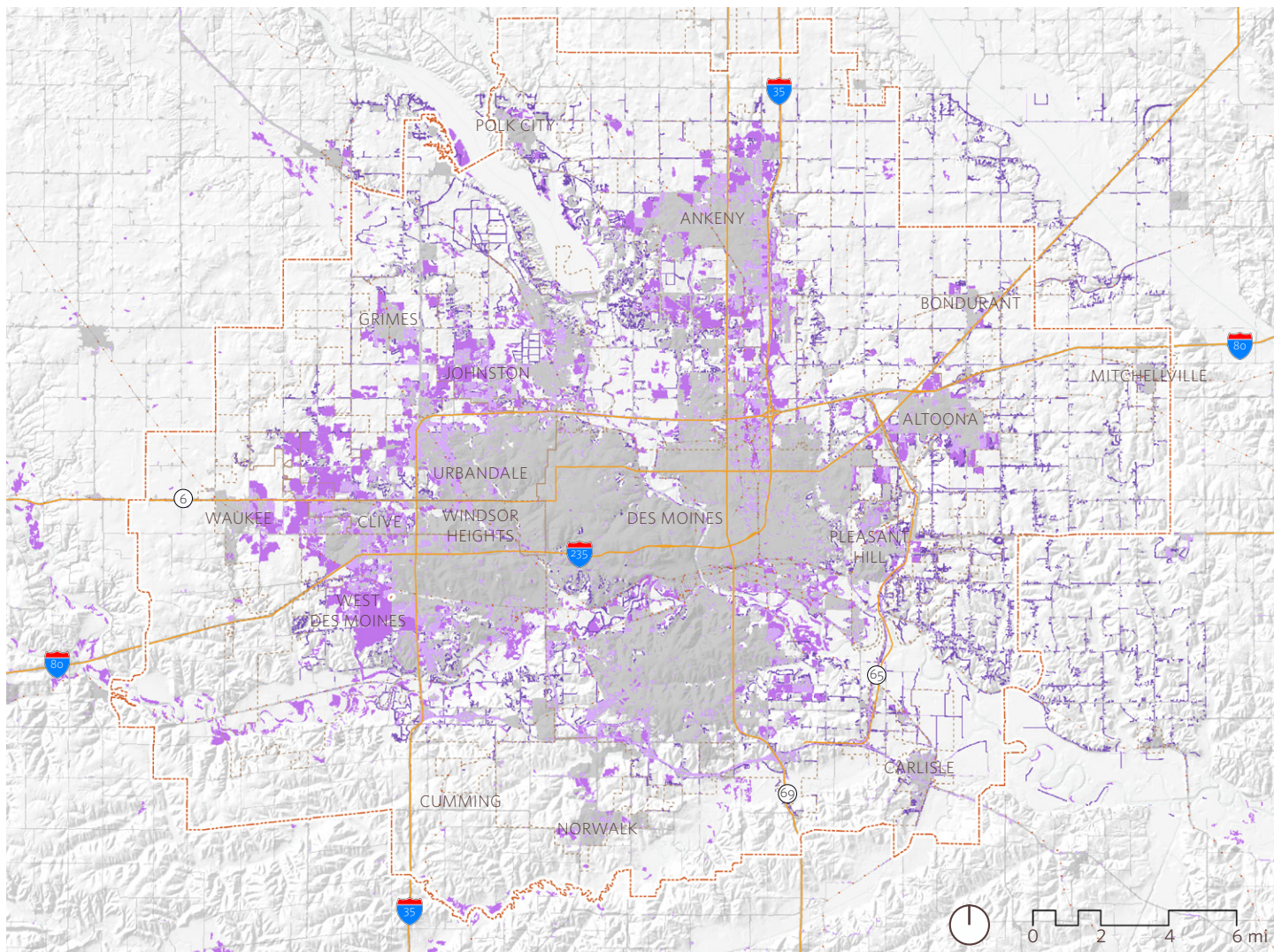
occurred to the west and north of the core urban area. Growth has been particularly strong in Waukee, West Des Moines, Urbandale, Johnston, and Ankeny.

In the five-year period from 2006 and 2011, approximately 14,000 acres were urbanized. This is two-thirds of the area urbanized over the previous five years (2001-2006) and is about equal to the amount of urbanization that occurred in the previous ten-year period (1992-2001). If the 2006-2011 amount of urbanization is repeated, this would result in the urbanization of approximately 112,000 acres by the year 2050, or about two-thirds of the current agricultural land within the study area. Before and after images (see p. 9) illustrate some of the many forms this

	Acres	Percent of study area
Commercial	10,115	3%
Industrial	3,558	1%
Urban residential	16,355	5%
Suburban residential	29,663	8%
Rural residential	22,531	6%
Water	10,346	3%
Barren or Shrub	5,786	2%
Forested	17,671	5%
Agriculture	162,491	46%
Wetland	11,894	3%
Other	62,612	18%
TOTAL		

Source: GeoAdaptive LLC, Sasaki Associates

Regional urbanization (1992-2011)



urbanization can take, as former agricultural land is transformed into a range of residential development.

Continued urbanization brings forward several challenges for the region. At the forefront is competition among jurisdictions to capture growth, which expands the tax base, impacting municipal revenue. Further, with downtown Des Moines office employment and the state government presence, there are efficiencies in accessibility to the metro center with a more evenly distributed development pattern. Any decisions about future growth policies will need to address this inherent tension between growth that is concentrated in just a few municipalities, and growth that is distributed more evenly throughout the metro area.

Source: Analysis performed by GeoAdaptive Inc. based on USGS National and Land Cover 2006 data from LANDSAT satellites and county parcels data

Urbanized prior to 1992	114,453 acres
Urbanized 1992-2001	13,174 acres
Urbanized 2001-2006	21,327 acres
Urbanized since 2006	13,957 acres
Total urbanized area	162,911 acres

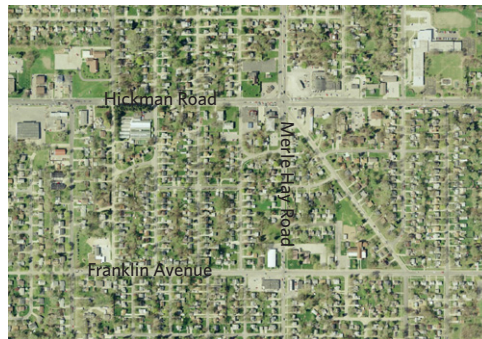
Other potential opportunities presented by ongoing urbanization are guiding growth to minimize needed infrastructure expansion, and identifying large unbuilt areas that could be preserved to provide habitat and recreational space.

Land use change (1938-2009)

1938 - Before



2009 - After



Small Lot Subdivision Des Moines

Traditional Lots - In older neighborhoods within the region, developers built 5-7 homes per acre, creating space for 2,000 or more families per square mile.



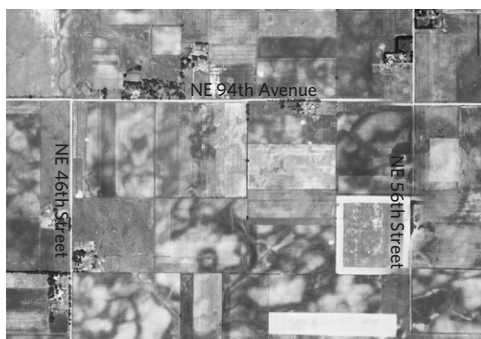
Larger Lot Subdivision West Des Moines

In recent decades, larger lots became the norm, allowing just 2.5-3 families per acre. To house the same number of families as on traditional lots, perhaps twice as much land is needed.



Exurban Development Booneville

To preserve their rural character, some communities require homes to be built on 1-acre lots or larger. Exurban development is considered very troublesome by wildlife biologists, because housing 2,000 families consumes up to seven times the land of a traditional neighborhood.



Rural Land Use Bondurant

The pastures and hay meadows visible in the 1938 air photo are gone by 2009, in a process of land use intensification that affected the entire Midwest. Streams, wildlife, and wetlands have dramatically changed.

TRANSPORTATION

REGIONAL DEVELOPMENT TRENDS, OPPORTUNITIES & CHALLENGES

In the Des Moines Metropolitan Planning Area (MPA), 92 percent of person trips are made using a personal vehicle; simply put, cars are the dominant mode of transportation, and roadway access has been a key to development throughout the region. The rate of vehicle ownership, in turn, is high, with 95 percent of occupied housing units having a vehicle available. As shown in the figure below, commute trips to work are overwhelmingly by private auto. Today, the average vehicle trip within the MPA takes 25 minutes and covers a distance of 15 miles.

How well is the roadway system working? In 2005, 1.3 miles (or 0.1 percent) of MPA's nearly 1,500 miles of streets operated at Level of Service (LOS) E or F. Level of Service is a system of measuring and comparing a roadway's operating conditions based on vehicle volume compared to capacity. This measure addresses the number of vehicles traveling on a road, but not does account for the total number of people traveling on the road.

Without any future improvements to the street system, the travel demand model forecasts that

22 miles (or 1.5 percent) of the road network will operate at LOS E or F by 2035. The transportation mode table below shows the LOS changes from 2005 to 2035. The MPO's travel demand model LOS projections for 2010 can be used as a proxy for current conditions, and is shown in the LOS table (see p. 11). Only two links

Cars are the dominant mode of transportation,
(92% of person trips are made using a personal vehicle; 95% of occupied housing units having a vehicle available)

the roadway system works well...

(1,498.7 of the 1,500 total miles of streets operate at a good or excellent level of service)

...and will continue to in the future,

(1,478 of the 1,500 miles of streets will still operate at a good or excellent level of service in 2035, even without any future improvements)

but transit, pedestrian, and bicycle networks are growing.

Mode of transportation to work & vehicle availability, 2005-2007 ACS 3-year estimates

	Dallas County		Polk County		Warren County		3-County Total	
Total Labor Force (Employed, Age 16+)	32,782 people		221,375 people		24,152 people		278,309 people	
Drive Alone	27,396	83.6	180,449	81.5	19,019	78.7	226,864	81.5
Carpool	3,088	9.4	22,939	10.4	2,691	11.1	28,718	10.3
Transit	63	0.2	3,940	1.8	72	0.3	4,075	1.5
Walked	286	0.9	4,101	1.9	705	2.9	5,092	1.8
Other	331	1.0	2,100	0.9	144	0.6	2,575	0.9
Worked at Home	1,618	4.9	7,846	3.5	1,521	6.3	10,985	3.9
Mean Travel Time to Work	20.8 minutes		18.6 minutes		24.2 minutes		21.2 minutes	
Occupied Housing Units	25,735 units		180,177 units		17,931 units		223,843 units	
Households without a Vehicle	599	2.33	10,088	5.60	601	3.35	11,288	5.04

Source: HY 2035 MTP, p. 2-16

LOS changes from 2005 to 2035 under existing conditions

	2005		2035	
LOS A	1164.9	80.4	746.1	51.5
LOS B	211.0	14.6	371.9	25.7
LOS C	66.7	4.6	238.3	16.4
LOS D	4.9	0.3	70.6	4.9
LOS E	1.0	0.1	16.0	1.1
LOS F	0.3	0.0	5.8	0.4
Total	1448.8 miles		1448.7 miles	

Source: HY 2035 MTP, p. 5-9

show LOS F (66th Street connecting Johnston to the Northwest Des Moines subarea and University Avenue on the Polk and Dallas County border), two streets near University Avenue and a third at the northwest corner of the CBD are projected to be LOS E. All other roads are D or better. A total of 72.1 percent of the roads are projected to operate at LOS A as of 2010, which provides an oversupply of capacity and offers opportunities for growth or reallocation without negatively impacting the transportation network.

While roadways and autos lead the transportation network, the Greater Des Moines region is not a stranger to multimodalism. A robust and growing transit system network, including not just local fixed-route buses but also demand-response service, an active carpool culture, and multiple Transportation Demand Management programs, provides valuable options and growing opportunities for a more balanced future system. In the past few years, a new trend of active transportation has emerged. Pockets of pedestrian infrastructure focused in the developed downtowns, a growing bicycling network, and a highly utilized trail network each have been expanded, with significant commitments for additional improvements over the next decade by communities throughout the region.

With limited vehicular delay and short driving travel times between all points at all times of day, driving will remain the dominant mode for the foreseeable future. Transportation in Greater Des Moines works well, and there is little incentive to change this pattern. The opportunity exists, however, to provide more modal choice before external factors change. Stakeholder input and

increasing travel by alternative modes tells the region most people want to drive, but many want to walk, bike, or ride the bus. Some people want to shift the daily commute modes; some just want their children to be able to bike to school or their elderly relatives to be able to travel to medical appointments without driving. Some want an option in case gasoline prices rise. Supporting robust transit and biking networks can offer these choices, and the existing excess roadway capacity means it can be provided without limiting the driving network. Providing pedestrian networks anywhere retail, office, education, and cultural uses exist could compliment the roadway network, providing transportation options for all.

Downtown Des Moines roadways



INFRASTRUCTURE

REGIONAL DEVELOPMENT TRENDS, OPPORTUNITIES & CHALLENGES

ROADWAYS & BRIDGES

A safe and efficient system of roads and bridges is an important component of the region's economic livelihood, as they allow the transport of goods and people throughout the region and beyond.

As discussed in the Transportation section of this report, Greater Des Moines' roadway system is working well. This provides an opportunity to direct resources towards non-automobile modes of transportation, towards the improvement of other forms of infrastructure, or to roadway projects that incorporate elements benefitting the public realm.

As of 2009, the four counties within The Tomorrow Plan's study area—Dallas, Madison, Polk, and Warren—had approximately 1,200 bridges. Of these, approximately 340 (29 percent) were identified as structurally deficient or functionally obsolete, a proportion consistent with the state as a whole. However, Iowa's bridges are among the worst in the nation, indicating that not only Greater Des Moines, but also the state as a whole, will face the challenge of funding bridge repair or replacement.

SKYWALKS

Des Moines has an extensive skywalk system within its Downtown Core. With over 4 miles of enclosed walkway, it is one of the largest of such systems in the United States. The Des Moines Skywalk System has been criticized for hurting street-level business, though a recent initiative has been made to make street-level Skywalk entrances more visible.

AIRPORT

Des Moines International Airport is a joint civil-military public-use airport located three miles southwest of the central business district of Des Moines. The airport serves the Des Moines metropolitan area with approximately 19

connections to major airline hubs. In 2011, it was reported that DSM is now the 85th busiest airport in the United States by passenger traffic.

This airport is included in the National Plan of Integrated Airport Systems for 2011–2015, which categorized it as a primary commercial service airport. As per Federal Aviation Administration records, the airport had 919,990 passenger boardings (enplanements) in calendar year 2008; 853,596 enplanements in 2009; and 898,840 in 2010.

On November 1, 2011, the City of Des Moines transferred control of the airport from the city to the Des Moines Airport Authority. The city retains ownership of the land but transfers title to all property and equipment to the Authority. In turn, the authority will agree to a 99-year lease on the land.

In January 2012, Southwest Airlines announced that it would be introducing service in Des Moines through the eventual conversion of existing AirTran operations to Southwest. Local officials hope that the new carrier will not only improve passenger service, but will help to reduce rates, providing better mobility for residents and visitors to the region. Expanding passenger air service was among the goals set in the recent Capital Crossroads Strategic Plan.

In addition to commercial operations, the airport is also hosts the 132d Fighter Wing (132 FW) of the Iowa Air National Guard.

DAMS

The failure of northeastern Iowa's Lake Delhi dam in 2010 brought dam safety forward in the public eye. The Iowa Department of Natural Resources (DNR) monitors the construction of new dams and the condition of approximately 3,800 dams around the state. Dams are classified into three categories according to the downstream damages that would occur if the dam were to fail:



Des Moines Metropolitan Wastewater Reclamation Facility. Source: City of Des Moines, dm.gov

- **High Hazard**—Dam failure may create a serious threat of loss of human life.
- **Moderate Hazard**—Dam failure may damage some buildings or moderately traveled roads, or may interrupt utility service, but without substantial risk of loss of human life. Alternatively, Moderate Hazard dams may in themselves have importance to the water supply or recreation.
- **Low Hazard**—Dam failure is unlikely to threaten human life, though may cause the loss of livestock, agricultural land, outbuildings, and the dam itself.

The dam at Fort Des Moines Park is the only high hazard dam within The Tomorrow Plan study area, and is inspected by the DNR on a regular basis. As precipitation patterns change and land use decisions continue to impact the risk of flooding, there may be an opportunity to envision the role of dams in stormwater management.

WASTEWATER

The Des Moines Metropolitan Wastewater Reclamation Authority (WRA) is a regional utility that conveys and treats wastewater for most of The Tomorrow Plan study area. The WRA is made-up of 17 metro area municipalities,

counties and sewer districts that work together to protect public health and to enhance the environment by recycling wastewater and being the preferred treatment facilities for hauled liquid wastes.

The WRA includes a conveyance system and a treatment facility. The conveyance system includes 125 miles of sanitary sewer with pipe sizes up to 144" in diameter, equalization basins and lift stations. Under normal flow conditions, the system directs flows to the Wastewater Reclamation Facility. Under periods of high flows, equalization basins throughout the system are utilized to temporarily store flows which are in excess of what can be treated at the Wastewater Reclamation Facility. Once the flows return to normal, the equalization basins are then drained back into the system and the stored flows are treated.

The treatment facility uses a combination of physical, advanced biological and chemical processes to treat the wastewater as it flows through the plant. These processes produce high quality recycled wastewater discharged to the Des Moines River, treated biosolids that are land applied on farm fields for nutrient value and soil amendment, and biogas utilized for electrical and heat generation.

The wastewater treatment facility received a Governor's Iowa Environmental Excellence Award in 2010 for installing a software system that reduces the facility's energy consumption by over 100,000 kW in just the first six months of operation. This translates to a \$200,000 reduction in energy costs, and demonstrates the impacts of improving infrastructure efficiency.

WASTE

Metro Waste Authority (MWA) is an independent government agency comprised of 16 member communities, one county and six planning members throughout Greater Des Moines. Established in 1969, MWA was designated to manage the landfill for the Polk County area after state law required all Iowa communities to properly dispose of their solid waste in a sanitary landfill.

MWA operates many facilities and programs recognized for excellence at the state and national levels. These facilities include the Metro

Park East Landfill, the Metro Park West Landfill, the Metro Compost Center, the Metro Transfer Station, the Regional Collection Center and the Metro Recycling Centers. The MWA has adopted an Environmental Management System (EMS) to proactively manage its environmental impacts. In the past decade, this has led to reduced greenhouse gas emissions, fewer spills, decreased reliance on fossil-fuel based lubricants, increased office waste recycling, updated safety training programs for employees, and increased employee engagement in developing solutions for environmental protection. Additionally, waste diversion and reduction is an ongoing priority for the MWA and the communities it serves.

Yard waste cannot be put in the garbage since the Legislature banned it from the landfill in 1989. The Compost It! curbside yard waste collection program provides a convenient way for area residents to recycle yard waste. It is cost-effective since only those residents who use it pay for it.

CLIMATE & CLIMATE CHANGE

REGIONAL DEVELOPMENT TRENDS, OPPORTUNITIES & CHALLENGES

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Local climate impacts a number of systems in Greater Des Moines. The obvious is food—precipitation levels and the length of the growing season have a direct impact on agricultural productivity, a major industry in the state. Climate information also plays a role in designing infrastructure and buildings, and in planning for energy production and distribution. More and more often, industry is finding that historic climate data is not an adequate predictor of future trends, as several key climate indicators have changed drastically in Iowa over the past decades.

CLIMATE

Being located near the center of North America, far removed from a large body of water, Greater Des Moines has a warm summer type humid

continental climate, with hot, humid summers and cold, snowy winters. A humid continental climate is a climatic region typified by large seasonal temperature differences, with warm to hot (and often humid) summers and cold (sometimes severely cold) winters. Summer temperatures can often climb into the 90 °F (32 °C) range, occasionally reaching 100 °F (38 °C). Humidity can be high in spring and summer, with frequent afternoon thunderstorms. Fall brings pleasant temperatures and colorful fall foliage. Winters vary from moderately cold to bitterly cold, with low temperatures venturing below 0 °F (-18 °C) quite often. Annual snowfall averages 36.4 inches (92 cm), and annual precipitation averages 34.72 inches (882 mm), with a peak in the warmer months.

CLIMATE CHANGE

Ongoing research of trends and variability in a number of climate factors suggests that changes are underfoot. Researchers at the Iowa State University Climate Science Initiative note the following shifts in statewide climate patterns:

- **Precipitation is increasing**—For the past 100 years, there has been a gradual upward trend in precipitation. Much of this increase has come in the first half of the year, leading to wetter springs and drier autumns.
- **The number of large storms (>1.25 inches) is increasing**—More intense rain events impact runoff.
- **Night-time low temperatures are increasing**—Iowa now has more frost-free days than in the past; winter temperatures have increased more than summer temperatures.
- **The number of days of below-freezing daytime temperatures is dropping**—The downward trend in heating degree days influences demand for heat during cold weather periods.

Beyond precipitation and temperature, climate change may be linked to wind speed, cloud cover, atmospheric carbon dioxide levels, and more. While climate change presents any number of challenges, it also provides the opportunity to adjust agricultural practices, and to develop creative building and development practices that allow for maximum flexibility in an ever-changing environment.

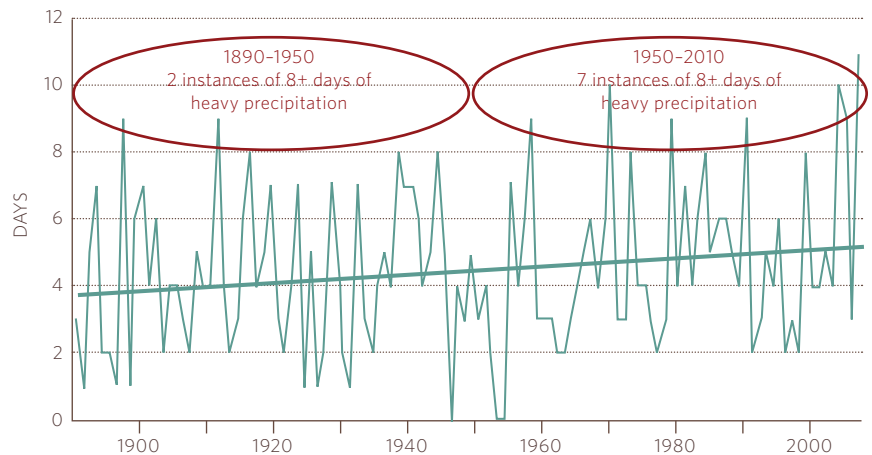
Climate change source: Eugene Takle, Assessment of Potential Impacts of Climate Changes on Iowa Using Current Trends and Future Projections (2009)

ENERGY USE

While the exact link between human behavior and climate change is a topic of much discussion, there is reason to believe that fossil fuel consumption has been a contributor to many of the trends just described. Conversely, climate change can be a driver of energy use. Warmer winter temperatures reduce the amount of energy spent heating homes and businesses, but higher temperatures in summer increase the energy demand for cooling.

Des Moines precipitation

Number of days annually with over 1.25" of precipitation



Source: Eugene Takle, Climate Change in the Heartland (2010). Webcast presentation.

At the state level, Iowa has introduced a number of goals around energy independence and alternative energy ranging from introducing 10 GW of wind energy and increasing both the environmental and economic viability of the biofuels industry. Programs to accomplish these goals include the Green Government Initiative, the Iowa Clean Cities Council, and the State Energy Council.

Locally, several energy use reduction initiatives are underway. The City of Des Moines is just one example of such. The City accomplished a 9 percent reduction in its CO₂ emissions between 2008 and 2010, and plans to reduce emissions by an additional 15 percent by 2015. Select emission reduction projects add up to an annual savings for the City of 6 million Kwh of electricity use, 42,000 gallons of unconsumed fuel, and \$85,000 in spending. These impacts will continue to increase as more programs are implemented and measurement capacity increases. The Des Moines Area Community College (DMACC) has also been targeting a reduction in energy use. A 2010 grant from the Iowa State Energy Program will enable projects expected to reduce DMACC's annual energy use by 16 percent and save the institution \$280,000 a year. Opportunity clearly exists for continued reduction of energy use throughout The Tomorrow Plan study area.

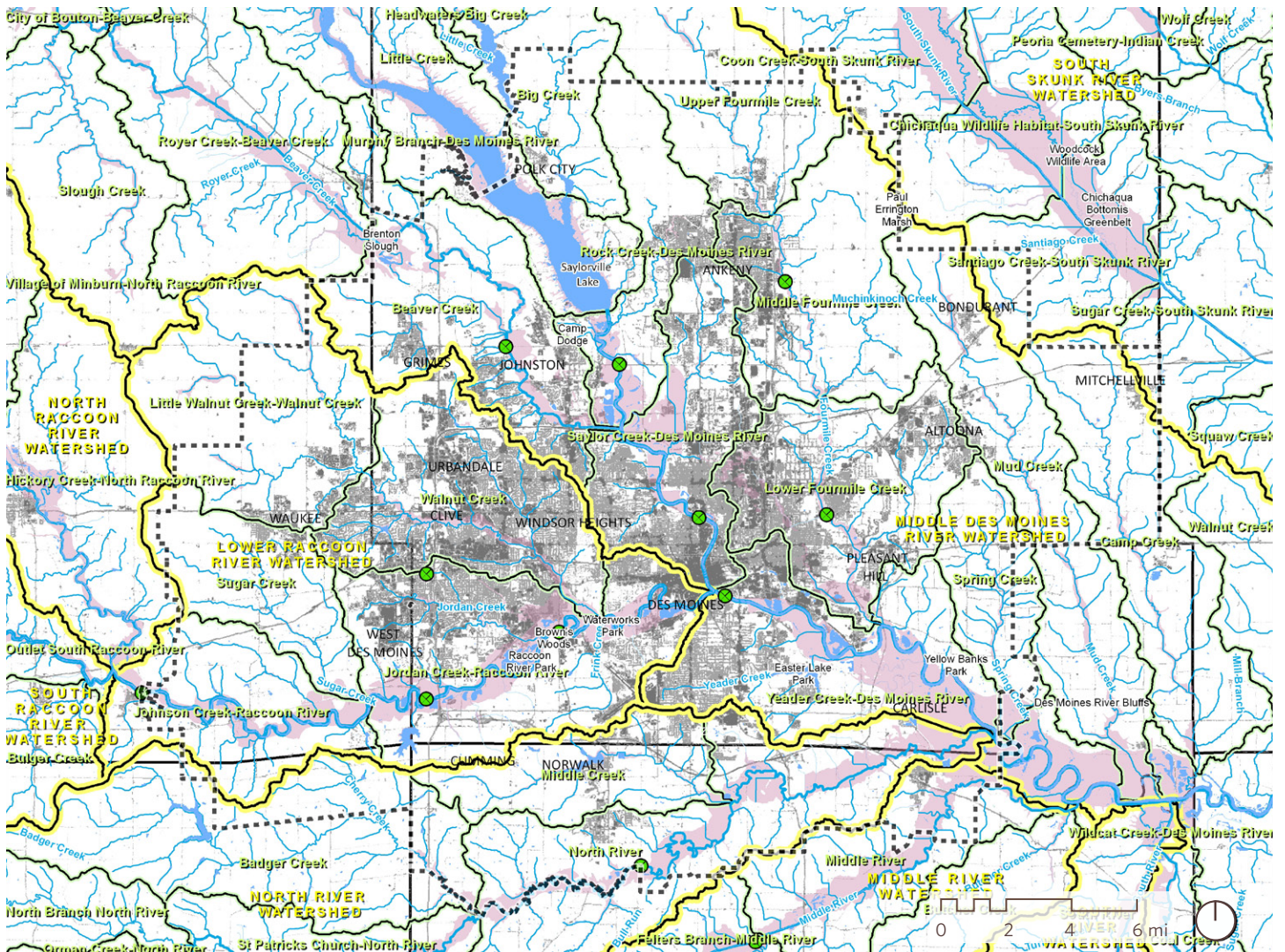
HYDROLOGY

REGIONAL DEVELOPMENT TRENDS, OPPORTUNITIES & CHALLENGES

Water is a complex issue everywhere, and Greater Des Moines is no different. The region is primarily in three major watersheds: Middle Des Moines River, Lower Raccoon River, and

North River. The flow of water through these watersheds is influenced by land cover (especially impervious cover by pavement and rooftops), topography, soil, and vegetation.

Greater Des Moines watersheds, floodways, impervious surfaces, and waterways



Sources: NLCD 2006, City of Des Moines, Iowa DNR, USFWS

STREAM ORDER

- Low (1-3)
- Medium (4-5)
- High (6-7)

IMPERVIOUS COVER

- 11-20%
- 21-60%
- 61-100%

- Floodplain (FEMA 100 year and 2008 extent)
- Minor watershed boundary
- HUC 12 subwatershed boundary
- USGS gauge station

Impervious cover and drained agricultural land by sub-watershed (2012)

Watershed	Percent Impervious Cover	Percent Drained Agricultural Land	Percent in Study Area
LOWER RACCOON RIVER			
Jordan Creek	14.0	2.9	100.0
Johnson Creek	1.0	7.9	80.5
Sugar Creek	2.1	1.2	93.5
Walnut Creek	23.1	0	100.0
Little Walnut Creek - Walnut Creek	1.8	0	57.6
MIDDLE DES MOINES RIVER			
Camp Creek	1.5	2.7	41.3
Yeader Creek	12.0	2.4	83.0
Mud Creek	2.6	0.6	52.5
Spring Creek	1.8	2.8	76.6
Lower Fourmile Creek	19.6	0.1	100.0
Middle Fourmile Creek	6.9	0	98.8
Upper Fourmile Creek	1.7	0	38.7
Saylor Creek	23.7	1.9	100.0
Rock Creek	5.5	1.8	97.5
Murphy Branch	1.9	0	27.3
Beaver Creek	7.8	0	87.9
Big Creek	1.8	0	46.7
MIDDLE RIVER			
Middle River	5.1	14.1	18.9
NORTH RIVER			
North River	3.7	26.1	71.9
Middle Creek	5.7	15.5	100.0
Badger Creek	1.0	17.6	26.2
SOUTH SKUNK RIVER			
Santiago Creek	1.9	0	16.0

Middle Des Moines River Watershed – Most of downtown Des Moines and nearby suburbs are in this watershed. Ten different creeks enter the river, including Beaver, Saylor, Fourmile, Rock, Spring, and Yeader. Impervious cover ranges from less than 2 percent up to 24 percent. The excess runoff from impervious cover is managed with storm drains, pipes, and detention basins

(“gray infrastructure”). Most drainageways are altered and degraded. Flooding on the Des Moines River itself is largely controlled by Saylorville Dam.

Lower Raccoon River Watershed – This watershed is in downtown Des Moines and the western suburbs. The creeks here are Johnson, Jordan, Walnut, and Sugar. Impervious cover

in the Jordan and Walnut Creek watersheds has damaged these drainageways. Drained cropland in Johnson Creek occupies at least 8 percent of the watershed. Flooding on the Raccoon is not controlled by upstream dams.

North River Watershed – Nearly three-quarters of the North River is in the study area. Major creeks are the Middle and Badger. Cropland dominates land use, with up to 26 percent of watersheds consisting of drained agricultural land. Suburban development is limited. Much of the precipitation falling on urban watersheds quickly runs off, collects in gray infrastructure, and pulses into receiving waters.

While this reduces local flooding, it alters stream water levels. They rise higher and more often; this is called “bounce” and such streams have a “flashy” flow. Typically bouncy, flashy waters also have poor water quality, poor habitat for fish and aquatic insects, more erosion, and more downstream flooding. This affects fishing, boating, swimming, tourism, and wildlife populations. Bed and bank erosion can threaten land and infrastructure, such as storm sewer outfalls, trails and bridges. Sediment in such streams is heavy and buries aquatic habitats.

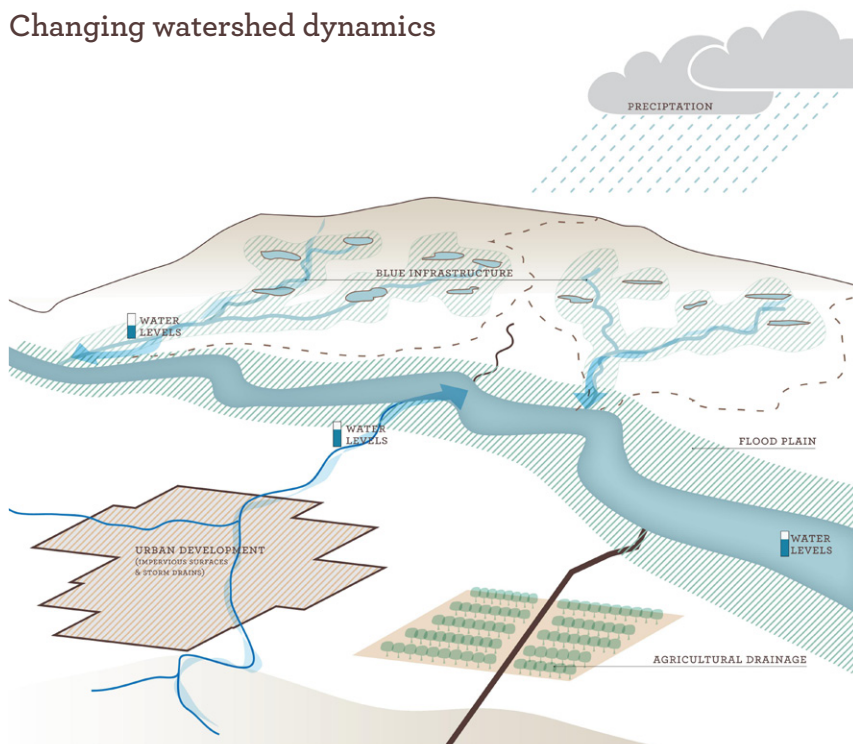
Urban watersheds also lower groundwater aquifers by diverted runoff directly to open water, bypassing natural infiltration and groundwater recharge that happens with vegetation and soil. This can lower well-water levels and damage streams and lakes that depend on groundwater discharge.

Agricultural drainage systems consisting of buried drain tiles and ditches have a similar effect. While improving agricultural productivity, runoff to nearby streams is accelerated and nitrogen concentration can rise. Because streams in the Greater Des Moines region carry more water today than historically, they cut into their beds and banks, which brings sediment into the stream; in some watersheds, 50-75 percent of the sediment comes from the stream itself. If not addressed, the changes in urban and agricultural watersheds can prevent their waters from being used for swimming, fishing, or aquatic habitat. When that happens, a water body is said to be “impaired” and comes under regulatory oversight



The Des Moines River downstream of the city. During flooding the brown water of the river is visible against the clearer water of the backwater. Source: Kim Chapman, Applied Ecological Services

Changing watershed dynamics



in order to restore the values of these public waters. Several water bodies in the region are impaired, primarily for aquatic life, sediment, and bacteria. Although not officially listed, it is believed that nearly all the water bodies in the region are impaired in some way.

OPPORTUNITIES

While substantial challenges exist for the region’s waters, proven strategies can improve the quality and stability of surface waters and groundwater. Ideas from Conservation Design and Low Impact Development employed in new development will preserve natural features, sustain free ecosystem services, protect aquatic resources, and promote sustainable land development. Existing developments and agricultural fields, especially those with man-made drainage systems, can be modified using best management practices (BMPs). This approach stabilizes the hydrologic regime, reducing flooding, erosion, and other problems. Ordinances, education, financial and regulatory incentives, cost-share programs, demonstration projects, and technical support all can help implement BMPs.

Several watershed initiatives are already underway— in Beaver Creek, Fourmile Creek, Waffley Creek, and Walnut Creek. In a real sign of progress, a section of Fourmile Creek was removed from the impaired waters list. Stream buffer protection has been considered or implemented in Polk County, Ankeny, Pleasant Hill, and Johnston.

An important idea and tool is the stormwater treatment train—a sequence of naturalized stormwater management elements, such as vegetated swales, created wetlands, dry ponds, and raingardens. In addition to their use at single developments, regional stormwater treatment trains can use existing floodplains, wetlands, flow paths, and depressions to reduce water volume and flood damage and also improve water quality. Regional stormwater treatment trains can double as greenways for trails and provide wildlife habitat and corridors. These “multifunctional greenways” attract funding and partnering initiatives.

Flood flow values at SE 6th Street

Flood Event	Previous Flow Value (cfs)	2010 Revised Flow Value (cfs)
2-year	40,400	44,100
10-year	72,000	83,300
50-year	87,000	107,600
100-year	106,000	122,100
500-year	not estimated	142,000

Source: Army Corps of Engineers

This table indicates that floods are becoming more severe. For instance, a 10-year flood (a flood with a 1 in 10 chance of occurring in any given year) previously would have water passing through the flood gauge at SE 6th Street in downtown Des Moines at a rate of 72,000 cubic feet per second (cfs). Statistics revised in 2010 show that the same location now receives 83,300 cfs of flow in 10-year flood conditions. The additional 11,300 cfs is nearly enough to fill a standard 25 meter swimming pool.

LANDSCAPE & ECOLOGY

REGIONAL DEVELOPMENT TRENDS, OPPORTUNITIES & CHALLENGES

Prior to European settlement, what is now Greater Des Moines was blanketed by tallgrass prairie studded with thousands of small wetlands. Forests existed primarily along rivers and streams; spaces between the prairies and forest were typically savanna, an oak-dominated habitat very much like today's oak-studded parks. In this landscape, a wide array of wildlife found habitat. Native American tribes used this landscape for thousands of years until the mid-1800s.

Beginning in the early 1800s, the Iowan landscape was dramatically changed – first and foremost by the plow, and more recently by urban and suburban development. Land clearing removed over 90 percent of natural habitat, and remaining habitats are fragmented

Centuries of land clearing and development have drastically reduced the region's core natural habitat, (90% of natural habitat existing in the 1800s is now gone)

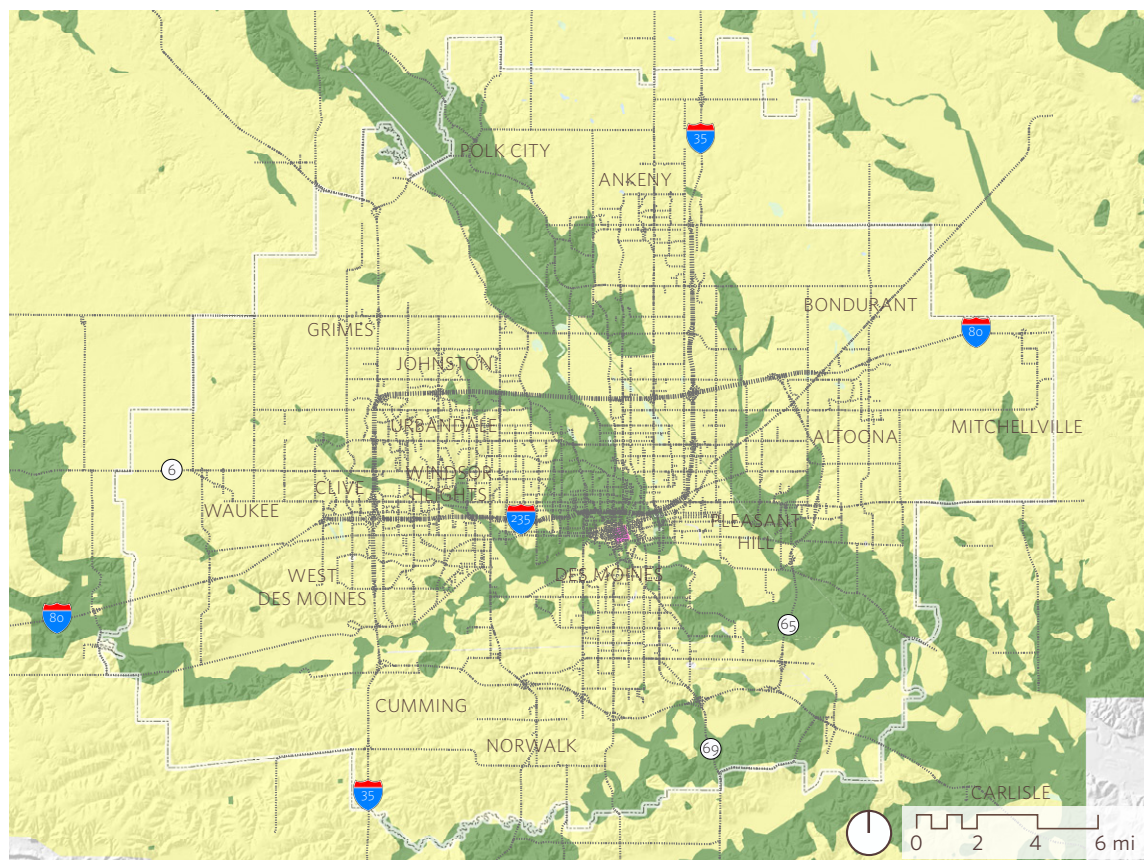
negatively impacting plant and animal species, water flow, climate regulation, air and water purification...

...but interest in conservation growing.

(total acres of conserved land in Greater Des Moines have increased nearly 5% in the past 10 years)

and in poor condition due to incompatible land management practices and invasive species. At

Historical vegetation



Sources: Land cover (1839-1952) by DNR from GLO records. Analysis performed by GeoAdaptive, Inc. based on USGS National Land Cover 2006 data and county parcels data

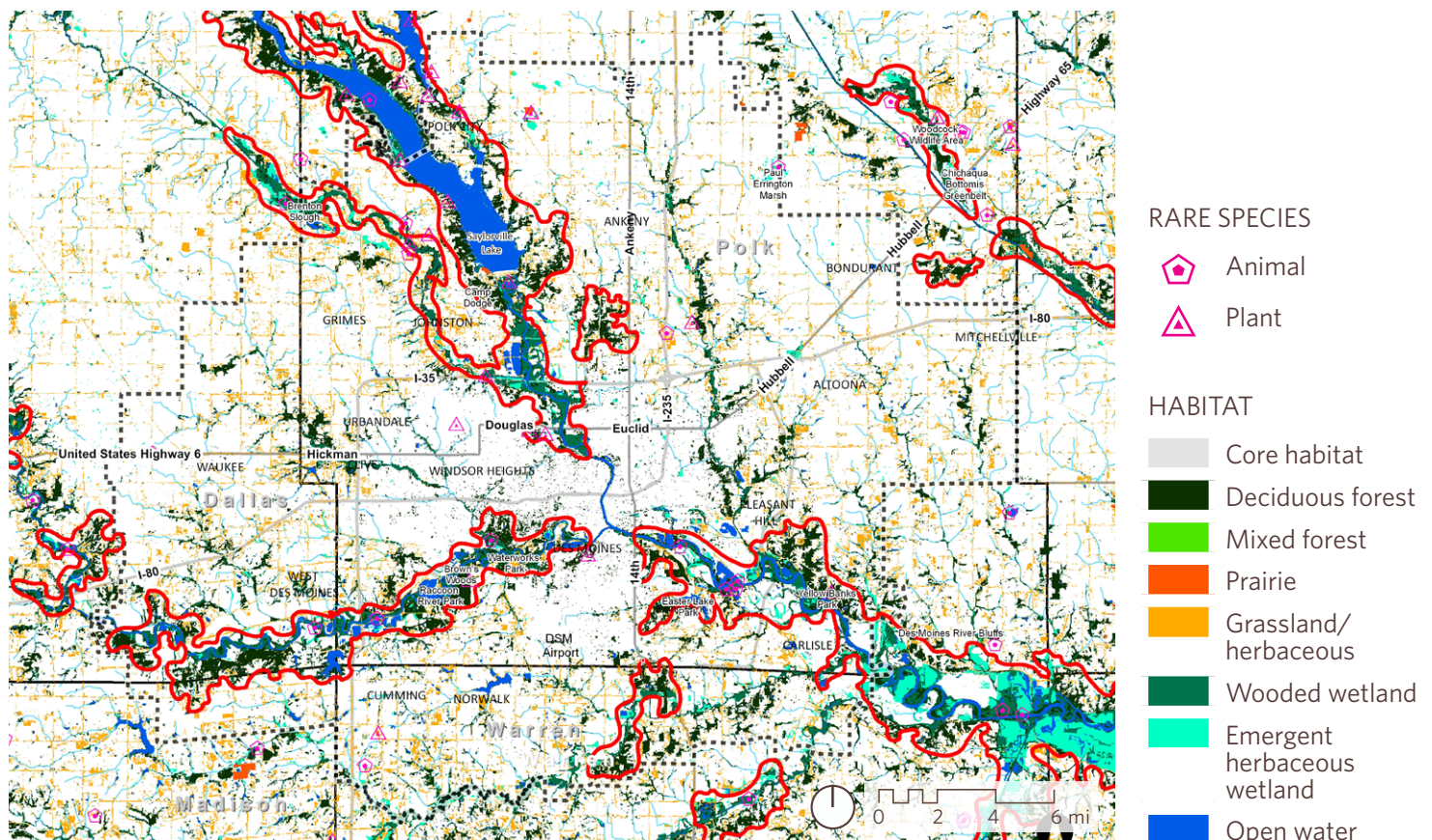
least a quarter of the region's species are at risk of local extinction due to the removal of natural vegetation and loss of core habitat. An equally large group of aquatic species are at risk due to the poor condition of the region's lakes, streams, and rivers.

Core habitat is large and continuous, undivided by roads, buildings, and cropland. Some of the region's sensitive and most interesting species—Red-headed woodpecker, Northern harrier, Eastern meadowlark, American white pelican, Northern cricket frog, and Spiny soft-shelled turtle—inhabit large, often high-quality core habitats. As core habitat acreage increases and habitat is improved, they benefit; as it shrinks, their risk of extinction rises. Natural areas also provide other free ecosystem services, such as water flow regulation, local climate regulation, air and water purification, pollination, carbon sequestration, and recreational opportunities.

OPPORTUNITIES

The region's extensive loss of native habitats and its indigenous species are both symptom and cause of more far-reaching environmental problems, such as stream instability, erosion, and flooding. The main landscape challenges are to restore meaningful core habitats and ecological connections, and to protect and expand populations of uncommon wildlife species. The Iowa Department of Natural Resources, county conservation boards, conservation non-profits, federal government agencies, and others have already identified the region's large or high quality habitats and begun projects to restore and expand habitat, such as at Chichaqua. Iowa's Wildlife Action Plan defines species in need of conservation attention and identifies strategies for addressing wildlife depletion. Completing a natural areas inventory in the region would provide critical information to identify, characterize, and prioritize projects for habitat restoration, species conservation, and greenway creation.

Natural habitat



Sources: State Wildlife Action Plan 2010, NLCD 2006, City of Des Moines, Iowa DNR, USFWS. Rare species data do not represent the results of a systematic survey. They are randomly collected points of occurrence; some records are historic and the dataset is incomplete.

PARKS & RECREATION

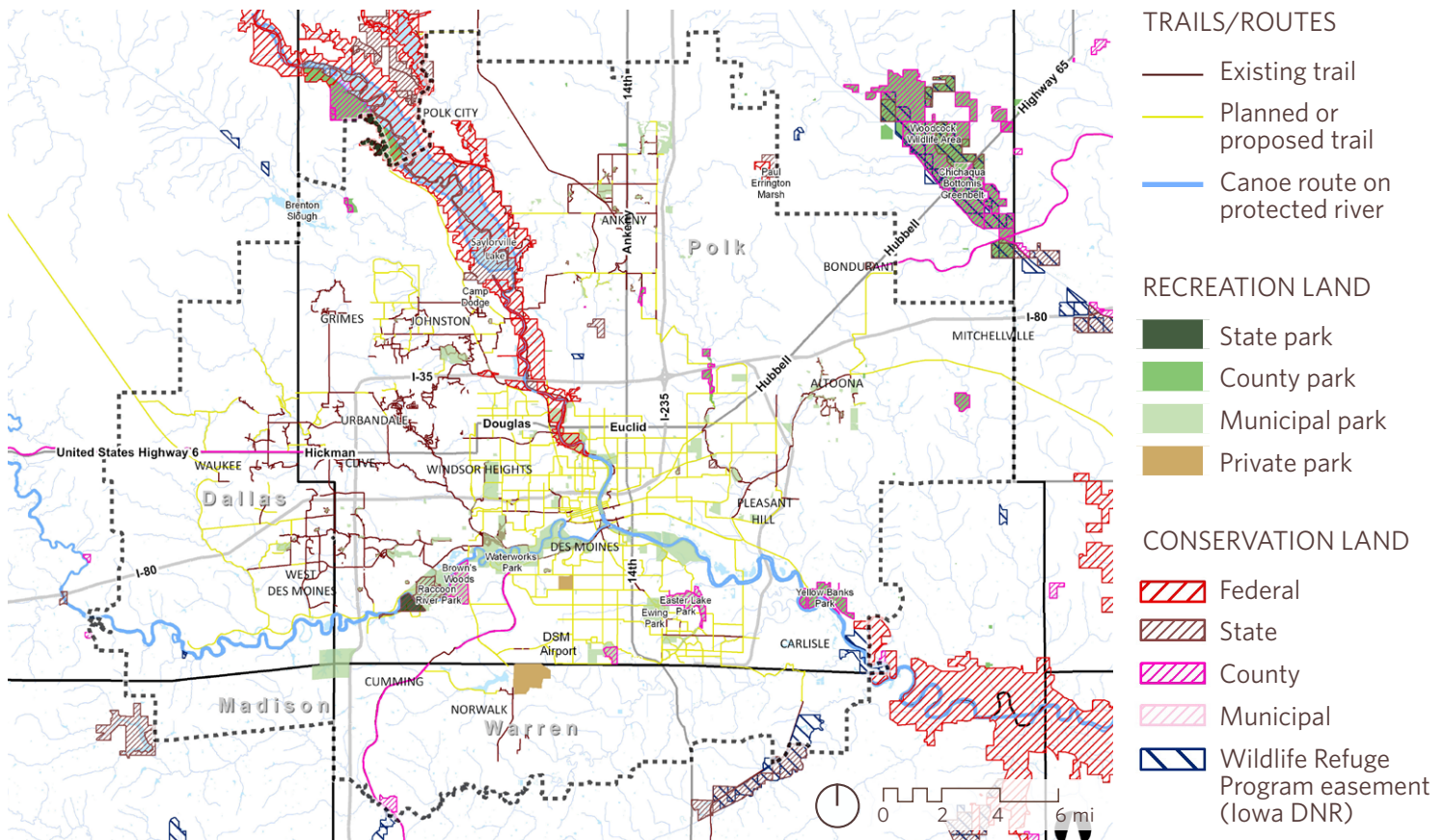
REGIONAL DEVELOPMENT TRENDS, OPPORTUNITIES & CHALLENGES

A region's parks, recreational areas, and trails add to its attractiveness, vitality, and sustainability. They establish a sense of place and allow people to pursue healthy lifestyles that include exercise and quiet appreciation of the outdoors. Particularly in an area like Greater Des Moines that is growing in population and trending toward an increasingly suburban land use pattern, proactive efforts should be made today to protect land for open space enjoyment by future generations.

The Tomorrow Plan study area has a mix of federal, state, county, municipal, and private parks, conservation areas, and recreation lands. Active recreation sites, such as the Blank Park Zoo or Ankeny's Prairie Ridge Sports Complex, are complemented by protected or undeveloped lands, such as state preserves, wildlife management areas, and marshlands.

The recreational trail system is a point of pride, providing multi-modal access to the outdoors, promoting a sense of community,

Conservation, park, and recreation lands



Sources: City of Des Moines, Iowa DNR, USFWS

The Raccoon and Des Moines Rivers are Sovereign Meandered Rivers whose beds and banks are owned by the State of Iowa.

The regional recreational trail system is a point of pride (Over 115 miles of trails can be found within the region, and efforts are underway to expand the system)

State designated natural resources, including the Strasser Woods State Preserves, Walnut Woods State Park, and Big Creek State Park, within the region are protected by the Iowa Department of Natural Resources.

Des Moines' Gray's Lake was named one of America's Great Public Spaces by the American Planning Association in 2011 (image at right).



Gray's Lake Park

and encouraging healthy activity. The Capital Crossroads – Natural Capital Committee* is currently pursuing a goal to make Central Iowa the “trails capital of the world” through support of regional greenway systems and an emphasis on connectivity of trails systems. To date, regional trails have largely been developed by taking advantage of rails-to-trails opportunities, which are a great way to introduce a linear open space asset but often result in little natural connectivity to other open spaces. Although some key links have been made, the next step will be to enhance system-wide connectivity. The parks and trails are all important amenities; yet, they cover only a small portion of the full regional landscape and lack connectivity, weakening support for underlying ecological systems. For this reason, open space and trail planning should be integrated with regional conservation planning as a way to galvanize partners in support of a grand vision and to magnify the effect of individual projects.

OPPORTUNITIES

As Greater Des Moines moves forward, a comprehensive natural areas inventory will be a useful tool and will provide information that will lead to holistic and efficient planning for the region's park and recreation network. This inventory will also assist in future conservation

projects. Good natural resource information is foundational to sustainability planning and enables a region to capitalize on its unique environmental and recreational opportunities. Through its Conservation Board, Polk County has cataloged, conserved, managed, and promoted its larger open space assets, and can serve as a model for a comprehensive regional understanding for all of the region's open space assets.

HIGHLIGHTS OF THE SYSTEM

While each community within Greater Des Moines must have its own neighborhood parks and mini-parks to serve local needs, the area is fortunate to have many larger park assets that benefit the full region and provide a spectrum of environmental education opportunities. A few highlights of these regional parks include:

- Gray's Lake: 165 acres in Downtown Des Moines with kayaking, boating and trails
- Water Works Park: nearly 1,500 acres of open wooded areas and recreational facilities
- Brown's Woods: 484 acres encompassing the state's largest urban forest preserve
- Jester Park: 56 acres near Saylorville Lake with campsites, elk and bison viewing
- Raccoon River Park: 700' of urban beach access; and,
- Fort Des Moines: 3,225 acres including 40 miles of trails and an arboretum with 222 unique or rare species.

*The Natural Capital Committee is one of several subcommittees charged with implementing the recommendations made in the 2011 Capital Crossroads plan, a strategic plan for economic growth that covers The Tomorrow Plan's study area and beyond.

PLACEMAKING & COMMUNITY

REGIONAL DEVELOPMENT TRENDS, OPPORTUNITIES & CHALLENGES

A geographic space truly becomes a place when people come together in meaningful ways, with pride in the community, city and region. Places have value—they draw visitors and long-term residents—and are an important contributor to quality of life. In turn, a high quality of life is a key contributor to economic development.

Much of Greater Des Moines' sense of place revolves around its high quality of life. The area is proud to have been deemed one of the "Top Ten Cities for the Next Decade" in Kiplinger. Over the past two years the region has turned up on lists of top places to raise a family, healthiest metro areas, best places for young professionals, and strong performers in business and jobs.

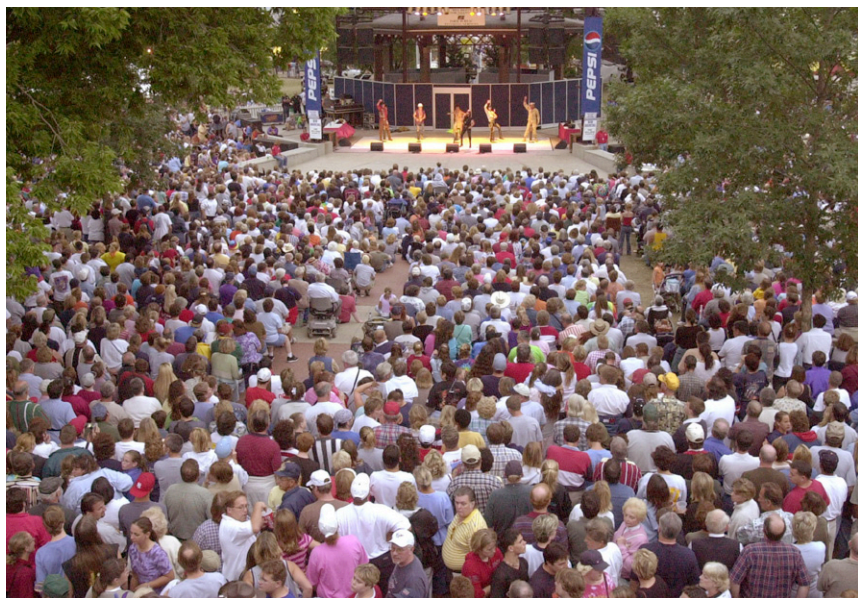
Arts and culture also contribute to establishing a sense of place. As the state capital and largest population center in the region, the City of Des Moines has a number of cultural amenities serving the entire metro area. These range from the Science Center of Iowa to the Blank Park Zoo, Historic Valley Junction, the Pappajohn Sculpture Park, the State Historical Museum, the World Food Prize Hall of Laureates, the Civic Center, and more. The City of Des Moines also hosts the Iowa State Fair, which attracts over a million visitors annually, and the 80/35 Music Festival.

Historic preservation contributes to placemaking and community by serving as a reminder of a shared past. Within The Tomorrow Plan's study area the City of Des Moines, Dallas County, and Madison County each have a local preservation commission. These bodies have the dual focus of identifying historically significant buildings and landmarks, and managing and protecting historic buildings. Local preservation efforts also extend to cultural resources, including five Certified Cultural and Entertainment Districts within the study area.

A commonly heard theme throughout the region is the importance of each city, town or community retaining its own distinct identity. Residents

appreciate that there are many different sizes and types of communities, and like having their choice amongst them. This is a substantial opportunity for the region—having a range of communities can draw more people to the area, and benefits everyone by increasing diversity. However, establishing a regional, rather than local, identity remains a challenge. A stronger regional identity would not be a replacement for community identity, but instead would build upon it. Growing the regional identity can contribute to increased cooperation amongst communities and also help make Greater Des Moines more visible outside of Iowa.

Sense of community is an intangible thing, related to participation, civic pride and personal connections. Access to and the location of public facilities and services can strengthen ties within the community. Public input gathered online and at The Tomorrow Plan meetings suggests that residents feel there is a strong sense of community in place. While this is true in many parts of the region, an existing challenge is the spatial concentration of poverty and low educational attainment.



Concertgoers at the Iowa State Fair

GOVERNANCE

REGIONAL DEVELOPMENT TRENDS, OPPORTUNITIES & CHALLENGES

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Strong regional governance can be an important factor in facilitating regional change. However, across America, establishing regional governance structures and endowing them with authority consistently remains a challenge. Greater Des Moines is no different, and despite several past efforts for government consolidation or establishment of a regional governing body, governance remains under the control of counties and cities.

Still, there are a number of organizations that currently play a role in regional oversight. These include the Des Moines Area Regional Transit Authority, the Des Moines Area MPO, the Greater Des Moines Partnership, the Center on Sustainable Communities, United Way of Central Iowa, and the Community Foundation of Greater

Des Moines among others. In addition, past planning efforts such as Project Destiny (2003) and Capital Crossroads (2011) have worked to develop regional visions for the future.

Ongoing regional efforts such as the development of the recreational trail system, and the Metro Waste Authority have demonstrated the capacity for regional cooperation around certain issues. Stormwater management is one area within which opportunity for increased regional coordination exists; a key element of The Tomorrow Plan will be to continue identifying openings for regional cooperation.

For further discussion of regional governance structures and best practices, please see the Model Sustainable Development Practices section of this report (p. 50).

POPULATION & HOUSING

REGIONAL DEVELOPMENT TRENDS, OPPORTUNITIES & CHALLENGES

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POPULATION

Between 1960 and 2010, Greater Des Moines (Dallas, Madison, Polk, and Warren Counties) grew in population by over 235,000 people, increasing from nearly 323,600 persons to nearly 558,700 persons. On an average annual basis, the growth rate was 1.1 percent. The nation grew

at the same annual rate during this period, while the State of Iowa population increased at a much slower annual rate of 0.2 percent.

The sustained, moderate rate of job growth experienced in the past has stimulated patterns of domestic in-migration to the region. Positive net migration to Greater Des Moines represented

The Tomorrow Plan study area population and households

	1990	2000	2010	Average annual growth rate (%)
Population	341,172	398,196	479,298	1.7
Households	134,083	158,015	188,711	1.7
Housing units	141,082	165,814	202,033	1.8
Housing vacancy	4.9%	4.7%	6.6%	

Source: U.S. Census Bureau, 1990 Census, 2000 Census, 2010 Census; Gruen Gruen + Associates.

approximately 46 percent of all population growth throughout the decades of the 1990s and 2000s. Migration from within the State of Iowa is the largest source of positive net migration. Over the 2005 to 2009 period, approximately three-quarters, or 77 percent, of net migration to Greater Des Moines originated from within the State of Iowa. From 1960 to 2010, Greater Des Moines' share of the state population has increased from 11.7 percent in 1960 to 18.4 percent in 2010, further evidencing the pattern of urbanization.

The City of Des Moines remains the largest community in the region, accounting for 42 percent of the regional population and 43 percent of households. Growth within the City of Des Moines over the past 20 years has occurred at a rate of less than one-half percent per year, so just eight percent of the increase in total population is attributable to the population increase within Des Moines. West Des Moines and Ankeny grew by nearly 52,000 persons from 1990 to 2010, accounting for 40 percent of total population growth. Urbandale comprised another 10 percent of the population growth, increasing by nearly 16,000 persons.

HOUSEHOLDS

The Greater Des Moines region grew by nearly 61,000 households, or 1.6 percent annually, between 1990 and 2010. The rate of household formation in Greater Des Moines has been higher than both the nation and State of Iowa, which experienced annual household growth rates of 1.2 percent and 0.7 percent, respectively.

Overall, the region's average household size has remained stable at about 2.50 persons. Polk County has the smallest average household size of 2.48 persons, while Dallas County contains the largest household size of 2.60 persons. The average household size does not vary considerably from the state or nation, but, unlike most areas of the country, it has not declined over time.

The Tomorrow Plan study area currently has a population of approximately 479,000 (approximately 86 percent of the four-county population). Since 1990, the population has increased by approximately 138,000, or 40

Over the past 20 years, population growth in Greater Des Moines has significantly outpaced the rest of the state; (1.1% average annual growth rate in Greater Des Moines, compared to 0.2% for Iowa)

Most of this population growth occurred outside the City of Des Moines.

(8% of the region's growth was in Des Moines, 40% was in West Des Moines and Ankeny, 10% was in Urbandale, and the remaining 42% was in other regional communities)

Household size and formation has remained relatively stable

(The region's average household size is 2.50 persons)

but an excess of housing units relative to household formation has been constructed,

(From 1990 to 2010, the number of housing units constructed exceeded households formed by approximately 7,000)

providing mobility within the market while keeping housing expenses below the national average.

percent. This equates to an average annual growth rate of 1.7 percent. The number of households increased by 54,600, or at an average annual growth rate of 1.7 percent, from about 134,100 households in 1990 to 188,700 households in 2010.

HOUSING

The creation of new housing in Greater Des Moines occurred most rapidly over the prior decade of the 2000s, during which the regional housing supply increased by approximately 49,000 units at an annual rate of 2.4 percent. The housing stock of Dallas County and the western suburbs of Des Moines grew at an annual rate of 5.1 percent, with an average of nearly 1,110 units added each year.

The number of housing units within Greater Des Moines increased at a slightly higher rate of 1.8 percent, from 141,000 units to 202,000 units. The housing vacancy rate increased to 6.6 percent by 2010.

Approximately 61 percent of all housing units added over the prior two decades were located in four communities: West Des Moines, Ankeny, Urbandale, and Des Moines.

For the period from 1990 to 2010, the number of households formed within the region increased by 60,909, while the supply of housing units increased by 68,504. By permitting the land development and housing market to function competitively, the Greater Des Moines region has maintained an affordable housing market.

HOME PRICES

Not once in the past 30 years have median home prices in Des Moines escalated above three times (300 percent) the area median household income.

More than three-quarters, or approximately 76 percent, of Des Moines households that own housing spend less than 30 percent of their annual income on housing and related expenses, including property taxes, insurance, and utilities. By comparison, only 69 percent of owner occupied households in the United States spend less than 30 percent of their annual household income on housing. This low cost of housing is a key comparative advantage for the region.

Similarly, rental housing in Greater Des Moines is more affordable. Approximately 54 percent of renter households spend less than 30 percent of their annual income on rent and utilities. Approximately one-third of renter households in Des Moines spent 35 percent or more of their income on rent and utilities; nearly 44 percent of renter households nationwide spent 35 percent or more of their income on rent and utilities.

AFFORDABLE HOUSING

Although the relatively low cost of housing is a comparative advantage for Greater Des Moines in relation to other regions in the country, finding safe, stable, and affordable rental housing is still a challenge for many in the metro area. A

recent survey of market-rate apartments in the area found that rents have risen an average of 5 percent for one- to three-bedroom apartments in the past year. Vacancy rates for both market-rate and low-income housing have decreased over the same time period, suggesting the rental market is tightening in response to increased demand for apartments. This demand is driven by a combination of factors—the expiration of first-time homebuyer credits, increased lending requirements on homes, and a growing regional population.

CHALLENGES AND OPPORTUNITIES

- Housing demand in the near term will be heavily shaped by the housing market crisis of the past few years. More homes were built than the number of households formed. As a result, new housing development will be tempered by the need to absorb existing inventory.
- Creating high amenity downtown or “in-town” locations of choice for some Baby Boomer and Echo Boomer households seeking housing nearby specialty and convenience retail, cultural amenities, entertainment, and services represents both a challenge and an opportunity.
- Both challenges and opportunities can be expected for communities to understand the need for and encourage adaptive reuse and redevelopment of obsolete local real estate, particularly retail centers.
- As Eric Burmeister of the Polk County Housing Trust Fund points out, the traditional solutions to affordable housing needs has been to provide graduated rental assistance from government tax dollars. However, with shrinking tax revenues, this is becoming less and less sustainable. A new approach is needed for providing affordable housing, potentially by reducing a family’s costs in other areas such as transportation to free up more income for housing expenses.

JOBS & ECONOMIC COMPETITIVENESS

REGIONAL DEVELOPMENT TRENDS, OPPORTUNITIES & CHALLENGES

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Greater Des Moines has a well-educated workforce and a productive economy. Much of this relates to a concentration of economic activity in the financial sector. However, the region's challenge will be to sustain its economic health over time, namely by continuing to develop a skilled labor force and by keeping the cost of living below national averages.

EMPLOYMENT

Between 1990 and 2010, total employment in the Des Moines MSA grew by 34 percent, increasing from 235,700 jobs to 315,100 jobs. The average annual growth rate over the last 20 years has been 1.5 percent. This average annual rate of employment growth compares to 0.9 percent for the State of Iowa and 0.8 percent for the Nation over the same period.

Today, Greater Des Moines is primarily a "white collar" economy. In the past, the bulk of new income and employment opportunities have been created by two sectors: professional and business services and financial activities. Growth in professional and business services and financial activities employment have accounted for approximately one-half of all new jobs created during the past 20 years. Collectively, annual growth in these two sectors approximated three percent, or nearly double the overall rate of regional employment growth.

Polk County comprises approximately 85 percent of the regional employment base, with 2010 non-farm employment estimated at just fewer than 266,000 jobs. The Polk County base has, however, experienced relatively limited growth over the past decade, adding only 2,600 jobs between 2000 and 2010. Net job gains in the region have occurred to the west in Dallas County, which accounted for approximately 75 percent of regional employment growth over the 2000 to 2010 period.

Within The Tomorrow Plan's study area, the northwest side of Des Moines, portions of West Des Moines, Clive, and Urbandale (generally delineated by Interstate 80 and Interstate 35 on

The region has a well-educated workforce

(35% of adults have a bachelor's or advanced college degree)

and a productive economy.

(Annual employment growth over the past 20 years is 1.5%)

Economic activity is concentrated in the finance industry,

(Growth in professional services and financial activities has accounted for approximately half of all new jobs created over the past 20 years)

presenting both an opportunity and a challenge for diversification, alongside the need to sustain the supply of adequate labor and maintain a relatively low cost of living.

the north and the Polk County line to the west), and the Central Business District of Des Moines presently contain about 60 percent of all jobs.

GROWTH AND PREDOMINANCE OF FINANCIAL ACTIVITIES

Not only do financial activities represent the largest source of employment at 16 percent of total employment, financial activities generate an even higher share of regional income (24 percent), and account for nearly one-half of all economic activity within the Des Moines metropolitan area.

Over the prior decade, regional domestic output related to financial activities grew considerably faster than other sectors of the economy, especially between 2002 and 2007, when real gross metropolitan product in the financial activities sector grew by more than 60 percent.

COMPETITIVE ADVANTAGES

Several characteristics help set Greater Des Moines apart from other regions:

- Greater Des Moines has a well-educated workforce: approximately 35 percent of the adult population has attained a bachelor's or advanced college degree (up from approximately 24 percent in 1990), compared

to 25 percent for the State of Iowa and 28 percent for the nation;

- Greater Des Moines also has a productive workforce: in 2010, Des Moines' Gross Domestic Product (GDP) approximated \$123,000 per worker. This compares quite favorably to the State of Iowa (GDP per worker of \$85,000) and the nation (GDP per worker of \$94,000). Workforce productivity in Des Moines exceeds the GDP per worker in Chicago, Kansas City, Minneapolis, and Omaha, each ranging from \$100,000 to \$108,000;
- As summarized in the housing section, another competitive advantage is an ample supply of affordable housing and a low cost of living;
- A healthy balance between employment and housing opportunities: the current jobs-to-housing ratio for The Tomorrow Plan's study area approximates 1.5, an ideal ratio;
- A short commute potential: the preponderance of resident workers (77 percent) spend fewer than 25 minutes commuting to work, compared to 58 percent of workers nationally;
- Relatively inexpensive land and building space; and,

- An ample supply of available land and building space.

CHALLENGES AND OPPORTUNITIES

While Greater Des Moines has benefited in recent years from economic growth in the financial and professional services sectors, diversifying the regional economic and employment base will be a challenge moving forward. Opportunities exist to build on the region's education and medical institutions as well as government activities as sources of stability. If done cooperatively among the communities within the region, this would result in new beneficial businesses and economic activities that broaden the tax base, rather than merely shifting existing businesses within the region.

The retention and attraction of educated, young talent is also a key challenge for the region. Doing so could include continuing the investments in infrastructure, public amenities, and other enhancements to the Des Moines Central Business District to preserve and improve its appeal as a place to not only work but to also play and live. Encouraging mixed-use environments near (or as part of) employment centers and educational or medical assets may also appeal to the next generation workforce.

Des Moines MSA share of non-farm employment by sector: 1990 and 2010

	1990 (%)	2010 (%)	Shift 1990-2010 (percentage points)
Natural resources and construction	3.7	4.1	0.4
Manufacturing	8.7	5.6	-3.1
Wholesale trade	6.6	5.4	-1.1
Retail trade	12.2	11.4	-0.8
Transportation and utilities	4.4	3.0	-1.4
Information	4.0	2.5	-1.5
Financial activities	13.1	16.2	3.1
Professional and business services	8.6	11.9	3.3
Educational and health services	12.3	13.5	1.2
Leisure and Hospitality	8.2	8.8	0.6
Other services	4.5	4.1	-0.4
Government	13.8	13.5	-0.3

Source: Iowa Department of Workforce Development, *Current Employment Statistics*; Gruen Gruen + Associates.

EDUCATION

REGIONAL DEVELOPMENT TRENDS, OPPORTUNITIES & CHALLENGES

High-quality education is a major factor for success at all scales—individual, city, county and region—and thus an important element of a sustainable economy. As discussed in the Human Capital section of the Capital Crossroads report, education is an investment in training the workforce of the future. Now, more than ever, companies locate based on the location of skilled workers, rather than workers moving to follow a company.

Greater Des Moines is home to over ten institutions of higher education, including four-year colleges such as Drake University and Grand View University, to graduate-level institutions such as Des Moines University and two-year professional schools such as the Des Moines Area Community College. Just to the north, Iowa State University in Ames enrolls 20,000 undergraduates and an additional 10,000 graduate and professional students.

The presence of these schools undoubtedly contributes to the high levels of educational attainment in the region. Over the past two decades, the proportion of people with a high school education or less has declined as the proportion of residents with bachelor’s and advanced college degrees has increased. More than 90 percent of The Tomorrow Plan study area population now has a high school degree. By 2009, over one-third of the population had a college degree.

However, the education level of residents varies significantly throughout the metro area. Clive, Waukee, Johnston, West Des Moines, and Urbandale—each with over 45 percent of residents holding bachelor’s degrees or higher—have a higher proportion of college graduates than The Tomorrow Plan study area as a whole. Educational attainment in Greater Des Moines is currently lowest in the core city, a challenge for the region moving forward.

Administration and resources are also important dimensions of education. The Tomorrow Plan study area incorporates part or all of eighteen

Educational attainment in largest communities within the study area (2005–2009)

Percentage of people 25 and older with bachelor’s or advanced college degree

Altoona	29.2
Ankeny	47.5
Clive	60.4
Des Moines	23.9
Johnston	49.3
Norwalk	29.2
Urbandale	46.0
Waukee	50.0
West Des Moines	48.1

Source: U.S. Census Bureau; Gruen Gruen + Associates.

Educational attainment (persons 25 years and over)

	1990 (%)	2000 (%)	2005–2009* (%)	Shift 1990–2009 (percentage points)
Less than high school	14.2	11.3	8.7	-5.5
High school graduate or higher	61.4	57.9	56.4	-5.0
Bachelor’s degree	16.9	21.9	25.1	+8.2
Advanced degree	7.4	8.9	9.8	+2.4

Source: U.S. Census Bureau; Gruen Gruen + Associates.

school districts; significant portions (over 80 percent of land area) of eight of these districts are within the study area. Together, these eight districts have a current enrollment of over 66,000 students. The Des Moines Independent School District accounts for nearly half of these students, while smaller districts such as Norwalk and Saydel have enrollments less than 10 percent that of Des Moines. There may be opportunity to reduce municipal costs by merging some school districts within the region.

Student enrollment (2012)

School districts predominantly* within study area

Ankeny Community School District	8,706
Des Moines Independent Community School District	30,013
Johnston Community School District	5,762
Norwalk Community School District	2,346
Saydel Community School District	1,090
Urbandale Community School District	3,153
Waukee Community School District	6,742
West Des Moines Community School District	8,468

* 80% or more of the district’s land area is within The Tomorrow Plan study area

Source: Iowa Department of Education, 2011–2012 Certified Enrollment Summary by District (revised 1.18.2012).

PUBLIC HEALTH

REGIONAL DEVELOPMENT TRENDS, OPPORTUNITIES & CHALLENGES

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Public health is a wide-ranging topic, and one that has garnered increased attention from planners over the past decade. It is also a topic taken seriously in Iowa—a coalition of individuals, organizations, and public agencies has recently joined forces to pursue the goal of making Iowa the healthiest state in the nation by 2016.

The most recent statewide community health needs assessment shows that health issues throughout Iowa are also relevant within some, if not all, of the four counties comprising The Tomorrow Plan’s study area. While obesity dominates the list of concerns, other issues directly related to The Tomorrow Plan include:

- **Water quality**—Aging or decaying

infrastructure cause water quality concerns, as do stormwater and wastewater issues.

- **Motor vehicle accidents prevention**—Motor vehicles are a leading cause of unintended injury, with the greatest need being to prevent distracted driving.
- **Reduced access to health services**—Lack of transportation is a serious barrier to accessing health services, and can be related to provider shortages. The aging population magnifies this challenge, as the elderly often have limited mobility yet need to visit the doctor frequently.
- **Emergency response**—The majority of emergency response needs are related

to infrastructure and human resources. Investing in these areas may open an opportunity for municipalities to coordinate and share resources.

OBESENITY

The most frequently cited public health need in Iowa, however, is to combat obesity. Nearly three of every ten adult Iowans is obese, and one-third of third, fourth, and fifth grade students in Iowa is overweight or at risk of becoming overweight. Statewide obesity rates have climbed shockingly fast over the past two decades, and obesity rates in The Tomorrow Plan study area are no different.

Obesity comes at great cost not only to individuals, but also to the general public. The Healthiest State Initiative points out that if Iowa could maintain 2009 obesity rates, rather than having them continue to increase as projected, the state could save as much as \$1.6 billion by 2018.

Fortunately, there are a number of approaches to targeting the obesity and other health issues. The Urban Institute estimates that together improved health behaviors and a healthier environment can address about 70% of health issues. With increased attention and political will for health initiatives, this may be a significant opportunity for Greater Des Moines to marshal resources from health-related funding sources as well as more traditional funding to invest in more outdoor recreation spaces, expand food choices, further develop alternate modes of transportation, and make infrastructure improvements.

EQUITY

Surveys and data analysis conducted by the Polk County Health Department suggest that public health issues vary within the metro area. Specifically, several downtown neighborhoods show asthma rates twice that for the state as a whole. These same neighborhoods are among areas that demonstrate high levels of health, social, and economic vulnerability as measured by rate of single parenting, lack of education, unemployment, limited language skills, and low levels of home ownership.

Obesity rates

	1990	2000	2005	2008
Polk County	-	22.3	24.0	26.7
Iowa	14.0	21.6	25.4	26.7
United States	23.3	22.1	24.4	26.7

Source: 2010 Polk County Chartbook

AIR QUALITY

Air quality reflects the amount of pollution emitted into the air by industry and other human activities, and is tied closely to issues of land use, climate, infrastructure, transportation, and public health. Air quality has significant impacts on public health, environmental health, and climate. Types of outdoor air pollution include particulates resulting from all forms of burning, as in power generation, transportation, incineration, and wood fires; industrial by-products; greenhouse gasses; acid rain; and, chlorofluorocarbons. Common indoor air pollutants include volatile organic compounds; chemical by-products; carbon monoxide; mold; and, radon.

In the late 1970s, the U.S. Environmental Protection Agency (EPA) found that several cities within Polk County did not meet the recently-established National Ambient Air Quality Standards for total suspended particulate TSP matter or carbon monoxide levels. By 1984, nearly all affected areas were upgraded from primary TSP non-attainment to secondary TSP non-attainment, and carbon monoxide levels fell to meet the standards. All affected areas met national standards by 1987, and continue to maintain Clean Air Act standards.

At present, Greater Des Moines enjoys healthy air—in the past 10 years, there have been an average of one day or fewer of unhealthy days for groups sensitive to asthma and lung disease, and no unhealthy days for the general population. With air quality already at healthy levels, the region can focus its attention to other elements of sustainability, though will need to make wise decisions around land use, infrastructure, and transportation to maintain the current level of air quality.

FOOD

REGIONAL DEVELOPMENT TRENDS, OPPORTUNITIES & CHALLENGES

Iowa produces a fifth of all the corn grown in the US and a sixth of our soy. Nearly a third of all pigs raised in the US are on Iowa farms. Nonetheless, Iowa imports over 80% of its food, with most of it travelling 1,200 miles or more.

However, enthusiasm for locally-produced food has grown in Greater Des Moines and around the country in recent years. Supporters argue that increasing access to locally grown food:

- Reduces reliance on fossil fuels to transport food long distances
- Provides fresher food with more nutrients
- Requires less packaging, processing, and refrigeration than food shipped long distances
- Keeps money in the regional economy

With such a wide range of benefits, increasing the production and distribution of locally grown food could be an important component of planning for a more sustainable future for the region.

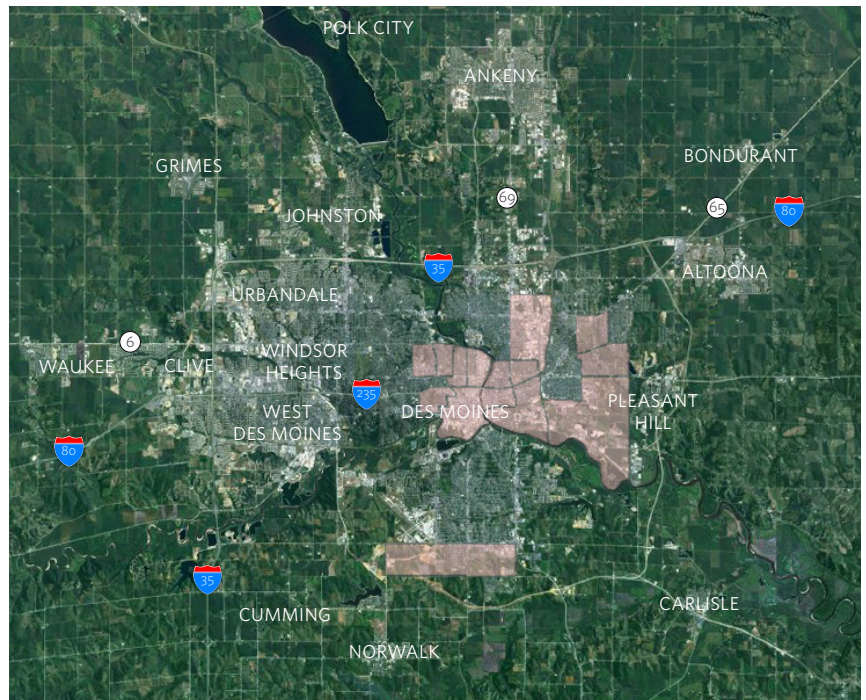
Already, at least a dozen weekly farmers markets provide local food to neighborhoods and communities in The Tomorrow Plan study area. A typical Saturday brings 5,000 to 20,000 people to the Des Moines Downtown Farmers Market where fresh produce and culinary specialties are sold by 200 vendors from around the state.

FOOD DESERTS

Within The Tomorrow Plan study area, approximately 32,200 people or 6.7 percent of the regional population live in “food deserts”—low-income areas with low access to large grocery stores. Nearly 40 percent of these people are children (age 0-17) or seniors (age 65 or over). Nationwide, 4.4 percent of people live in food deserts; in Iowa, the overall rate is 3.4 percent.

Research suggests that people living in food deserts suffer from diet-related health issues such

Census tracts with food deserts (2011)



Source: USDA Food Desert Locator

According to the Healthy Food Financing Initiative, a federal partnership to expand the availability of nutritious food, a **food desert** is an area within a low-income census tract where a substantial number or share of residents has low access to a supermarket or large grocery store. To qualify as a “low-income community,” a census tract must have either: 1) a poverty rate of 20 percent or higher, OR 2) a median family income at or below 80 percent of the area’s median family income; to qualify as a “low-access community,” at least 500 people and/or at least 33 percent of the census tract’s population must reside more than one mile from a supermarket or large grocery store (for rural census tracts, the distance is more than 10 miles).

as diabetes, obesity, and cardiovascular disease, at higher rates than people with reliable access to mainstream grocery stores. While there are already several initiatives underway to improve access to healthy food in Greater Des Moines, the existence of food deserts is an opportunity to further the conversation about locally grown food, social equity, and housing choice.

MODEL SUSTAINABLE DEVELOPMENT PRACTICES

While this report focuses on assessing the present sustainability of Greater Des Moines, The Tomorrow Plan's goal of preparing for a more sustainable future must be kept in mind. Accordingly, this section summarizes best practices from across the United States in the five thematic areas of sustainability. Some of these practices are already underway in the region, while others may be beneficial additions in the future.

Each and every community in the Greater Des Moines region is doing its part to develop sustainable practices. While it is not possible to list them all in this document, this section represents an array of national best practices. They may not all be appropriate for implementation in Greater Des Moines, but do provide an opportunity for education and discussion at the very least.

BEST PRACTICES: NATURAL ENVIRONMENT

Historically, Midwestern settlements experienced a close relationship with the land, working in concert with the region's climate, landscape, ecology, and wildlife. Today, modern patterns of life are more separate from the natural environment, although the need for sensitive ecological planning is no less prominent.

Ecosystems—and the problems they face—are inherently complex, and decisions about how to manage natural resources require a dose of good judgment in addition to sound science. For this reason, local knowledge that comes from long-term observation and interaction must be a basis for environmental policy decisions.

The next section discusses issues and best practices focused on the Natural Environment, which includes hydrology, landscape and ecology, and climate change.

HYDROLOGY

Hydrology refers to the network of waterways and water bodies that run through a region. From an ecological perspective, hydrological systems are best studied and planned for at the watershed scale.^{1,2} The water levels and flows in different watersheds are closely tied to the regional climate and the water cycle, which influence the annual rainfall and seasonal cycles. Watersheds may be small, like the watershed of a stream, or vast, like the Mississippi River watershed. One significant challenge to planning and hydrological resource management is that watershed boundaries frequently cross legislative boundaries.

Traditional water management approaches, such as dams and engineered management systems, provide a host of benefits while also significantly

impacting the resilience of surrounding ecosystems.

As scientists and planners develop a deep understanding of the connections between water quality and the capacity of surrounding ecosystems to improve and preserve that quality, there is an increased reliance on natural and engineered ecosystems to provide water treatment as a biological service. Revegetation of steep slopes, the establishment of vegetative buffers, and constructed wetlands are examples of the planned use of ecological services to preserve water quality.

On a larger scale, planners also may restrict development and the use of sensitive watershed areas. Intact forests, prairies, and wetlands may be used to serve the same function as a dam, in that they can absorb, treat, and slowly release stormwater. Some jurisdictions are planning dam removals,³ while others provide facilities for migrating fish to navigate around dams. Protection from flooding either from increased river flows or rising sea levels may be accomplished using natural buffers (e.g. wetlands, greenbelts, or designating parcels of land to accommodate flood surges), land planning practices (policies prohibiting development in flood zones or stormwater taxes per volumes of runoff), and engineered barriers (levies or investment in larger holding and water treatment facilities). Engineered barriers—called gray infrastructure—are the most expensive and ecologically disruptive solution, though the agencies that pay for those solutions may be different from the agencies that will benefit financially from lowland development. In many areas, developers that destroy wetlands must pay to construct an equivalent area of wetland elsewhere.⁴

1 Maryland Department of Natural Resources, "A User's Guide to Watershed Planning in Maryland", n.d., <http://dnr.maryland.gov/watersheds/pubs/userguide.html>.

2 State of Washington, "Watershed Plan - Development and Implementation | Washington State Department of Ecology", n.d., <http://www.ecy.wa.gov/watershed/>.

3 MSNBC, "Largest dam removal in US history gets started - US news - Environment - msnbc.com", n.d., http://www.msnbc.msn.com/id/44554709/ns/us_news-environment/t/largest-dam-removal-aims-bring-salmon-back/.

4 North Carolina Ecosystem Enhancement Program, "North Carolina Ecosystem Enhancement Program", n.d., <http://portal.ncdenr.org/web/eep>.

Best practice examples: Hydrology

- California Marine Life Protection Act (<http://www.dfg.ca.gov/mlpa/>)
- New York City Watershed Program (<http://www.dec.ny.gov/lands/25599.html>)
- Integrated Flood Management (http://www.apfm.info/ifm_tools.htm)
- North Carolina Ecosystem Enhancement Program

LANDSCAPE AND ECOLOGY

Regional landscape and ecology are characterized by different ecosystems—including forests, wetlands, and open prairies—as well as wildlife and wildlife habitat. Different ecological systems can vary dramatically across a region, as can the needs of particular species.

Healthy landscapes and ecosystems are of great value to people.

- Humans use undeveloped areas for a wide range of uses, including recreation, hunting, farming, forestry, mining, and pharmaceutical production.
- The natural environment also provides many ecological services,⁵ including filtering water and air; producing oxygen and sequestering greenhouse gases like carbon dioxide; pollinating plants and agricultural crops; preventing land erosion; and, providing natural protection and shelter from fire, flood, wind, and severe storms.
- There also is significant evidence that contact with natural systems is beneficial to human health, reducing blood pressure, stress levels, and healing time after injuries,⁶ and increasing attention spans⁷ and elevating moods.

Urban, suburban, and rural development

⁵ USDA, “Ecosystem Services”, n.d., <http://www.fs.fed.us/ecosystems/services/>.

⁶ Ulrich, Roger, “Effects of Healthcare Environmental Design”, n.d., <http://www.designandhealth.com/uploaded/documents/Publications/Papers/Roger-Ulrich-WCDH2000.pdf>.

⁷ Kaplan, Stephen, “The Restorative Benefits of Nature”, n.d., http://www.ideal.forestry.ubc.ca/frst524/09_kaplan.pdf.

practices—namely patterns of Land Use, Infrastructure choices, usage of Hydrological Systems, and Food Systems—have a strong impact on the health of surrounding ecological systems and the species within them. On one hand, settlements can exert a negative impact on the integrity of the landscape when they significantly destroy or fragment habitat through development, species destruction, major physical disruption, pollution, and the introduction of invasive species.

On the other hand, land use management can have a neutral or positive impact by:

- Preserving or reconstructing habitats;
- Cleaning up pollution;
- Supporting bio-diverse ecosystems;
- Avoiding habitat destruction; and,
- Using policy to encourage development to have a low ecological impact and ultimately promote the resilience of natural systems.

Working with nature rather than against it often increases the tangible and financial rewards of human efforts, particularly over longer periods of time. This perspective takes into account human reliance on ecological systems for survival and acknowledges that people also are a part of those systems.

Best practice examples: Landscape and ecology

Levies for Natural Services:

Minneapolis Stormwater Utility Fee

(<http://www.ci.minneapolis.mn.us/stormwater/fee/>)

Since March of 2005, the costs for providing stormwater management have been listed as a separate line item on the City’s utility bills. In the past, those costs were included as part of customers’ sewer charges.

Minneapolis, like other urban environments, has a significant amount of impervious area (hard structures or surfaces, such as building rooftops, asphalt, or concrete), which stops stormwater

(rain or melting snow) from naturally absorbing into the ground. In an urban environment, the amount of impervious area on a property is the most significant factor affecting stormwater quality and quantity.

People that use effective stormwater management practices on their properties can apply to receive reductions in their monthly stormwater utility fee. See “Applying for Stormwater Credits” for more information.

Nebraska Natural Resource Districts

(http://www.papionrd.org/about_nrd/nrd_history_and_purpose.shtml)

Nebraska’s Natural Resources Districts (NRDs) were created in 1972. The NRDs are multi-county governments with broad responsibilities to protect the natural resources of the state. Major Nebraska rivers form the NRD boundaries, enabling the NRDs to engage in watershed planning and to respond to local needs. Funding is derived from property taxes, generally amounting to less than 2 percent of property taxes collected in each district. NRD programs include flood control, recreation facility management, wildlife habitat improvement, water quality, soil conservation, and education.

CLIMATE CHANGE

Iowa’s temperate climate shapes the regional landscape, flood risks, and agriculture. However, the Iowa Climate Change Impacts Committee reported in 2011 that the state has seen “warmer winters, longer growing seasons, warmer nights, higher dew-point temperatures, increased humidity, greater annual stream flows, and more frequent severe precipitation events”⁸ in the past few decades than were prevalent over the last 50 years. These trends are expected to continue. As weather patterns change, humans will need to adapt to changed living conditions and sometimes greater threat of natural disaster.

Because there are many ways that the climate can change, and many constraints on adjusting

behavior and existing infrastructure, there are many techniques available for climate adaptation, including these measures articulated by the EPA. Natural systems, such as floodplains, marshes, and intact ecosystems, can be used to absorb the impacts of changing weather patterns. Development policies can prohibit new development in high-risk areas or can move development out of those areas. Lastly, legislative bodies often approach the question of how to reduce greenhouse emissions by articulating Climate Action Plans (CAP), in which policymakers set reduced emissions goals and prioritize strategies to reduce emissions.

Best practice examples: Climate change

EPA Measures for Climate Adaptation

Human Health

- Many diseases and health problems that may be exacerbated by climate change can be effectively prevented with adequate financial and human public health resources, including training, surveillance and emergency response, and prevention and control programs.
- Urban tree planting to moderate temperature increases
- Weather advisories to alert the public about dangerous heat conditions
- Grain storage, emergency feeding stations
- Adjusting clothing and activity levels, increasing fluid intake

Coastal Areas and Sea Level Rise

- Developing county-scale maps depicting which areas will require shore protection (e.g. dikes, bulkheads, beach nourishment) and which areas will be allowed to adapt naturally
- Analyzing the environmental consequences of shore protection
- Promoting shore protection techniques that do not destroy all habitat
- Identifying land use measures to ensure that wetlands migrate as sea level rises in some

8 “Climate Change Impacts on Iowa 2010 - Complete Report.”

areas

- Engaging state and local governments in defining responses to sea level rise
- Improving early warning systems and flood hazard mapping for storms
- Protecting water supplies from contamination by saltwater

Agriculture and Forestry

- Altering the timing of planting dates to adapt to changing growing conditions
- Altering cropping mix and forest species that are better suited to the changing climatic conditions
- Breeding new plant species and crops that are more tolerant to changed climate condition
- Promoting fire suppression practices in the event of increased fire risk due to temperature increases
- Controlling insect outbreaks

Ecosystems and Wildlife

- Protecting and enhancing migration corridors to allow species to migrate as the climate changes
- Identifying management practices that will ensure the successful attainment of conservation and management goals
- Promoting management practices that confer resilience to the ecosystem

Water Resources

- Altering infrastructure or institutional arrangements
- Changing demand or reducing risk
- Improving water use efficiency, planning for alternative water sources (such as treated wastewater or desalinated seawater), and making changes to water allocation
- Conserving soil moisture through mulching and other means
- Protecting coastal freshwater resources from saltwater intrusion

Energy

- Increasing energy efficiency to offset increases in energy consumption due to warming
- Protecting facilities against extreme weather events
- Diversifying power supply in the event of power plant failures due to excess demand created by extreme heat, or by extreme weather events⁹

Maryland Commission on Climate Change (<http://www.mdclimatechange.us/twg.cfm>)

Washington State Integrated Climate Response Strategy (http://www.ecy.wa.gov/climatechange/ipa_responsestrategy.htm)

BEST PRACTICES: BUILT ENVIRONMENT

LAND USE

Land use choices have significant impacts on communities and the natural environment, which range from habitat impacts, preservation initiatives, pollution, and greenhouse gas emissions. Human effects on the natural environment are described in the Hydrology, Landscape and Ecology, and Climate Change sections.

Suburban expansion has accelerated in recent years, earning the name “sprawl.”¹⁰ Each type of land use and adjacency has a variety of ramifications. Widely distributed cities with separated job and housing centers establish a land use condition in which it is imperative that most people drive to most destinations. This urban form:

- Increases commuting times;
- Increases carbon emissions from private

9 EPA, “Adaptation | Climate Change - Health and Environmental Effects | U.S. EPA”, n.d., <http://www.epa.gov/climatechange/effects/adaptation.html>.

10 Christina Rosan, “Metropolitan governance and local land use planning in Boston, Denver, and Portland” (Massachusetts Institute of Technology, 2007), <http://dspace.mit.edu/handle/1721.1/42258>.

transportation;¹¹

- Renders public transit inefficient in many areas;
- Consumes a large amount of land area per person;
- Necessitates larger, more expensive infrastructure systems;
- Increases the proportion of land covered with impermeable surfaces, thereby worsening flood risks and heat island effects;¹²
- Fragments ecosystems; and,¹³
- Can have negative effects on health and community ties.¹⁴

Because of the negative impacts of sprawling development, many planning agencies have explored recently been implementing “smart growth” models of development.¹⁵ Smart growth models emphasize infill development, neighborhood revitalization, mixed uses, and denser development. They also aim to support health and climate change mitigation by making walking and biking viable transportation choices, and by making transit efficient and widely available. Smart growth creates more livable, less resource intensive communities, and preserves open spaces and agricultural lands. It also may encourage a mix of housing types and household incomes in each neighborhood. Because jobs and housing options are mixed, commutes are shorter and congestion is eased. Another example of

11 Stanford University, “Alternative Transportation : Commute Cost & Carbon Emissions Calculator”, n.d., http://transportation.stanford.edu/alt_transportation/calculator.shtml.

12 Bernadette Hanlon, “Cities and suburbs: new metropolitan ... - Bernadette Hanlon, John R. Short, Thomas J. Vicino - Google Books”, n.d., http://books.google.com/books?id=9ZLhjE4cFwcC&pg=PA164&lpg=PA164&dq=suburbs+impermeable&source=bl&ots=v0ai7RexX0&sig=bgP8K-u1DhMKuRsc5MXsyxFggUM&hl=en&ei=hlG8Tq7RBKTCOAGvpjTBA&sa=X&oi=book_result&ct=result&resnum=1&ved=0CB4Q6AEwAA#v=onepage&q=suburbs%20impermeable&f=false.

13 Sarah Jack Hanners, “Pollination in an Urbanizing Landscape: Effects of Habitat Fragmentation on Wild Bee Assemblages”, December 30, 2004.

14 Consortium for Atlantic Regional Assessment, “Land Use and Health - Cities and Suburbs”, n.d., http://www.cara.psu.edu/tools/lu-health/cities_and_suburbs.asp.

15 “Smart Planning - Rebuild Iowa Office”, n.d., http://www.rio.iowa.gov/smart_planning/index.html.

lower-impact land use is cluster development, which focuses on clustering development in one part of a land parcel and preserving the majority of the parcel as open space. This approach promotes keeping ecosystems intact and provides open space for nearby residents to enjoy.¹⁶ Cluster development, like smart growth, also may promote community and walking throughout the neighborhood.

For industrial land uses, planners and developers have begun creating eco-industrial parks, in which businesses cooperate with one another and the community to operate efficiently and use as many of each other’s by-products as possible. The industrial ecology systems can take many forms, including using the off-gas from landfills for power, heating districts with waste heat from power generation, wastewater cascading, and using industrial by-products, like steam or gypsum, as inputs for other processes.¹⁷

Best practice examples: Land use

- Smart Growth in Lancaster, Pennsylvania (http://www.epa.gov/dced/awards/sg_awards_publication_2009.htm#overall_excellence)
- Mixed-use and cluster development in Reston, Virginia (<http://www.planning.org/planning/2011/aug/reston.htm>.)

INFRASTRUCTURE

Infrastructure—including roads, utilities, and sewers—are the systems that underpin the economy and define the way people move through society. These systems not only support various lifestyles but also impact the natural environment that they run through and may be sourced from. There are six major types of infrastructure to consider. Each of these types of infrastructure has different impacts on human lives and the environment, and each has established and evolving best practices for

16 Matthew Mega, “Residential Cluster Development: Overview of Key Issues”, n.d., <http://www.extension.umn.edu/distribution/naturalresources/components/7059-01.html>.

17 Smart Communities Network, “Smart Communities Network: Introduction to Industrial Ecology”, n.d., <http://www.smartcommunities.ncat.org/business/parkintro.shtml>.

lowest-impact functioning. The focus here is primarily on the impacts of the design of the infrastructure itself. The following best practices are organized by infrastructure type.

Best practice examples: Infrastructure

Vehicular transportation, including roads, transfer stations, sidewalks, bridges, driveways, parking lots, and parking structures.

- Complete Streets in Missouri (<http://mobikefed.org/2011/04/complete-streets-missouri-policies-named-among-top-nation>)
- Low-Impact development in Seattle (http://www.seattle.gov/util/About_SPU/Drainage_&_Sewer_System/GreenStormwaterInfrastructure/NaturalDrainageProjects/StreetEdgeAlternatives/)

Rail transportation, including railroad tracks, switching yards, service yards, and mode transition areas.

- Light Rail in Phoenix, Arizona (<http://www.azcentral.com/news/traffic/lightrail/articles/2010/05/06/20100506phoenix-light-rail-record.html>)
- Amtrak

Shipping, including ports, maintenance and storage facilities, canals, lighthouses, buoys, and dredged areas.

- San Antonio, Texas River Walk (<http://www.thesanantonioriverwalk.com/>)
- Providence, Rhode Island River Walk (http://www.pps.org/great_public_spaces/one?public_place_id=86.)

Hydrological infrastructure including dams, reservoirs, engineered waterways, levees, dykes, gutters, drains, culverts, swales, retention ponds, water tanks and cisterns, aqueducts, canals,

pumping stations, irrigation systems, and water delivery systems.

- Allowing water to flow unimpeded is the best way to maintain healthy natural systems. Alternatively, people can rely on strategically managed ecosystem services, like engineered wetlands or selectively flooded areas. In many places, humans also rely on ‘grey infrastructure,’ such as dikes and levees. In order to minimize the use of water and negative impacts on natural systems, planners and municipal staff often encourage household water conservation.¹⁸ They also may restrict agricultural water use, discourage heavily water-dependent crops in dry climates, and require particular water volumes in natural waterways. New developments can be required to retain all stormwater on site or to release it gradually into the watershed after storm events. Stormwater releases can be coordinated across municipalities to avoid overwhelming systems.

Sewers, including household, industrial, and stormwater sewers, which may or not be separated, as well as water treatment centers of various types

- Philadelphia Green Infrastructure and combined sewer savings (http://cfpub.epa.gov/npdes/greeninfrastructure/gicasestudies_specific.cfm?case_id=62)
- Green infrastructure in Lexana, Kansas (http://cfpub.epa.gov/npdes/greeninfrastructure/gicasestudies_specific.cfm?case_id=75.)

Energy delivery systems, including renewable and non-renewable power production centers, power lines, transfer stations, electric car charging stations, and battery systems.

- Solar energy in Wisconsin (<http://www.jsonline.com/business/70162512.html>)

¹⁸ EPA, “How to Conserve Water and Use It Effectively | Polluted Runoff | US EPA”, n.d., <http://water.epa.gov/polwaste/nps/chap3.cfm>.

- Wind energy in Nebraska (<http://www.nrdc.org/energy/renewables/nebraska.asp>)
- Biomass in Ohio (<http://www.nrdc.org/energy/renewables/ohio.asp>)

TRANSPORTATION

As legislators and planners become more aware of the advantages and disadvantages of each mode of transportation, best practices have been shifting. Great emphasis is being placed on reducing the carbon emissions of transportation and on increasing the number of trips made using public transportation and non-motorized modes.¹⁹

Carbon emissions can be reduced by:

- Shortening average trip length by co-locating jobs, housing, and amenities;²⁰
- Locating housing and other development near public transportation lines (called Transit Oriented Development, or TOD);
- Increasing population density (smart growth);
- Increasing public transit ridership by offering efficient, inexpensive, pleasant transit options, like a Bus Rapid Transit (BRT), subway, and commuter rail systems;
- Increasing the amount of locally-produced goods and food by encouraging farming and local manufacturing;
- Easing access to local goods by supporting markets and other local distribution methodologies;
- Increasing non-motorized transportation by providing comfortable sidewalks, trails, dedicated bike lanes, bike facilities, and integration with the transit system; or,
- Reducing requirements for parking and road infrastructure by changing legislation.

¹⁹ EPA, "Basic Information | Transportation and Climate | US EPA", n.d., <http://www.epa.gov/otaq/climate/basicinfo.htm>.

²⁰ EPA, "Tools, Analysis, & Publications | Transportation and Climate | US EPA", n.d., <http://www.epa.gov/otaq/climate/publications.htm#basic>.

Planners and legislators are increasingly practicing comprehensive planning, which seeks to unify or coordinate the planning processes and goals used for particular planning disciplines. Comprehensive plans incorporate a wide range of variables, including transportation, land use, ecology, infrastructure, economy, and community concerns. Best practices for determining transit routes are, therefore, practices of creating beneficial relationships between transportation and other elements, like housing and job centers. Best practices for the infrastructure of transportation are discussed in the Infrastructure section.

Best practice examples: Transportation

- Transit Oriented Development (TOD), South Orange, New Jersey (http://www.njslom.org/magart_1006_p46.html.)
- Bus Rapid Transit (BRT) Lines, Denver, Colorado (http://www.rtd-fastracks.com/main_104.)
- CA's Sustainable Communities legislation (SB-375) (<http://www.arb.ca.gov/cc/sb375/sb375.htm>)
- TriMet Max Light Rail Service, Portland, OR (<http://trimet.org/max/>)

AIR QUALITY

Air quality reflects the amount of pollution emitted into the air by industry and other human activities, and is tied closely to issues of land use, climate, infrastructure, transportation, and public health. Air quality has significant impacts on public health, environmental health, and climate. Types of outdoor air pollution include particulates resulting from all forms of burning, as in power generation, transportation, incineration, and wood fires; industrial by-products; greenhouse gasses; acid rain; and, chlorofluorocarbons. Common indoor air pollutants include volatile organic compounds; chemical by-products; carbon monoxide; mold; and, radon. The quality of polluted air can be improved by organic treatment provided by plants or by filtration. Because the air is

always in motion, air pollution may have effects in locations far removed from production locations.²¹

Best practices for addressing air pollution focus on reducing and controlling the production of pollutants, and reducing pollutant impacts through dilution and placement of pollution sources. For outdoor air pollution, many types of restriction on pollution sources may be implemented. These include bans on burning at particular times of year,²² or when pollution levels are high; restrictions on vehicle emissions implemented through smog testing, miles per gallon requirements, or the promotion of low-emissions vehicles; and, particulate or greenhouse gas emission allowances for industries. Indoor air pollution can be reduced by air filtration; construction practices or legislation that restrict the use of harmful chemicals, and the use of materials containing harmful chemicals; and, control of household and commercial goods and furnishings to restrict harmful chemicals from entering homes and workplaces. Adequate ventilation helps to reduce pollution concentrations and effects. Ventilation can be controlled by users and building managers in indoor locations.²³ Outdoors, individuals can remove themselves from sources of pollution, and agencies can ensure adequate buffer spaces between pollution sources and population or recreation centers.

Best practice examples: air quality

- “Spare the Air” program in the San Francisco Bay Area, California (<http://sparetheair.org/>)
- Pollution monitoring, control, and reporting in Nashville, Tennessee (<http://health.nashville.gov/ENV/AirPollution.htm>)
- Yearly outdoor burn bans in Georgia²⁴

21 EPA, “Air | Browse EPA Topics | US EPA”, n.d., <http://www.epa.gov/ebtpages/air.html>.

22 Georgia Forestry Commission, “GeorgiaBurnBan”, n.d., <http://www.gatrees.org/ForestFire/GeorgiaBurnBan.cfm>.

23 Consumer Safety Commission, “The Inside Story: A Guide to Indoor Air Quality”, n.d., <http://www.cpsc.gov/cpscpub/pubs/450.html>.

24 Georgia Forestry Commission, “GeorgiaBurnBan.”

WATER QUALITY

Regional water quality reflects the behaviors of cities and suburbs, industry, and agriculture—in addition to runoff from communities located upstream. Water may be polluted with organic or inorganic materials. Organic materials include:

- Silt, the result of erosion;
- Microorganisms and pathogens, which frequently come from human and animal sewage. Microorganisms also may be naturally occurring and may be thrown into a case of ecological imbalance by other water pollutants, like excess nutrients.
- Excess nutrients may be either biologically or chemically derived and may cause algal blooms. Excess nutrients frequently are fertilizer runoff from agricultural or landscaping sources.

Inorganic pollutants include industrial chemicals; pharmaceuticals;²⁵ fertilizer and pesticides; and, oil and fuel. These chemicals may be introduced to waterways through industrial discharge, sewer treatment discharge, and stormwater runoff.²⁶ Like air pollution, water pollution has both public health and environmental effects.

Water may be cleansed or disinfected through natural or artificial filtration systems, chemical treatment, oxidization, and other treatments.

Best practice examples: Water quality

- New York City watershed program²⁷
- Street Edge Alternatives, Seattle, Washington (http://www.seattle.gov/util/About_SPU/Drainage_&_Sewer_System/GreenStormwaterInfrastructure/NaturalDrainageProjects/StreetEdgeAlternatives/)

25 “The Associated Press: Pharmaceuticals found in drinking water, affecting wildlife and maybe humans”, n.d., http://hosted.ap.org/specials/interactives/pharmawater_site/day1_04.html.

26 EPA, “Water > Water Pollution | Browse EPA Topics | US EPA”, n.d., <http://www.epa.gov/ebtpages/watwaterpollution.html>.

27 “New York City Watershed Program - NYS Dept. of Environmental Conservation.”

Additional best practices

- Installing distributed natural filtration systems, like bio swales, retention areas, and wetlands
- Full-cost pricing for water supply and treatment for all customers²⁸
- Monitoring and control of pharmaceuticals or active pharmaceutical ingredients released from industrial uses and municipal treatment plants
- Monitoring of pharmaceutical levels in drinking water
- Requiring high levels of purity in industrial runoff, up to drinking-water quality
- Erosion control measures at construction, agricultural, mining, and forestry sites to prevent erosion and silt accumulation
- Oil capture systems for runoff from roads, parking lots, and similar areas
- Preventing human and animal sewage from entering waterways
- Monitoring water supplies for microorganism contamination

PUBLIC HEALTH

The built environment impacts public health by shaping movement, social behavior, exposure to pollutants, and improved quality of life for the regional community.²⁹ Human health is optimized when people have access to clean air, water, and food. Humans should eat fresh, low-fat foods, exercise regularly, and have strong community ties. The physical environment has a large impact on public health. Effects can be seen not only in individuals but also in neighborhoods and communities.

Best practice examples: Public health

- Beacon Hill Village, Boston- Aging in Place (Jane Gross, "Aging at Home: For a Lucky
- 28 "GO TO 2040 -- Chicago Metropolitan Agency for Planning", n.d., <http://www.cmap.illinois.gov/2040/main>.
- 29 Andrea Bernstein, "NYC Health Commissioner: Urban Design is a Public Health Issue | Transportation Nation", n.d., <http://transportationnation.org/2010/11/19/nyc-health-commissioner-urban-design-is-a-public-health-issue/>.

Few, a Wish Come True - New York Times", n.d., <http://www.nytimes.com/2006/02/09/garden/09care.html?pagewanted=all>)

- Los Angeles County's Model Manual for Living Streets (<http://www.theatlanticcities.com/commute/2011/10/combating-obesity-street-design/256/>)

Additional best practices

- Encourage walking, biking, and other non-motorized transportation uses by establishing safe, pleasant routes and locating destinations within short distances of each other
- Ensure access to fresh, healthy, affordable food
- Create buffer zones around pollution sources like highways to lower pollution exposures
- Develop collaborative projects between planning, public health, and public works agencies³⁰
- Allow infill development, increased density, and mixed uses in established suburban neighborhoods
- Allow accessory units or "granny flats"³¹
- Allow denser, mixed-use new development
- Site development near existing transportation nodes³²
- Create and require pleasant streetscapes

BEST PRACTICES: ECONOMY

ECONOMIC DEVELOPMENT

Economic development efforts such as business recruitment and the creation of additional public amenities impact the attractiveness of the region

30 San Francisco Planning Department, "San Francisco Planning Department : WalkFirst", n.d., <http://www.sf-planning.org/index.aspx?page=2568>.

31 Haya El Nasser, "USATODAY.com - 'Granny flats' finding a home in tight market", n.d., http://www.usatoday.com/news/nation/2004-01-05-granny-flats_x.htm.

32 Brenda Wilson, "Riders Who Take Mass Transit Regularly May Lose Weight : Shots - Health Blog : NPR", n.d., http://www.npr.org/blogs/health/2010/06/30/128210165/riders_who_take_mass_transit_regularly_may_lose_weight.

as a place to live, work, learn, and play. Regions and municipalities use many strategies to build and support local and existing businesses, and to attract new businesses. Businesses generally are attracted to areas that have previously trained work forces in their areas of expertise, workforce development support, and potential spillover effects from other businesses in the same or related fields. Allowing businesses to be located near homes or in mixed-use commercial centers may be attractive, particularly because workers will enjoy working in these locations. On the social side, workers want to live in areas rich in public amenities, like cultural, educational, and recreational facilities, which also have a rich civic life, affordable housing, and high-quality educational systems. Workers that wish to remain in one location throughout their lives will seek communities where it is possible to age in place. Knowledge workers, in particular, are attracted to and can afford to live in areas with many amenities. Areas that wish to attract and retain businesses should strive to provide a unique sense of place where people truly want to live.

Best practice examples: Economy

- Oakland Green Jobs Corps³³
- Indiana Skills Enhancement Fund³⁴
- Denver Office of Economic Development³⁵

GOVERNANCE

Governance determines the policy- and decision-making process as well as the allocation of public funding. Regional governance systems are discussed in detail in the introductory pages of this section and will be an essential vehicle—along with the many local champions in local government—to foster the short- and long-term implementation of The Tomorrow Plan.

³³ “Ella Baker Center : Oakland Green Jobs Corps”, n.d., http://www.ellabakercenter.org/index.php?p=gcjc_green_jobs_corps.

³⁴ Indiana Economic Development Corporation, “Indiana - Skills Enhancement Fund”, n.d., <http://iedc.in.gov/programs-initiatives/skills-enhancement-fund>.

³⁵ City of Denver, “Denver Office of Economic Development”, n.d., <http://www.denvergov.org/Default.aspx?alias=www.denvergov.org/oed>.

In addition, agencies have significant opportunities to advance sustainability simply by optimizing their own operations. Governmental spending on operations represents a significant proportion of the dollars spent in the economy. Key leverage points are found in purchasing, building practices for new buildings and retrofits, staff resource use, and, perhaps most importantly, inter-agency collaboration. Agencies may implement low-impact purchasing policies, requirements that all new government buildings and retrofits conform to particular sustainability guidelines (like LEED), and encourage staff to use fewer resources through educational programs and posted reminders. Proactive retrofit programs of agency-operated systems, such as street light replacement programs or setting all printers to print double-sided, also increase agency efficiency. Inter-agency collaboration leverages expertise, ensures that everyone working on a particular issue has adequate data, and prevents agencies from working at cross purposes with another. This effect is amplified with multi-jurisdictional planning practices.

Agencies also may offer support programs for sustainable behaviors and initiatives. These programs may be agency run and administered, like some community gardens or appliance rebate programs, or may be run by other organizations, like a green jobs training program or non-profit grocery chain serving low-income neighborhoods.

Best practice examples: Governance

- Oakland Green Jobs Corps, Oakland, California³⁶
- Green Building Hotline and Resource Center, Portland, Oregon³⁷
- Residential Energy Conservation Ordinance, Berkeley, California³⁸

³⁶ Ella Baker Center, “Oakland Green Jobs Corps”, n.d., http://www.ellabakercenter.org/index.php?p=gcjc_green_jobs_corps.

³⁷ City of Portland, “Green Building Hotline and Resource Center.”

³⁸ City of Berkeley, “RECO Information - City of Berkeley, CA.”

EDUCATION

High-quality education is a major factor for success at all scales and, thus, an important element of a sustainable economy. Education serves the community in many ways and at many different levels: Children that attend high quality schools are placed at a relative advantage for earning potential,³⁹ and, as students mature, the availability of high-quality continuing education in professional, technical, and academic projects areas allows residents to remain in the community. The availability of educational institutions and a trained and educated workforce also serves to attract both businesses and skilled workers to the area.

American educational systems currently are undergoing changes at many levels. In the public sector, schools and colleges are experiencing significant budget and program cuts. In the private sector, budgeting, recruitment tactics, and degree values are being questioned by the federal government, particularly regarding for-profit institutions. Education is the bedrock of an advanced economy, however, leading to a best practice of valuing and funding educational institutions in all economic circumstances as stabilizers in the present, and investments in the future.

Schools also can be hubs for learning about natural systems, resource efficiency, and nutrition. School programs that teach children about climate change, biology, ecology, water and energy conservation, and nutrition will better enable the community to understand and easily adopt healthy and sustainable behaviors.

Best practice examples: Education

- California Department of Education School Garden Program provides nutrition and ecological training⁴⁰
- Laramie County Community College provides

³⁹ USA Today, "Amount of schooling affects earning potential", July 18, 2002, <http://www.usatoday.com/news/nation/census/2002-07-18-degree-dollars.htm>.

⁴⁰ "School Garden Program Overview - Healthy Eating & Nutrition Education (CA Dept of Education)", n.d., <http://www.cde.ca.gov/ls/nu/he/gardenoverview.asp>.

academic and professional programs, and direct transfers to The University of Wyoming⁴¹

BEST PRACTICES: COMMUNITY

PLACEMAKING

The distinctive qualities of a place determine regional competitiveness and quality of life. Key components of placemaking include shared history, arts and culture, civic engagement, connection to the natural world, and public safety. When a space has a sense of place, one can stand in the space and feel or see that it has a history, meaning for the people who created it, and uniqueness. This sense of uniqueness and the pleasantness brought by long care are deeply appealing. They help humans to understand the environment and feel that they have a place in it. A sense of place cannot be created in a day or in a year. Rather, a sense of place is the result of the influence of years of use and small changes, the passage of time, and community ownership of and belonging in a place.

Placemaking can be enhanced, however, by strategies of encouraging uniqueness and identity through neighborhood branding and preservation of historic districts. Civic engagement programs that build ownership of a place through service or general knowledge and enjoyment also build connections to places. Civic engagement can be built through volunteer programs, opportunities to engage in community decision making, use of civic facilities, and public events and entertainment. Finally, the revelation of or connection to the natural environment is a significant determinant of place. Understanding the ecological system that an individual is in is deeply grounding and enjoyable, as evidenced by the popularity of river walks, mountain views, parks, and the like.⁴² A natural context can be

⁴¹ Laramie County Community College, "Laramie County Community College, Wyoming", n.d., <http://www.lccc.wy.edu/>.

⁴² Susan Clayton and Gene Meyers, Conservation

established by establishing views of open space, access to open space, and parks that punctuate urban areas and may be filled with native species.

Best practice examples: Placemaking

- Bentonsport, Iowa, National Historic District (<http://www.bentonsport.com/>)
- Silver City Main Street Project, New Mexico (<http://www.silvercitymainstreet.com/>)
- Providence, Rhode Island, Riverwalk (http://www.pps.org/articles/what_is_placemaking/)

COMMUNITY

Sense of community is an intangible thing, related to civic pride, sense of place, and personal connections. Access to public facilities and services can strengthen ties within a community. A vibrant community and a strong sense of place are in some ways interdependent. Familiar places are vessels for meaning, shared experience, and memory.⁴³ A community grows out of repeated interactions in a place. These interactions lead to friendships, pride for one's group or community, and a shared vision for the future of the community and its place that one is willing to work to achieve. Places with a strong sense of community are very appealing places to live and do business.

Municipalities can work to build and support community. One of the first steps to building community is to provide spaces for gathering and community interaction. These spaces should be equitably provided by area and income level, and may consist of community centers, recreation facilities, parks, plazas, or vibrant commercial strips where one can stop and enjoy a meal or beverage with friends.

Civic pride can be promoted in a number of ways. The first is to ensure that residents believe that their actions and opinions are important to and affect the community at large. They are

Psychology: Understanding and promoting human care for nature (Wiley-Blackwell, 2009).

43 Project for Public Spaces, "What is Placemaking?" « Project for Public Spaces - Placemaking for Communities », n.d.,.

a part of the community. Shared achievements, attractive and unique civic places and buildings, well-maintained infrastructure, and public entertainment also build civic engagement and pride. There are many layers and sub-sets within each community. One aspect of community that provides a sense of solidarity, dedication, and evolution is the integration of people of all ages into all aspects of the community. When one can live and obtain fulfillment in a place at any stage of life, and where one is connected to people that are in other stages of life, one can truly put down "roots," and community life is much fuller. High-quality education and play spaces support younger members of the community. Recreation, employment, education, and housing support younger adults, while older adults appreciate access to appropriate recreation facilities, exercise opportunities, ongoing education, and the ability to live independently as part of the community. Another way that municipalities can support community development is to support others interested in its development, like neighborhood associations, community groups, and service organizations.

Best practice examples: Community

- Davis, CA weekly Picnic in the Park (<http://www.davisfarmersmarket.org/picnic>)
- Minneapolis, Minnesota, Neighborhood and Community Engagement Commission (http://www.minneapolismn.gov/ncr/NCEC_Home.asp)

HOUSING

Housing is a central component of the long-term livability of a region. Key considerations include affordability,⁴⁴ equity, location, and homelessness. Housing affordability and availability can have profound effects on the economy, environment, and community of every city. Given the option, most people will tend to gravitate towards pleasant housing that is near their work, services, and open space. However, given the frequent congestion, depressed neighborhoods,

44 HUD, "Affordable Housing - CPD - HUD", n.d., <http://www.hud.gov/offices/cpd/affordablehousing/index.cfm>.

or high real estate prices that often surround employment centers, most people face a variety of tradeoffs when finding housing. In dense and thriving urban centers, many workers commute for long distances to reach their workplaces, particularly if they cannot afford to live closer to the center.⁴⁵ In order to ease this condition, many cities establish affordable housing requirements for all new development, including requirements that a percentage of units be affordable by local standards or that developers pay to build affordable housing elsewhere.

Homelessness is a significant problem in many urban centers. The homeless population is one of the most needy groups and also may be the most difficult to serve given the high incidence of addictions and mental illness amongst the homeless as well as difficulties establishing consistent contact.

Best practice examples: Housing

- Boston, Massachusetts Homeless Services Bureau (<http://www.bphc.org/programs/homeless/Pages/Home.aspx>)
- San Francisco Department of Public Health-Homeless Services (<http://www.sfdph.org/dph/comupg/oservices/homeless/default.asp>)
- US Department of Housing and Urban Development HOPE VI Program (http://portal.hud.gov/hudportal/HUD?src=/program_offices/public_indian_housing/programs/ph/hope6)

BEST PRACTICES: RESOURCE FLOWS

ENERGY

Energy use influences the net carbon footprint for the region. Key considerations include the form of the built environment, including transportation and land use patterns, as well as individual

energy consumption. The focus of this section is on building energy efficiency. Transportation and land use are addressed in previous sections. Residential and commercial buildings account for approximately 39 percent of U.S. energy use and 38 percent of carbon dioxide emissions. Residential buildings alone account for 21 percent of U.S. energy consumption, while commercial buildings account for 18 percent. Transportation accounts for 28 percent, while industry comprises 33 percent of the total.⁴⁶

There are four primary ways to reduce energy consumption in buildings. They are to optimize the use of existing systems, retrofit existing systems, modify inhabitant behavior to be more efficient, and utilize new systems.

Government and non-profit agencies can promote energy efficiency in several ways. Energy efficiency incentives, like subsidized retrofits, rebates on efficient appliances, and programs aimed at collecting and replacing old appliances are effective, as is legislation requiring inventories and retrofits when buildings change hands. Public education on energy and the use of other resource effects public behavior, as do cost increases for resource use in the form of flat increases, stepped increases, or peak-use surcharges. Governments also can invest in many in-building and public facility measures, like efficient streetlights, traffic lights, and other infrastructure.

Best practice examples: Energy

- Durham, North Carolina Home Energy Savings Program (<http://www.ci.durham.nc.us/departments/manager/sustainability/energy.cfm>)
- Fort Fairfield, Maine Streetlight replacement program (<http://energy.gov/articles/maine-community-seeing-things-new-light>)
- San Francisco, California boiler replacement program (<http://energy.gov/articles/san>)

⁴⁵ David Peterson, "The longest commute | StarTribune.com", n.d., <http://www.startribune.com/local/11606766.html>.

⁴⁶ Pew Center for Climate and Energy Solutions, "Buildings Overview | Pew Center on Global Climate Change", n.d., <http://www.pewclimate.org/technology/overview/buildings>.

francisco-turns-heat-push-eliminate-old-boilers)

- Oregon's Clean Energy Works program (<http://energy.gov/articles/oregon-program-aims-create-jobs-save-energy>)

WASTE AND RECYCLING

In 2009, there were 4.3 pounds of municipal waste generated in the U.S. per person per day.⁴⁷ That equates to over 1,500 pounds per year. Thirty-three percent, or about 1.5 pounds per day, of that waste was recycled.

There are many reasons to reduce or eliminate waste production. First, waste production is inefficient in the long term. It means that people are using energy and materials for the sake of convenience and that they are not able or motivated to reclaim these products. They then re-produce identical materials. These materials go on to landfills, where habitat is destroyed and land is irreparably polluted, whether or not the landfills are lined. When humans close the production-to-waste loop through recycling or upcycling materials, the manufacturing process is rendered more efficient overall, slowing resource consumption and preventing significant carbon dioxide production. In 2009, 82 million tons of material was recycled, a carbon savings equivalent to taking 33 million cars off the road.⁴⁸

Almost every resident of the U.S. participates in the waste production process and is aware of recycling programs whether or not they are locally available. Waste programs are extremely visible. Because of this and the generally high understanding of waste and recycling programs, these programs can be excellent vehicles for engaging the public to adopt sustainable behaviors.

Best practice examples: Waste

- Loudoun County, Virginia Recycling Requirements⁴⁹

47 EPA, "Municipal Solid Waste | Wastes | US EPA", n.d., <http://www.epa.gov/osw/nonhaz/municipal/>.

48 Ibid.

49 Loudoun County, "Recycling Requirements."

- Alameda County, CA StopWaste program (<http://www.stopwaste.org/home/index.asp>)

Additional best practices for waste stream reduction and recycling promotion

- Waste reduction programs
- Recycling programs, either separated or single-stream
- Agency policy requiring recycling
- Municipal composting, including in-home and yard bins
- Agency policy requiring composting
- Hazardous waste collection and treatment
- Pay-as-you-throw waste or recycling programs

FOOD SYSTEMS

While most people buy food in supermarkets, where it appears neatly packaged, processed, and wrapped, the food originally comes from the earth. In cities in particular, humans are dependent on a reliable food production and supply system that they have little contact with. Human health depends on farmers, arable land, sunlight, water, and a pollution-free environment. Policy makers influence the functioning of food systems in a number of ways. Land use decisions determine the availability and location of agricultural land, which influences sense of place and average food miles. Agricultural policy initiatives and support determine farming methods and sustainability. Within urban areas, policy makers influence the location of grocery stores, urban agriculture, and farmers' markets, and implement nutrition and educational programs. The following is a discussion of common food-system action areas and best practices for each area.

FOOD DESERTS

Food deserts are receiving an increased amount of attention from the public and policy makers. Food deserts are defined as "low-income census tract[s] where a substantial number or share of residents has low access to a supermarket or large grocery store."⁵⁰ In urban food deserts,

50 USDA, "About the Food Deserts Locator", n.d.,

residents are more than one mile from a store. In rural areas, residents are more than ten miles from a store. Four percent of food deserts are urban.⁵¹ Because these residents are low-income, they may not have access to transportation and may be challenged to reach remote stores. Food deserts are not only an example of inequity; they also are indicators of health and wellness differentials; people that do not have access to healthy, affordable food have a much higher incidence of illness and chronic disease. Some policy makers are supporting businesses and non-profits working to alleviate food deserts by supporting urban farming in impoverished neighborhoods, mobile supermarkets that bring fresh food to a variety of neighborhoods, and the establishment of full-time grocery outlets in food deserts.

Sustainable Agriculture and Farmers' Markets

There are many ways in which agriculture can be promoted and can work to support regional sustainability. Agriculture is a practice that works with and can enhance natural systems. However, it also can be the cause of soil degradation, topsoil loss, soil salinification, habitat destruction, erosion, pollution, and resilient pest strains. Various farming practices have radically different carbon footprints. Factors that increase carbon emissions include the use of petrochemically-derived fertilizers and pesticides, tillage, and equipment passes. Transportation from farm to plate and processing further add to food's carbon footprint. Preserving farmland near population centers and encouraging local farmers' markets encourages a local connection to food production, increases access to fresh food, builds community, and reduces average food miles travelled. Methods of agriculture that rely on little or no tilling prevent carbon releases from the soil and encourage carbon sequestration, as well as reducing equipment passes. Crop rotation that includes nitrogen fixing plantings, like legumes or clover, builds soil quality.

<http://www.ers.usda.gov/data/fooddesert/about.html>.

⁵¹ Melanie Eversley, "Programs cropping up across USA to address 'food deserts' - USATODAY.com", n.d., http://www.usatoday.com/news/nation/2011-07-13-food-deserts-farmers-market-agriculture_n.htm.

Encouraging farmers to plant a diversity of crops and avoid monoculture not only improves the health of intermixed plants but prevents the spread and development of agricultural pests, which may build resistance to pesticides in monoculture areas. Healthy plants save farmers money. The integration of food production and direct retail to local grocery stores or farmers' market patrons encourages farmers to diversify their crops and potentially to implement organic practices. Organic agriculture is more sustainable over the long term, as determined by the United Nations; organic agriculture improves soil quality, avoids water pollution, prevents air pollution, increases biodiversity, avoids the undesirable propagation of genetically modified organisms (GMOs) and offers a range of ecological services that conventional agriculture does not.⁵²

URBAN AGRICULTURE

Private food production, community gardens, urban hydroponic facilities, and urban farms all are examples of urban agriculture. Historically, most families grew fruits and vegetables for private use when they had access to land, either adjacent to their homes or in allotment areas. This practice shifted with wide-scale industrialization, though it returned in the form of victory gardens during the First and Second World War.⁵³ Contemporary concerns about sustainability, interests in slow food, economic hardships, and an interest in supporting local production have led to a resurgence in urban gardening and agriculture. In some low-income areas, food security also is a concern. Some policy makers currently are working on best practices for urban farming on abandoned land, managing direct sales, and accommodating hydroponic and aquaponic facilities. Many areas already allow and support community gardens and urban farms. Urban agriculture facilities, which also

⁵² Food and Agriculture Organization of the United Nations, "Organic Agriculture: What are the environmental benefits of organic agriculture?", 2011, <http://www.fao.org/organicag/oa-faq/oa-faq6/en/>.

⁵³ Cornell University Mann Library, "Harvest of Freedom: The History of Kitchen Gardening in America", n.d., <http://exhibits.mannlib.cornell.edu/kitchengardens/intro.htm>.

may include school gardens, present excellent learning opportunities for children and adults alike. They teach not only where food comes from but what humans really rely on to survive.

NUTRITION

Closely associated with food production is food consumption. The imbalanced diets found across the country are facilitated by easily accessed processed foods and a general decline in physical activity. Nutrition programs in schools, informative reading material, and requirements that food chains prominently post the caloric content of food are all ways to combat diet-related illness and to allow consumers to make educated decisions about their own consumption.

Best practice examples: Food

- Food policy councils (Massachusetts, Connecticut, and more) (<http://mafoodpolicyalliance.org/FoodPolicyCouncil.aspx>)
- New York City, posting food calories on menus (http://articles.cnn.com/2008-01-22/health/calories.menus_1_calorie-counts-calorie-information-menus?_s=PM:HEALTH)
- Kansas City Community Gardens (<http://www.kccg.org/registration>)
- City Slicker Farms, Oakland, CA (<http://www.cityslickerfarms.org/mission-and-history>)
- Baltimarket: Virtual Supermarket Project, Baltimore, Maryland (<http://baltimarket.org/>)

BEST PRACTICES: REGIONAL GOVERNANCE

Regional planning offers the opportunity to achieve metropolitan coordination and significant economic, social, and environmental outcomes. Nevertheless, regional planning is challenging in the United States because the governance systems typically distribute power to individual cities, which fragments the process of land use planning and emphasizes

competition over coordination for the collective good. Despite many forces favoring the status quo, the projections of population growth, changing climate and ecological conditions, and the ongoing drive for sustainable economic growth in the region mean that continuing on the business-as-usual path may challenge some of the very qualities and amenities that are so valued by residents today.

Given the importance of regional governance as a mechanism for implementing major regional change, the next section discusses governance and different forms of metropolitan coordination in more detail. The latter sections discuss different themes relating to sustainability—the Natural Environment, Built Environment, Economics, Community, and Resource Flows—and the opportunities to incorporate best practices that tie back to the broader framework for sustainability across the region. The best practices may suggest opportunities for policy innovation in both the short- and long-term.

DEFINING GOVERNANCE

Governance refers to the structure and process for making decisions about public policy and the allocation of public funds. The choice of priority initiatives and the allocation of limited funding requires strategic decision-making at all levels to determine the most efficient and effective distribution of resources, which, ideally, both reflects constituents' diverse values and priorities and achieves multiple benefits. Consistent leadership within the governance structure helps to ensure a coherent long-term direction for a particular jurisdiction. Effective governance advances sustainability through three primary avenues:

- Promoting sustainability through the agency's own operations;
- Issuing rules or regulations that require the adoption of more sustainable behaviors, or the use of more sustainable technologies; and,
- Providing financial support for governmental and non-governmental entities to advance sustainability.

ONE REMEDY: PLANNING FOR ONE REGION

In the United States, most responsibility for land use decisions is in the hands of local governments. Local land use decisions have regional impacts, however, and some complex issues, such as watershed planning, suffer when only considered at the local level.

Metropolitan growth shaped entirely by local decision-making leads to fragmented resource management. In addition to enabling different communities to institute conflicting economic, social, and ecological policies that can cause a range of mutually-problematic outcomes, the duplication of services and administration for fire, roads, sewer, police, schools, and other services provided by individual jurisdictions may not be the most efficient use of resources. Furthermore, more dispersed development typically increases the cost of providing infrastructure and services to each housing unit. Inefficiencies such as these lead to cash-strapped municipalities that then must compete with one another for taxable commercial tenants, while seeking to zone-out low income, low tax-paying residents. This pattern reinforces the high price of servicing each household and isolates low-income households in small pockets far from good schools and high-quality services.

Dispersed, locally serviced development consumes not only a disproportionately high amount of government funds, it also consumes a similarly large portion of natural resources, like habitat or land, water, fuel, and so on.⁵⁴ Regional land use planning and inter-agency collaboration can increase operational efficiencies and prevent regional harm through tragedies of the commons.

Watershed planning and water quality issues are issues that do inspire regional coordination since rivers visibly flow through multiple jurisdictions, and downstream water levels and water quality are impacted by activity upstream. Locally, the *Raccoon River Water Quality Master Plan*⁵⁵ offers

many recommendations for improving the water quality of the river but states that, in order to implement them effectively, a regional planning or watershed management organization should be developed.

In order to address the need for planning across fragmented jurisdictional lines, many local governments also are members of broader regional governing groups. These groups exist around the country, and often take one of three primary forms:

- Organizations or agencies that can issue or set legislation
- Organizations that issue or control funding
- Organizations that have no legislative or financial power, but focus on capacity building, collaboration, and advisory services.

The following sections describe the pros and cons of a number of regional governance approaches, and offers selected case studies.

Different Regional Planning Structures

Regional planning agencies may be called councils of governments (COG), regional councils, regional commissions, regional planning commissions, planning district commissions, and development districts. According to the National Association of Regional Councils, “a regional council is a multi-service entity with state and locally-defined boundaries that delivers a variety of federal, state and local programs while continuing its function as a planning organization, technical assistance provider and “visionary” to its member local governments. As such, they are accountable to local units of government and effective partners for state and federal governments.”⁵⁶

COGS may have three levels of authority. First, COGs may exist as forums for collaboration and sources of expertise, and not carry legislative power or allocate funding. COGs that do

54 Rosan, “Metropolitan governance and local land use planning in Boston, Denver, and Portland.”

55 Agren, M&M Divide RC&D, “Raccoon River Water Quality Master Plan” (Iowa Department of Natural Resources,

May 9, 2011).

56 NARC, “National Association of Regional Councils - What is a Regional Council?”, n.d., <http://narc.org/regional-councils-mpos/what-is-a-regional-council.html>.

not have the power of allocating funding or harnessing regulatory incentives focus on capacity building for local agencies. According to Christina Rosan, Assistant Professor at Temple University, “capacity building is the weakest approach to metropolitan planning because local governments can ignore whatever information and advice the metro agency provides.”⁵⁷ Second, COGs may be federally-designated MPOs, able to provide financial incentives to their member governments in the form of transportation money. In this case, local authorities may ignore COG decisions if they choose to forgo transportation funding. Finally, COGs may have formal statutory authority to require local plans to follow regional goals, or have the power to override local decisions. COGs with direct authority over land use decisions are best able to ensure that regional goals and objectives will be met.

Convening and Capacity Building

COGs that have a scope limited to convening stakeholders, mediating planning processes, and building capacity are quite common. These organizations may be designated by the state or may be locally convened. In this case, there is frequently a separate MPO that operates in the same region, as is the case in Boston, where the Metropolitan Area Planning Council (MAPC)⁵⁸ provides general planning capacity, while the Boston Region MPO provides transportation planning and funding. This type of organization is politically easier to establish because members are not tied to decisions made by the organization, and state-level decision makers may not be involved. This type of organization can coordinate significant regional benefits by convening, capacity building, the provision of expertise, and centralized data collection. While many COGs succeed in making comprehensive regional plans that involve significant stakeholder engagement and buy-in, these plans may falter at the local implementation

stage because of local shifts in opinion or governmental leadership, or because local agencies lack the capacity to implement the plans due to staff shortages, expertise, or other factors.

The fact that the implementation of plans developed by advisory COGs is essentially voluntary may weaken the plans themselves. When creating a voluntary plan, government officials and general stakeholders may develop more visionary and less realistic plans than they would were they sure they would have to implement the plan. If the members of an advisory COG would like to create a plan that is realistic and has a high certainty of implementation, members could sign a memorandum of understanding (MOU) that they would implement their sections of the regional plan at the outset of the planning process. This step would add seriousness and realism to the planning process, resulting in a better plan, and furthermore, one that would be implemented at the local level.

Metropolitan Planning Organization (MPO)

Metropolitan Planning Organizations (MPO) are required by the federal government for urbanized areas with populations above 50,000. MPOs are responsible for developing transportation plans for their areas and for allocating federal funding for local transportation projects. While these are the MPOs’ primary responsibilities, MPOs have the ability to influence land use and other types of plans by awarding more points in their financial allocation process to projects that exhibit particular characteristics, such as promoting smart growth or low-impact development.⁵⁹ MPOs also may be combined with the regional COG to form a comprehensive regional planning organization that offers all the advantages of each type of organization. When MPOs function independently from COGs and do not have the capacity or authority to perform land use planning, the MPO may develop plans that focus solely on transportation and growth, and which cannot be formed around collectively

57 Rosan, “Metropolitan governance and local land use planning in Boston, Denver, and Portland.”

58 MAPC, “Metropolitan Area Planning Council | Promoting Smart Growth and Regional Collaboration”, n.d., <http://www.mapc.org/>.

59 “United States Code: Title 23,134. Metropolitan transportation planning | LII / Legal Information Institute”, n.d., <http://www.law.cornell.edu/uscode/23/134.html>.

considered land use. In the Greater Des Moines region, there currently is no COG, and the Horizon Year 2035 Metropolitan Transportation Plan, developed by the Des Moines Area MPO, notes, “Growth management strategies, such as land use policies, urban design guidelines, and jobs/housing balancing are potential strategies, but have not been pursued due to the lack of any regional land use planning authority,”⁶⁰ indicating that regional planning capacity in Greater Des Moines needs development; the capacity of the MPO would be increased by a partnership or integration with a broader regional planning agency.

In the Twin Cities region, the Metropolitan Council is the planning agency that serves the Twin City seven-county metropolitan area, and is both a regional planning council and the region’s MPO. This is an example of a COG that can influence local land use plans and projects using both capacity building efforts and transportation funding. The Council not only helps to develop regional plans with a variety of scopes but also provides ongoing monitoring and benchmarking for the region. In the Twin Cities region, municipalities must submit comprehensive plans compliant with the regional framework, and ensure that zoning conforms as well.⁶¹

Case Study:

Sustainable Communities in California

In California, the Sustainable Communities and Climate Protection Act of 2008 (SB-375) is designed to help California lower its carbon dioxide emissions by promoting good planning and more sustainable communities. Sustainable Communities requires the California Air Resources Board to develop regional greenhouse gas emission reduction targets for passenger vehicles for each state MPO.

Each of California’s MPOs must then prepare a “sustainable communities strategy (SCS)”

that demonstrates how the region will meet its greenhouse gas reduction target through integrated land use, housing, and transportation planning. Once adopted by the MPO, the SCS will be incorporated into that region’s federally enforceable regional transportation plan (RTP). Sustainable Communities also establishes incentives to encourage implementation of the SCS and APS. Developers can get relief from certain environmental review requirements under the California Environmental Quality Act (CEQA) if their new residential and mixed-use projects are consistent with a region’s SCS that meets the target.⁶²

Regional Government

A robust form of a regional planning organization is an entity that provides comprehensive regional planning capacity, allocates transportation funding, and has legislative authority. One example of this is a regional government. In Portland, this role is filled by Portland Metro, an elected regional government that provides planning services to the region and administers the region’s urban growth boundary.⁶³ Like a local legislative agency, Metro delimits urban and rural areas throughout the region. Under Oregon law, each city or metropolitan area has an urban growth boundary. The boundaries control urban expansion onto farm and forest lands, ensuring efficient urban development, relative ease of service delivery, and the preservation of natural resources. Property rights advocates tend to resist this type of boundary, and local governments may resist giving this type of authority to a regional entity. However, this type of regional planning agency has a high capacity for shaping regional development and services for the benefit of the region.

60 Des Moines Area MPO, “Horizon Year 2035 Metropolitan Transportation Plan”, n.d., <http://www.dmampo.org/library/documents/mtp2035.html>.

61 Metropolitan Council, “Metropolitan Council - 2030 Regional Development Framework summary”, n.d., <http://www.metrocouncil.org/planning/framework/summary.htm>.

62 California Air Resources Board, “Senate Bill 375 Regional Targets”, n.d., <http://www.arb.ca.gov/cc/sb375/sb375.htm>.

63 Portland Metro Council, “Metro: Mission, charter and code”, n.d., <http://www.oregonmetro.gov/index.cfm/go/web/id=24270>.

BEST PRACTICES BIBLIOGRAPHY

Agren, M&M Divide RC&D. "Raccoon River Water Quality Master Plan". Iowa Department of Natural Resources, May 9, 2011.

Alameda County. "Alameda County Waste Management Authority", n.d. <http://www.stopwaste.org/home/index.asp>.

American College and University President's Climate Commitment. "Energy Efficiency Building Retrofit Program | Presidents' Climate Commitment", n.d. <http://www.presidentsclimatecommitment.org/resources/eebrp>.

Amtrak. "Amtrak - Defining Energy Efficiency", n.d. [http://www.amtrak.com/servlet/ContentServlet?c=WSArticlePage&pagename=WhistleStop percent2FWWSArticlePage percent2FBlank_Template&cid=1153323727125](http://www.amtrak.com/servlet/ContentServlet?c=WSArticlePage&pagename=WhistleStop%20percent2FWWSArticlePage%20percent2FBlank_Template&cid=1153323727125).

Baltimarket. "Baltimarket", n.d. <http://baltimarket.org/>.

Bay Area Air Quality Management District. "Spare the Air", n.d. <http://sparetheair.org/>.

"Bentonsport Iowa National Historic District in the Villages of Van Buren County Iowa", n.d. <http://www.bentonsport.com/>.

Berg, Nate. "Combating Obesity with Street Design - Commute - The Atlantic Cities", n.d. <http://www.theatlanticcities.com/commute/2011/10/combating-obesity-street-design/256/>.

Bernstein, Andrea. "NYC Health Commissioner: Urban Design is a Public Health Issue | Transportation Nation", n.d. <http://transportationnation.org/2010/11/19/nyc-health-commissioner-urban-design-is-a-public-health-issue/>.

Boston Public Health Commission. "Homeless Services Bureau", n.d. <http://www.bphc.org/programs/homeless/Pages/Home.aspx>.

Brugemann, Robert. "Early Sprawl, an excerpt from Sprawl: A Compact History by Robert Bruegmann", n.d. <http://www.press.uchicago.edu/Misc/Chicago/076903.html>.

"Bus Rapid Transit", n.d. http://www.rtd-fastracks.com/main_104.

CNN. "NY orders calories posted on chain menus - CNN", n.d. http://articles.cnn.com/2008-01-22/health/calories.menus_1_calorie-counts-calorie-information-menus?_s=PM:HEALTH.

California Air Resources Board. "Senate Bill 375 Regional Targets", n.d. <http://www.arb.ca.gov/cc/sb375/sb375.htm>.

"California Department of Fish & Game, Marine Life Protection Act", n.d. <http://www.dfg.ca.gov/mlpa/>.

Californofnia Air Resources Board. "Senate Bill 375 Regional Targets", n.d. <http://www.arb.ca.gov/cc/sb375/sb375.htm>.

Callahan, Robert. "Effects Of Water Pollutants On People | LIVESTRONG.COM", n.d. <http://www.livestrong.com/article/220056-effects-of-water-pollutants-on-people/>.

City Slicker Farms. "Mission and History | City Slicker Farms", n.d. <http://www.cityslickerfarms.org/mission-and-history>.

City of Berkeley. "RECO Information - City of Berkeley, CA", n.d. <http://www.ci.berkeley.ca.us/ContentDisplay.aspx?id=16030>.

City of Denver. "Denver Office of Economic Development", n.d. <http://www.denvergov.org/Default.aspx?alias=www.denvergov.org/oed>.

City of Dubuque. "Dubuque, IA - Official Website - Design Guidelines", n.d. <http://www.cityofdubuque.org/index.aspx?NID=1295>.

City of Durham. "Durham, NC - Home Energy Savings Program", n.d. <http://www.ci.durham.nc.us/departments/manager/sustainability/energy.cfm>.

City of Minneapolis. "Neighborhood & Community Engagement Commission (NCEC)", n.d. http://www.minneapolismn.gov/ncr/NCEC_Home.asp.

City of New York. "NYC Zoning - About New York City Zoning", n.d. <http://www.nyc.gov/html/dcp/html/zone/zonehis.shtml>.

City of Portland. "Green Building Hotline and Resource Center", n.d. <http://www.portlandonline.com/bps/index.cfm?c=45837>.

City of San Francisco. "Department of Public Health: Homeless Services", n.d. <http://www.sfdph.org/dph/comupg/oservices/homeless/default.asp>.

City of Seattle. "Seattle Public Utilities -- Street Edge Alternatives", n.d. http://www.seattle.gov/util/About_SPU/Drainage_&_Sewer_System/GreenStormwaterInfrastructure/NaturalDrainageProjects/StreetEdgeAlternatives/.

Clark, John. "Reston Revisited", n.d. <http://www.planning.org/planning/2011/aug/reston.htm>.

Clayton, Susan, and Gene Meyers. *Conservation Psychology: Understanding and promoting human care for nature*. Wiley-Blackwell, 2009.

"Climate Change Impacts on Iowa 2010 - Complete Report", n.d. http://www.iowadnr.gov/portals/idnr/uploads/air/environment/climatechange/complete_report.pdf?amp;tabid=1077.

Climate Change Information Resources, New York Metropolitan Region. "CCIR-NYC -Limiting Future Climate Change: Mitigation", n.d. http://ccir.ciesin.columbia.edu/nyc/ccir-ny_q4.html.

Consortium for Atlantic Regional Assessment. "Land Use and Health - Cities and Suburbs", n.d. http://www.cara.psu.edu/tools/lu-health/cities_and_suburbs.asp.

Consumer Safety Commission. "The Inside Story: A Guide to Indoor Air Quality", n.d. <http://www.cpsc.gov/cpscpub/pubs/450.html>.

Content, Thomas. "Solar energy field remains strong in Wisconsin - JSOnline", November 16,

2009. <http://www.jsonline.com/business/70162512.html>.

DOE. "Maine Community Seeing Things in a New Light | Department of Energy", n.d. <http://energy.gov/articles/maine-community-seeing-things-new-light>.

———. "San Francisco Turns Up The Heat In Push To Eliminate Old Boilers | Department of Energy", n.d. <http://energy.gov/articles/san-francisco-turns-heat-push-eliminate-old-boilers>.

EPA. "2009 National Award for Smart Growth Achievement | Smart Growth | US EPA", n.d. http://www.epa.gov/dced/awards/sg_awards_publication_2009.htm#overall_excellence.

———. "Adaptation | Climate Change - Health and Environmental Effects | U.S. EPA", n.d. <http://www.epa.gov/climatechange/effects/adaptation.html>.

———. "Air | Browse EPA Topics | US EPA", n.d. <http://www.epa.gov/ebtpages/air.html>.

———. "Basic Information | Climate Change | U.S. EPA", n.d. <http://epa.gov/climatechange/basicinfo.html>.

———. "Basic Information | Heat Island Effect | U.S. EPA", n.d. <http://www.epa.gov/heatisld/about/index.htm>.

———. "Basic Information | Transportation and Climate | US EPA", n.d. <http://www.epa.gov/otaq/climate/basicinfo.htm>.

———. "Climate Change | U.S. EPA", n.d. <http://epa.gov/climatechange/>.

———. "How to Conserve Water and Use It Effectively | Polluted Runoff | US EPA", n.d. <http://water.epa.gov/polwaste/nps/chap3.cfm>.

———. "Lexana - Green Infrastructure Case Studies", n.d. http://cfpub.epa.gov/npdes/greeninfrastructure/gicasestudies_specific.cfm?case_id=75.

———. "Low Impact Development (LID) | Polluted Runoff (Nonpoint Source Pollution) | US EPA", n.d. <http://www.epa.gov/owow/NPS/lid/>.

———. "Municipal Solid Waste | Wastes | US EPA", n.d. <http://www.epa.gov/osw/nonhaz/municipal/>.

———. "Philadelphia - Green Infrastructure Case Studies", n.d. http://cfpub.epa.gov/npdes/greeninfrastructure/gicasestudies_specific.cfm?case_id=62.

———. "Tools, Analysis, & Publications | Transportation and Climate | US EPA", n.d. <http://www.epa.gov/otaq/climate/publications.htm#basic>.

———. "Water > Water Pollution | Browse EPA Topics | US EPA", n.d. <http://www.epa.gov/ebtpages/watwaterpollution.html>.

"Effects of Healthcare Environmental Design", n.d. <http://www.designandhealth.com/uploaded/documents/Publications/Papers/Roger-Ulrich-WCDH2000.pdf>.

El Nasser, Haya. "USATODAY.com - 'Granny flats' finding a home in tight market", n.d. http://www.usatoday.com/news/nation/2004-01-05-granny-flats_x.htm.

Eliperin, Juliet. "Pharmaceuticals in Waterways Raise Concern", n.d. <http://www.washingtonpost.com/wp-dyn/content/article/2005/06/22/AR2005062201988.html>.

Ella Baker Center. "Oakland Green Jobs Corps", n.d. http://www.ellabakercenter.org/index.php?p=gcjc_green_jobs_corps.

"Ella Baker Center : Oakland Green Jobs Corps", n.d. http://www.ellabakercenter.org/index.php?p=gcjc_green_jobs_corps.

Energy Information Administration. "EIA Renewable Energy- Renewable Energy Consumption and Electricity Preliminary Statistics", n.d. http://38.96.246.204/cneaf/alternate/page/renew_energy_consump/rea_prereport.html.

"Environmental Justice | Compliance and Enforcement | US EPA", n.d. <http://www.epa.gov/environmentaljustice/>.

"Environmental Justice | Compliance and Enforcement | US EPA", n.d. <http://www.epa.gov/environmentaljustice/>.

Eversley, Melanie. "Programs cropping up across USA to address 'food deserts' - USATODAY.com", n.d. http://www.usatoday.com/news/nation/2011-07-13-food-deserts-farmers-market-agriculture_n.htm.

Food and Agriculture Organization of the United Nations. "Organic Agriculture: What are the environmental benefits of organic agriculture?", 2011. <http://www.fao.org/organicag/oa-faq/oa-faq6/en/>.

"GO TO 2040 -- Chicago Metropolitan Agency for Planning", n.d. <http://www.cmap.illinois.gov/2040/main>.

Georgia Forestry Commission. "GeorgiaBurnBan", n.d. <http://www.gatrees.org/ForestFire/GeorgiaBurnBan.cfm>.

Great Lakes Commission, EPA. "TEACH: Water Pollution in the Great Lakes", n.d. <http://www.great-lakes.net/teach/pollution/water/water3.html>.

Gross, Jane. "Aging at Home: For a Lucky Few, a Wish Come True - New York Times", n.d. <http://www.nytimes.com/2006/02/09/garden/09care.html?pagewanted=all>.

HUD. "Affordable Housing - CPD - HUD", n.d. <http://www.hud.gov/offices/cpd/affordablehousing/index.cfm>.

———. "HOPE VI - Public and Indian Housing - HUD", n.d. http://portal.hud.gov/hudportal/HUD?src=/program_offices/public_indian_housing/programs/ph/hope6.

Hanlon, Bernadette. "Cities and suburbs: new metropolitan ... - Bernadette Hanlon, John R. Short, Thomas J. Vicino - Google Books", n.d. http://books.google.com/books?id=9ZLhjE4cFwC&pg=PA164&lpg=PA164&dq=suburbs+impermeable&source=bl&ots=v0ai7RexX0&sig=bgP8K-u1DhMKuRsc5MXsyxFggUM&hl=en&ei=hIG8Tq7RBKTCOAG-vppjTBA&sa=X&oi=book_result&ct=result&resnum=1&ved=OCB4Q6AEwAA#v=onepage&q=suburbs percent20impermeable&f=false.

Hinners, Sarah Jack. "Pollination in an Urbanizing Landscape: Effects of Habitat Fragmentation on Wild Bee Assemblages", December 30, 2004.

Hugh, Brent. "Complete Streets: Missouri policies named as among top in the nation | Missouri Bicycle and Pedestrian Federation", n.d. <http://mobikefed.org/2011/04/complete-streets-missouri-policies-named-among-top-nation>.

Indiana Economic Development Corporation. "Indiana - Skills Enhancement Fund", n.d. <http://iedc.in.gov/programs-initiatives/skills-enhancement-fund>.

Kansas City Community Gardens. "Community Partner Gardens | Kansas City Community Gardens", n.d. <http://www.kccg.org/registration>.

Laramie County Community College. "Laramie County Community College, Wyoming", n.d. <http://www.lccc.wy.edu/>.

Lawrence Berkeley National Lab. "Air Pollution", n.d. <http://www.lbl.gov/Education/ELSI/pollution-main.html>.

Loudoun County. "Recycling Requirements", n.d. <http://www.loudoun.gov/Default.aspx?tabid=747>.

MAPC. "Metropolitan Area Planning Council | Promoting Smart Growth and Regional Collaboration", n.d. <http://www.mapc.org/>.

MSNBC. "Largest dam removal in US history gets started - US news - Environment - msnbc.com", n.d. http://www.msnbc.msn.com/id/44554709/ns/us_news-environment/t/largest-dam-removal-aims-bring-salmon-back/.

Mann Library, Cornell University. "Harvest of Freedom: The History of Kitchen Gardening in America", n.d. <http://exhibits.mannlib.cornell.edu/kitchengardens/intro.htm>.

Maryland Department of Natural Resources. "A User's Guide to Watershed Planning in Maryland", n.d. <http://dnr.maryland.gov/watersheds/pubs/userguide.html>.

Massachusetts Food Policy Alliance. "Food Policy Council", n.d. <http://mafoodpolicyalliance.org/FoodPolicyCouncil.aspx>.

Mega, Matthew. "Residential Cluster Development: Overview of Key Issues", n.d. <http://www.extension.umn.edu/distribution/naturalresources/components/7059-01.html>.

Metropolitan Council. "Metropolitan Council - 2030 Regional Development Framework summary", n.d. <http://www.metrocouncil.org/planning/framework/summary.htm>.

Metropolitan Government of Nashville and Davidson Counties. "Nashville.gov - Health - Air Pollution Home Page", n.d. <http://health.nashville.gov/ENV/AirPollution.htm>.

"Minneapolis Stormwater Utility Fee", n.d. <http://www.ci.minneapolis.mn.us/stormwater/fee/>.

Des Moines Area MPO. "Horizon Year 2035 Metropolitan Transportation Plan", n.d. <http://www.dmampo.org/library/documents/mtp2035.html>.

NARC. "National Association of Regional Councils - What is a Regional Council?", n.d. <http://narc.org/regional-councils-mpos/what-is-a-regional-council.html>.

"NIES assessment_of_health_effects_from_exposure_to_powerline_frequency_electric_and_magnetic_fields.pdf", n.d. http://www.niehs.nih.gov/health/assets/docs_a_e/assessment_of_health_effects_from_exposure_to_powerline_frequency_electric_and_magnetic_fields.pdf.

NRDC. "NRDC: Renewable Energy in Nebraska", n.d. <http://www.nrdc.org/energy/renewables/nebraska.asp>.

———. "NRDC: Renewable Energy in Ohio", n.d. <http://www.nrdc.org/energy/renewables/ohio.asp>.

National Complete Streets Coalition. "Complete Streets » Complete Streets FAQ", n.d. <http://www.completestreets.org/complete-streets-fundamentals/complete-streets-faq/>.

National Geographic. "Air Pollution Facts, Air Pollution Effects, Air Pollution Solutions, Air Pollution Causes", n.d. <http://environment.nationalgeographic.com/environment/global-warming/pollution-overview/>.

National Housing Institute. "Healthy Foods, Strong Communities: Bringing fresh foods into low-income neighborhoods", n.d. <http://www.nhi.org/online/issues/147/healthyfoods.html>.

National Trust for Historic Preservation. "Great American Main Street Awards®", n.d. <http://www.preservationnation.org/travel-and-sites/travel/gamsa/>.

New Jersey State League of Municipalities. "NJLM - Transit Oriented Development", n.d. http://www.njslom.org/magart_1006_p46.html.

"New York City Watershed Program - NYS Dept. of Environmental Conservation", n.d. <http://www.dec.ny.gov/lands/25599.html>.

North Carolina Ecosystem Enhancement Program. "North Carolina Ecosystem Enhancement Program", n.d. <http://portal.ncdenr.org/web/eeep>.

"Oregon Program Aims to Create Jobs, Save Energy | Department of Energy", n.d. <http://energy.gov/articles/oregon-program-aims-create-jobs-save-energy>.

Papio-Missouri River Natural Resources District. "Natural Resource District History and Purpose", n.d. http://www.papionrd.org/about_nrd/nrd_history_and_purpose.shtml.

Paseo del Rio Association. "The Official Website of The San Antonio River Walk", n.d. <http://www.thesanantonioriverwalk.com/>.

"Pay-As-You-Throw | Conservation Tools | US EPA", n.d. <http://www.epa.gov/osw/conserve/tools/payt/>.

Peterson, David. "The longest commute | StarTribune.com", n.d. <http://www.startribune.com/local/11606766.html>.

Pew Center for Climate and Energy Solutions. "Buildings Overview | Pew Center on Global Climate Change", n.d. <http://www.pewclimate.org/technology/overview/buildings>.

"Picnic in the Park — Davis Farmers' Market", n.d. <http://www.davisfarmersmarket.org/picnic>.

"Polk County Air Pollution Brochure", n.d. http://www.polkcountyiowa.gov/airquality/RESOURCES/Open_Burning/working_brochure.pdf.

Portland Metro Council. "Metro: Mission, charter and code", n.d. <http://www.oregonmetro.gov/index.cfm/go/by.web/id=24270>.

Project for Public Spaces. "Riverwalk & Waterplace Park - Great Public Spaces | Project for Public Spaces (PPS)", n.d. http://www.pps.org/great_public_spaces/one?public_place_id=86.

———. "What is Placemaking? « Project for Public Spaces - Placemaking for Communities", n.d. http://www.pps.org/articles/what_is_placemaking/.

"Riverwalk & Waterplace Park - Great Public Spaces | Project for Public Spaces (PPS)", n.d. http://www.pps.org/great_public_spaces/one?public_place_id=86.

Rocky Mountain Institute. "Rail Versus Trucking: Who's The Greenest Freight Carrier?", n.d. <http://www.treehugger.com/cars/rail-versus-trucking-whos-the-greenest-freight-carrier.html>.

Rosan, Christina. "Metropolitan governance and local land use planning in Boston, Denver, and Portland". Massachusetts Institute of Technology, 2007. <http://dspace.mit.edu/handle/1721.1/42258>.

San Francisco Planning Department. "San Francisco Planning Department : WalkFirst", n.d. <http://www.sf-planning.org/index.aspx?page=2568>.

"School Garden Program Overview - Healthy Eating & Nutrition Education (CA Dept of Education)", n.d. <http://www.cde.ca.gov/ls/nu/he/gardenoverview.asp>.

Seattle Public Utilities. "Seattle Public Utilities -- Street Edge Alternatives", n.d. http://www.seattle.gov/util/About_SPU/Drainage_&_Sewer_System/GreenStormwaterInfrastructure/NaturalDrainageProjects/StreetEdgeAlternatives/.

Silver City Main Street Project. "Silver City MainStreet Project > Home", n.d. <http://www.silvercitymainstreet.com/>.

Smart Communities Network. "Smart Communities Network: Introduction to Industrial Ecology", n.d. <http://www.smartcommunities.ncat.org/business/parkintro.shtml>.

"Smart Planning ~ Rebuild Iowa Office", n.d. http://www.rio.iowa.gov/smart_planning/index.html.

Socioeconomic Data and Applications Center, Columbia University. "6 LUCC and the Hydrological Cycle", n.d. http://sedac.ciesin.columbia.edu/tg/guide_glue.jsp?ds=6&rd=lu.

Stanford University. "Alternative Transportation : Commute Cost & Carbon Emissions Calculator", n.d. http://transportation.stanford.edu/alt_transportation/calculator.shtml.

State of Maryland. "Maryland Climate Change Advisory Group :: Background", n.d. <http://www.mdclimatechange.us/twg.cfm>.

State of Washington. "Washington State Response Strategy | Preparing for Impacts | Climate Change | Washington State Department of Ecology", n.d. <http://www.ecy.wa.gov/>

climatechange/ipa_responsestrategy.htm.

———. “Watershed Plan - Development and Implementation | Washington State Department of Ecology”, n.d. <http://www.ecy.wa.gov/watershed/>.

“The Associated Press: Pharmaceuticals found in drinking water, affecting wildlife and maybe humans”, n.d. http://hosted.ap.org/specials/interactives/pharmawater_site/day1_04.html.

The Republic. “Phoenix’s light-rail trains set ridership record in April”, May 6, 2010. <http://www.azcentral.com/news/traffic/lightrail/articles/2010/05/06/20100506phoenix-light-rail-record.html>.

“The Restorative Benefits of Nature”, n.d. http://www.ideal.forestry.ubc.ca/frst524/09_kaplan.pdf.

The Shipping Federation of Canada, Department of Environmental Quality. “DEQ - Ballast water management practices provided by the Shipping Federation of Canada (Attachment A)”, n.d. http://www.michigan.gov/deq/0,4561,7-135-3313_3677_8278-16217--,00.html.

“Tools for Integrated Flood Management”, n.d. http://www.apfm.info/ifm_tools.htm.

“TriMet: MAX Light Rail Service”, n.d. <http://trimet.org/max/>.

“US Fish and Wildlife Bird Mortality Fact Sheet.pdf”, n.d. <http://www.fws.gov/birds/mortality-fact-sheet.pdf>.

USA Today. “Amount of schooling affects earning potential”, July 18, 2002. <http://www.usatoday.com/news/nation/census/2002-07-18-degree-dollars.htm>.

USDA. “About the Food Deserts Locator”, n.d. <http://www.ers.usda.gov/data/fooddesert/about.html>.

———. “Ecosystem Services”, n.d. <http://www.fs.fed.us/ecosystems/services/>.

———. “Invasive Species: About NISIC - What is an Invasive Species?”, n.d. <http://www.invasivespeciesinfo.gov/whatis.shtml>.

———. “Invasive Species: State Resources - Iowa”, n.d. <http://www.invasivespeciesinfo.gov/unitedstates/ia.shtml>.

USGS. “Eutrophication Definition Page”, n.d. <http://toxics.usgs.gov/definitions/eutrophication.html>.

———. “Hydroelectric power and water. Basic information about hydroelectricity, USGS Water Science for Schools.”, n.d. <http://ga.water.usgs.gov/edu/wuhy.html>.

“United States Code: Title 23,134. Metropolitan transportation planning | LII / Legal Information Institute”, n.d. <http://www.law.cornell.edu/uscode/23/134.html>.

Wilson, Brenda. “Riders Who Take Mass Transit Regularly May Lose Weight : Shots - Health Blog : NPR”, n.d. http://www.npr.org/blogs/health/2010/06/30/128210165/riders_who_take_mass_transit_regularly_may_lose_weight.

World Shipping Council. "Invasive Species | World Shipping Council", n.d. <http://www.worldshipping.org/industry-issues/environment/invasive-species>.

USDA. "About the Food Deserts Locator", n.d. <http://www.ers.usda.gov/data/fooddesert/about.html>.

———. "Ecosystem Services", n.d. <http://www.fs.fed.us/ecosystemservices/>.

———. "Invasive Species: About NISIC - What is an Invasive Species?", n.d. <http://www.invasivespeciesinfo.gov/whatis.shtml>.

———. "Invasive Species: State Resources - Iowa", n.d. <http://www.invasivespeciesinfo.gov/unitedstates/ia.shtml>.

USGS. "Eutrophication Definition Page", n.d. <http://toxics.usgs.gov/definitions/eutrophication.html>.

———. "Hydroelectric power and water. Basic information about hydroelectricity, USGS Water Science for Schools.", n.d. <http://ga.water.usgs.gov/edu/wuhy.html>.

"United States Code: Title 23,134. Metropolitan transportation planning | LII / Legal Information Institute", n.d. <http://www.law.cornell.edu/uscode/23/134.html>.

Wilson, Brenda. "Riders Who Take Mass Transit Regularly May Lose Weight : Shots - Health Blog : NPR", n.d. http://www.npr.org/blogs/health/2010/06/30/128210165/riders_who_take_mass_transit_regularly_may_lose_weight.

World Shipping Council. "Invasive Species | World Shipping Council", n.d. <http://www.worldshipping.org/industry-issues/environment/invasive-species>.



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