Pathways to Regional Sustainability

Best Practices for Wisconsin's Capital Region



Capital Region Sustainable Communities

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Contents

Executive Summary

The federal *Partnership for Sustainable Communities* is an interagency initiative that coordinates policies and grant administration between the Department of Housing and Urban Development (HUD), the Department of Transportation (DOT), and the Environmental Protection Agency (EPA). In 2010, HUD awarded Wisconsin's Capital Area Regional Planning Commission (CARPC) a $2 million Sustainable Community Regional Planning Grant (SCRPG) to support the Capital Region Sustainability Consortium initiative.

HUD's livability initiative addresses not only long-term regional outcomes, but the planning process, as well. Regional *process* goals are: 1) multi-level coordination and 2) inclusive planning. Regional *outcome* goals are: 3) land reuse and redevelopment, 4) housing and transportation affordability, and 5) equitable access to services, education, and living-wage jobs. To these five "flagship" goals, the CRSC added three other regional sustainability goals: 6) natural resources protection, 7) healthy food supply and access, and 8) transportation choices.

A review of the sustainability planning literature and regional sustainability initiatives yielded nine lessons for sustainability planning and implementation at the regional scale. These lessons emphasize the importance of context-sensitive decision-making, sound evidence, and effective communication. Successful sustainability initiatives are also collaborative processes, characterized by clearly defined short- and long-term goals, action plans with defined targets, and a process for regularly monitoring and reporting performance indicators.

Five conditions are generally necessary for successful multi-stakeholder sustainability initiatives. Stakeholders have a common agenda, shared measurement systems, mutually reinforcing activities, continuous communication, and a bridging or *backbone* support organization.[1] Stakeholders then develop a strategic framework for collective action around a common set of interests, and implement coordinated strategies to produce desired results as reflected by measureable indicators.[2] Indicator targets are revised when initiatives meet goal targets. Strategies are adjusted, when necessary, to improve their effectiveness.

Regions are complex systems of interracting social, economic, and environmental systems. Regional sustainability initiatives assess system performance in order to understand where the region is doing well and where it is deficient. These initiatives benefit from systematic approaches and long-term engagement that seek incremental, yet continual, improvement.

Selecting meaningful sustainability indicators for a specific geographic area is a complex process requiring multiple selection criteria. An effective suite of regional indicators is comprehensive, yet parsimonious, and includes both leading and lagging indicators. Additionally, each individual indicator is simple, meaningful, actionable, relevant, and timely (i.e., SMART).[3] *Bellwether* indicators focus attention on issues that stakeholders care most about.

Successful sustainability initiatives also keep a *compelling scoreboard* [4] that is regularly updated to gauge progress and to learn from collective experience. Making indicator data available online – through an easy to understand *data dashboard* – can raise public awareness and inform decision-making on issues ranging from housing and transportation policies and investments to land

1 Kania, J. and M. Kramer. 2011. Collective impact. *Stanford Social Innovation Review* (winter).

2 Easterling, D. 2013. Getting to Collective Impact: How Funders Can Contribute Over the Life Course of the Work. *Foundation Review*, 5(2): Article 7

3 National Center for Environmental Innovation (NCEI). 2009. *Lean Government Metrics Guide*. Washington, D.C.: U.S. Environmental Protection Agency, EPA-100-R-09-005.

4 Covey, F. 2006. *Execution Essentials: The 4 Disciplines of Execution.* FranklinCovey.

stewardship practices.

The Capital Region Sustainability Consortium's (CRSC) mission is to:[5]

> *"…protect the environment, provide efficient and cost-effective public services, ensure regional mobility, foster economic opportunity, provide diverse and equitable housing choices, and promote broad participation in planning and implementation."*

CRSC's participatory planning process enabled the consortium to collectively identify several "pathways" to advance regional sustainability priorities. These strategies – comprising a *theory of change* – involve actions that have multiple potential benefits, such as environmental quality (e.g., protecting essential ecosystem services), regional mobility (e.g., implementing a multi-modal transportation system), and social capacity (e.g., ensuring access to education and job-training).

The final section of this report focuses on actions that local, county, and regional governments can take to advance sustainability within the Capital Region. These *good governance* initiatives – in conjunction with public-private partnerships – can help the region institutionalize policies, plans, and practices that will increase the Capital Region's long-term resilience and sustainability.

5 Capital Region Sustainability Consortium. http://www.capitalregionscrpg.org/

Regional Sustainability Challenges and Oportunities

1.1 What is sustainable development?

Regional sustainability initiatives are, fundamentally, about planning for the future. Initiating a regional sustainability initiative raises two fundamental questions.[6]

> *What is to be sustained? What is to be developed?*

Essential environmental processes must be *sustained* to protect human health and ecosystem services, and to support the Capital Region's economy and quality of life. Similarly, human capacity must be *developed* if the region is to flourish, stay resilient during economic instability, and provide all residents equitable opportunities for advancement.

> *"Humanity has the ability to make development sustainable – to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs."*[7]

Place-based sustainability is especially challenging because it involves interconnected social and ecological systems, where daily efforts to meet human needs *"interact with multiple life-support systems in highly complex and often unexpected ways."*[8]

Unique contextual factors – which create both challenges and opportunities for the Capital Region – are briefly summarized on the following pages.

1.2 Geographic context

Wisconsin's Capital Region is a complex system of interconnected social, economic, and environmental systems, nested within an even more complex national and international milieu. Dane County is 1,197 square-miles (3,100 square-kilometers in area, with nearly one-half million residents and 60 municipalities. Yet, the Capital Region extends beyond Dane County to encompass portions of surrounding counties. This region is part of a larger system or network of metropolitan regions and mega-regions.

Similarly, Madison and the region's smaller cities and villages are inexorably linked – economically, physically, and ecologically. The government, education, medical, cultural, and business activities in the state's capital benefit these smaller communities, and, in turn, the capital city benefits from the region's workforce and consumer spending. Unlike many older U.S. cities surrounded by extensively developed metropolitan areas, the City of Madison – the region's "central city" – still has some room to grow outward (what urban geographers call "spatial elasticity").[9] Yet, the city already occupies an extensive land area, and it has a relatively low population density.

Although Dane County's cities and villages have the statutory capacity to continue growing outward, the social, economic, and environmental implications of this 20th century growth paradigm must be reassessed. A key challenge for Madison – and other cities, villages, and towns within the Capital Region – is to manage growth in ways that enhance residents' quality of life and increase economic opportunity, while also protecting the region's ecosystems. This region's natural history has left a legacy of glaciated and non-glaciated landscapes with world-class agricultural soils and a chain of five glacial lakes in the county's center (Figure 1). This lake system is not only important to the region's ecology, it is also a unique aesthetic and recreational amenity that enhances quality of life in the entire Capital Region. Therefore,

6 Kates, R. et al. 2005. What is sustainable development? Goals, Indicators, Values, and Practice. *Environment: Science and Policy for Sustainable Development*, 47(3): 8-21.

7 World Commission on Environment and Development (WCED). 1987. *Our Common Future*. New York: Oxford University Press, p. 8.

8 Clark, W. 2007. Sustainability science: A room of its own. *PNAS*, 104(6): 1737-1738. p.1727

9 Rusk, D. 1992. *Cities Without Suburbs.* Washington, D.C.: Woodrow Wilson Center Press.

leveraging these regional resources and economic linkages – through mutually-beneficial coordination of plans and policies – has the potential to pay multiple dividends.[10]

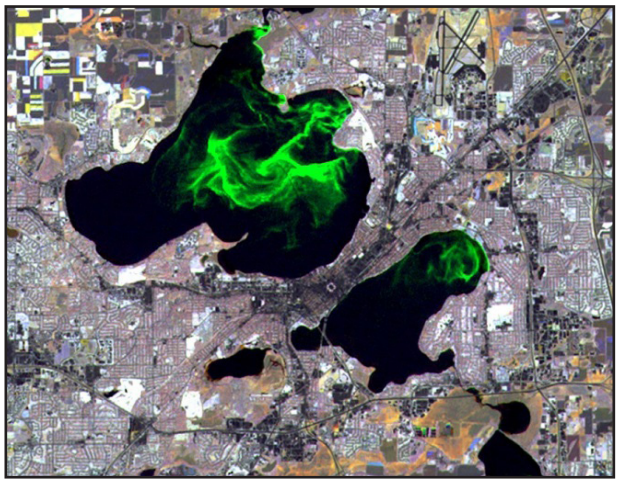

Figure 1 - Algal blooms in lakes Mendota and Monona from nitrogen and phosphorus runoff. (Photo: UW SSEC and WisconsinView)

1.3 Demographics, lifestyle preferences, and health

More than 82 percent of the U.S. population and 50 percent of the global population now live in urban areas. In the United States, the population is also aging (e.g., nearly one in five U.S. residents will be 65 or older in 2030 according to the Census Bureau) and becoming more racially and ethnically diverse. Other transitions include the relatively rapid growth of one-person households, and an increasing proportion of households that prefer an urban lifestyle. Consequently, a combination of factors – an aging population, shrinking household sizes, increasing diversity, and changing lifestyle preferences – is fueling redevelopment and infill in metropolitan areas across the U.S.

After six decades of mostly low-density suburban development, a significant and growing proportion of the U.S. population seeks the conveniences and lifestyle amenities of walkable, mixed-use neighborhoods.[11] The Urban Land Institute observes: [12]

> *"In a more crowded and interconnected world, the ability to avoid hassles adds more value, and convenience becomes ever more prized."*

Only about 30 percent of all households, nationally, have school-aged children. And many housing location decisions hinge on factors other than the quality of the public schools. For example, a large percentage of *Millenials* (born between 1980 and 2000) and *Empty-Nesters* prefer living in walkable neighborhoods with convenient access to shopping, entertainment, and recreation.[13] This is increasing the demand for energy-efficient single- and multi-family dwellings that are also location-efficient – conveniently located near walkable, mixed-use areas with a variety of shops and restaurants. The most successful of these shopping areas typically include a supermarket and service by high-quality mass transit.[14]

In many U.S. metropolitan areas, commuting times have been steadily increasing – especially for suburban commuters driving alone to work.[15] Even though mobility by private vehicle is still relatively easy in Dane County, as the population continues to grow, peak-hour commuting is becoming more challenging. The convenience of driving – in 15 minutes or less –from outlying communities to downtown Madison is likely to vanish. Dane County's population is projected to grow from 2010 to 2040 by 119,000 people (from 488,000 to 607,000). Although population growth

10 Brookings Institution, *Metropolitan Policy Program* (http://www.brookings.edu/about/programs/metro)

11 Leinberger, C. 2008. *The Option of Urbanism*. Washington, D.C.: Island Press.

12 Urban Land Institute, 2012. *What's Next? Getting Ahead of Change.* Washington, D.C.: Urban Land Institute, p.35

13 CNT et al. 2014. *Dane County Market Demand Study: Bus Rapid Transit & Other Local Investments in Walkable Transit-Supportive Communities.*

14 Hack, G. 2013. *Business Performance in Walkable Shopping Areas.* Robert Wood Johnson Foundation.

15 Schrank et al. 2012. *TTI's 2012 Urban Mobility Report*. Texas A&M Transportation Institute. Texas A&M University System.

projections to the year 2100 would be tenuous at best, it is feasible (with a conservative 1 percent annual growth rate) that the county's population will be over one million people by the end of the century.

How communities grow is inextricably linked to human health, safety, and welfare.[16] The built environment's *structure* – the three-dimensional arrangement and design of buildings, transportation networks, and public open spaces – significantly affects its *function*. Built environments, for example, can exacerbate social and economic inequities by impeding low-income households' access to jobs, healthy food, parks, and public services. Poor community design also has been implicated as one of America's major health threats, adversely affecting air quality, physical activity, and other health determinants.[17] Human health encompasses physical, mental, and social well-being, and not simply the absence of disease or infirmity.[18]

1.4 Innovation and the global economy

Metropolitan areas (cities and their suburbs) are increasingly the engines of economic prosperity in the United States.[19] Economic globalization has helped to restructure economies and, in the U.S., increase the role of information technologies and professional services on economic development. These structural changes have also contributed to rising income disparities and increasing poverty. Wisconsin's Capital region benefits, economically, from the clustering of educational and medical institutions, government agencies, insurance companies, and information technology businesses.

EPIC, the medical records software company in Verona, has been building a campus that is designed to foster – by clustering its talent – the synergy of an urban village. Villages and cities in the region can capitalize on the clustering of entrepreneurs and their highly-skilled employees by helping to meet the demand for walkable places with mixed uses, moderate densities, and well-designed architecture. In addition to revising zoning codes to enable this type of growth, municipalities must also invest in 21st century civil infrastructure, which includes multi-modal transportation systems, urban parks and plazas, and pedestrian-friendly streetscapes.

Targeted infrastructure investment is one way that communities can leverage their fiscal resources and maximize taxpayer benefits. This may require innovative approaches to growth and development, including public-private partnerships and both intra- and inter-jurisdictional collaborations. For example, the City of Chicago's investment in Millenium Park – a former rail yard near Lake Michigan – has been highly successful on multiple levels. Fiscal impact studies show that $1.4 billion in new residential development is projected adjacent to, or near, the new park from 2005 to 2015.[20] Local hotels, restaurants, and shops have also benefitted from the 5 million annual visitors who contribute estimated annual sales revenue of $1.4 billion, yielding an additional $78 million in local sales tax revenue.

1.5 Compartmentalized governance

Public policies are the "genetic codes" that shape the structure and function of the built environment. Yet public policies often have unintended consequences.[21] Historically, for example, the Federal Flood Insurance Program has

16 Arkin, E. et al., eds. 2013. *Time to Act: Investing in the Health of Our Children and Communities.* Princeton, NJ: Robert Wood Johnson Foundation Commission to Build a Healthier America.

17 Jackson et al. 2013. Health and the built environment: 10 years after. *American Journal of Public Health*, 103(9): 1542-1544.

18 World Health Organization (WHO). *Terminology Information System* [online glossary] http://www.who.int/health-systems-performance/docs/glossary.htm

19 Katz, B. 2014. *Metropolitan Policy Program*, Brookings Institution. Washington, D.C.

20 Landscape Architecture Foundation. *Case Study 399*; www.lafoundation.org

21 Ben-Joseph, E. and T. Szold, eds. 2005. *Regulating Place: Standards and the Shaping of Urban America*. New York: Routledge

subsidized the construction (and reconstruction) of buildings in floodplains and low-lying coastal areas battered by recurring weather-related flooding. Since the 2012 federal law (Biggert-Waters Flood Insurance Reform Act of 2012) was enacted, government subsidies are projected to decline, shifting the financial risks of flooding from the public sector back to individual property owners. But transitioning away from unsustainable infrastructure paradigms – and mitigating their often persistent land use legacies – is often easier said than done. Vested economic interests, resistance to change, and the compartmentalization of responsibilities within government "silos" create inertia that tends to perpetuate the *status quo*.

To improve coordination, both "vertically" (within municipal governments) and "horizontally" (across municipal governments), effective regional sustainability initiatives evaluate prevailing policies, decision-making practices, and institutional frameworks. Advancing regional sustainability depends, in part, on reforming outdated policies, practices, and frameworks to eliminate the institutional barriers to sustainability.[22, 23] Recognizing the importance of cross-silo coordination, for example, the City of Madison's Sustainability Plan[24] urges the city's engineering department to work more closely with the city's planning department.

A regionally-focused organization, like the Capital Area Regional Planning Commission (CARPC), has the potential to play a central role in facilitating inter-jurisdictional collaborations and capacity-building programs through multi-sector partnerships with educational institutions and non-profit organizations.

22 Alberti, M. 2008. *Advances in Urban Ecology: Integrating Humans and Ecological Processes in Urban Ecosystems*. New York: Springer.

23 Asikainen, E. and A. Jokinen, 2009. Future natures in the making: implementing biodiversity in suburban land-use planning. *Planning Theory & Practice*, 10(3): 351-368.

24 City of Madison. 2012. *City of Madison Sustainability Plan.*

Lessons From Leading Sustainability Initiatives

The federal *Partnership for Sustainable Communities* is an interagency initiative that coordinates and leverages federal housing, transportation, water, and other infrastructure investments in communities across the United States. Formed in 2009, the Partnership promotes sustainability by developing and implementing federal funding programs, policies, and legislative proposals:

> "*…to make neighborhoods more prosperous, allow people to live closer to jobs, save households time and money, and reduce pollution.*"[25]

The Partnership for Sustainable Communities is guided by six "livability" principles:

- provide more transportation choices
- promote equitable, affordable housing
- enhance economic competitiveness
- support existing communities
- coordinate and leverage federal policies and investment
- value communities and neighborhoods

This interagency partnership seeks to strengthen communities and neighborhoods by increasing residents' access to affordable and convenient options in three areas:

Transportation (safe, reliable, and affordable transportation reduces household transportation costs and greenhouse gas emissions, and promotes public health by enabling physical activity and improving air quality)

Housing (affordable, energy-efficient, and location-efficient housing for people of all ages, incomes, races, ethnicities, and abilities increases mobility and lowers the combined costs of housing and transportation)

Neighborhoods (location-efficient housing with

25 Partnership for Sustainable Communities. http://www.sustainablecommunities.gov/

good transit access can increase educational and job opportunities, while expanding business access to markets.

The following nine lessons have been distilled from a review of relevant precedents and published literature.

2.1 Process matters

As population growth and demographic shifts combine with technological advances, economic restructuring, and climate change, regions in the U.S. are facing multiple challenges. Regions grapple with increasingly complex policy issues, such as multi-modal transportation systems, economic development, and environmental protection. Developing a "theory of change" for a region is a deliberative and context-sensitive process of shaping the future (Figure 2). A *theory of change* is:[26]

> *"a description of how and why a set of activities – be they part of a highly focused program or a comprehensive initiative – are expected to lead to early, intermediate, and long-term outcomes over a specified period."*

Community visioning processes can foster buy-in from stakeholders and build capacity within the community to work collaboratively toward shared goals. An effective theory of change is not only aspirational – pursuing a small number of *audacious* goals – but it is also *inspirational* – it envisions a meaningful and shared community purpose. Yet an effective theory of change also must be plausible, doable, and testable.[27]

Accomplishing desired long-term goals is contingent upon first accomplishing short- and medium-term goals (e.g., through strategic

Terms	*Definition*
Outcome	Desired long-term goal.
Purpose	Statement to clarify relevance, provide context, and communicate the desired outcome.
Indicator (validation measure)	Verifiable metric (qualitative or quantitative), representing the actual state of a system -- and a reliable measure of progress toward goal.
Intervention	Actions, policies/practices, or systematic approach proven to be efficient and effective toward achieving the goal.
Preconditions	Intermediate goal necessary to reach the desired long-term goal.
Assumptions	Explain why the whole theory of change makes sense.

Source: ICLEI, STAR Rating System & The Aspen Institute Roundtable on Community Change

Figure 2 - Key components of a theory of change. Source: ICLEI STAR Rating System and the Aspen Institute Roundtable on Community Change.

investment or policy and program changes). Performance measures are assessed on a regular basis to gauge progress and inform "course corrections" by policy-makers and program managers. In a recent regional water quality management initiative, for example, social indicators were used to promote non-point source stormwater management.[28] In that process, resource managers:

- identified a conceptual framework to facilitate indicator selection
- listened to stakeholders explain what is important for project success, and linked these ideas to a theory of change
- focused on a small set of core regional indicators to ensure regional consistency and to create realistic expectations for data collection
- provided supplemental indicators to address additional local concerns
- built the capacity of stakeholders to understand and interpret the data, and to use that information to effect change in the intended outcomes

2.2 Place-making matters

26 Anderson, A. 2003. *Theory of Change*. New York: ActKnowledge and the Aspen Institute Roundtable on Community Change.

27 Connell, J. and A. Kubisch. 1998. *Applying a Theory of Change Approach to the Evaluation of Comprehensive Community Initiatives: Progress, Prospects, and Problems*. Aspen, CO: The Aspen Institute.

28 Genskow, K. and L. Prokopy. 2008. Lessons Learned in Developing Social Indicators for Regional Water Quality Management. *Society and Natural Resources*, 23: 83- 91.

The American Planning Association's *Great Places in America* program celebrates Great Public Places, Great Streets, and Great neighborhoods.[29] Exellence in urban design (e.g., high quality transportation system, attractive buildings with higher densities, and world-class parks and public open spaces) can enhance quality of life and increase regional sustainability.

Well-designed communities offer an array of choices for housing, shopping, transportation, and recreation. They provide supportive environments for multiple life stages, ranging from early childhood development to aging in place. Affordable, safe, and family-friendly neighborhoods are needed[30] as well as hip, vibrant urban neighborhoods.[31] High quality transit – part of a highly connected, multimodal transportation system – make these neighborhoods great places to live.

The Capital Region has a rich cultural history, with many communities – both small and large – having historic centers with distinctive architecture and public spaces. "Mainstreet" revitalizations can help to reinvigorate the region's village and city centers. Healthy and resilient regions accommodate a broad range of household types and income levels (e.g., unmarried singles, married couples without children, couples with children, empty-nesters).

Sustainable development protects ecosystem services by constructing resource-efficient buildings, transportation systems, and utilities – whether they serve "greenfield" development on the rural fringe, "greyfield" development on under-utilized urban sites, or adaptive reuse of older buildings in village and city centers. Sustainable infrastructure increases energy efficiency and cost-effectiveness, while improving environmental quality and creating jobs. Moreover, strategic reinvestment in infrastructure can accomplish multiple objectives simultaneously (e.g., home weatherization reduces energy consumption, improves regional air quality, conserves household income, and supports local businesses).

2.3 Scale matters

Santa Monica, California is a model for local community sustainability initiatives.[32] The city is a single jurisdiction of only about 10 square miles (25.9 square kilometers), yet it has implemented cutting-edge programs in energy conservation, stormwater management, and green building. The city's Office of Sustainability and the Environment (OSE) is:

> *"responsible for developing and implementing policy initiatives that promote local environmental, economic, and social sustainability and integrating resource management, conservation, and sustainability practices with ongoing City operations."*

Santa Monica also provides technical assistance to residents, students, and businesses on all aspects of green building.

Small municipalities can have a significant impact by revising policies and practices that enhance livability and increase government effectiveness. The City of Madison – the largest of the county's communities – has the autonomy to make significant civil infrastructure investments (e.g., a Downtown streetcar network). Yet regional-scale sustainability initiatives require not only *intra*-governmental coordination, but also *inter*-governmental coordination.

Dane County, in contrast, is nearly 1,200 square miles (3,108 square kilometers) in area with 60 minor civil divisions (e.g., cities, villages, towns) and many other governmental units (e.g., school districts, emergency management districts). Effective regional sustainability networks leverage

29 American Planning Association. *Great Places in America*. www.planning.org/greatplaces/

30 Kotkin, J. 2010. *The Next Hundred Million: America in 2050*. New York: Penguin Press.

31 Leinberger, C. 2009. *The Option of Urbanism.* Washington, D.C.: Island Press.

32 City of Santa Monica, CA. Office of Sustainability and the Environment. http://www.smgov.net/departments/ose/

individual community initiatives to advance a coordinated regional sustainability agenda. These collaborative initiatives are most effective when addressing common concerns, such as transportation choice or water quality. Yet a fundamental challenge for integrated, regional planning and policy-making is to overcome the compartmentalization of responsibilities across municipal agencies and departments. Three notable regional initiatives are the Mid-America Regional Council (MARC)[33], the Chicago Metropolitan Agency for Planning (CMAP)[34], and the Boston Indicators Project.[35]

2.4 Governance matters

The National Academy of Sciences (NAS) recently examined challenges and opportunities to advancing sustainability within the federal government. The interagency *Partnership for Sustainable Communities* was recognized as a model for federal collaboration.[36] Because the need for coordinated governance also exists at the local level, the NAS study is relevant for the Capital Region's sustainability initiative.

A key area for collaboration is *civil infrastructure* – systems providing transportation, outdoor recreation, environmental protection, and other essential services. Planning, financing, implementing, operating, and maintaining civil infrastructure is most effective when it is a process of intra- and, often, inter-jurisdictional coordination. Sustainability initiatives tap multiple sources of knowledge through the engagement of stakeholders in government, business, higher education, and non-profit organizations.

The U.S. Environmental Protection Agency's Sustainable and Healthy Communities Research Program (SHC) supports integrative solutions to sustainability challenges. The EPA created a sustainable design toolkit to assist local governments in identifying and removing policy barriers to green building and sustainable design.[37] The toolkit addresses building codes and ordinances in two parts: an *assessment tool* and a *guide* for developing an action plan that promotes "green" design to limit the destruction of natural resources, conserve energy, and increase infrastructure efficiencies.

Existing municipal codes and ordinances are evaluated and given either a Green, Yellow, or Red rating, to identify strengths as well as inconsistencies or shortcomings. For example, the assessment tool asks:

> *"Are there requirements in place to encourage infill or redevelopment in areas with existing infrastructure...to reduce the need for new road and water infrastructure?"*

The policy analyst then assigns ratings accordingly:

Green
- required by code/ordinance
- incentivized

Yellow
- expressly allowed
- code/ordinance silent, but typically allowed

Red
- code/ordinance silent, but not typically approved
- expressly prohibited

The results of this assessment can be used to address policy and institutional barriers to sustainability. Potential actions include the adoption of mixed-use development ordinances and design standards, and the targeted use of "green" development incentives: density bonuses, expedited permit review, reduced impact fees, and

33 Mid-America Regional Council (MARC). *Creating Sustainable Places: A Strategy for Regional Sustainability*. http://www.marc.org/sustainableplaces/initiative.htm

34 Chicago Metropolitan Agency for Planning. https://www.cmap.illinois.gov/

35 *The Boston Indicators Project: Measuring What We Value.* http://www.bostonindicators.org/

36 Graedel et al. 2013. *Sustainability for the Nation: Resource Connections and Governance Linkages.* National Research Council. Washington, D.C.: The National Academies Press.

37 U.S. Environmental Protection Agency, 2010. *Sustainable Design and Green Building Toolkit for Local Governments.* EPA 904B10001.

cost sharing through special tax zones.

Training local staff in the use of this toolkit could be integrated into the Future Urban Development Area (FUDA) planning process that CARPC coordinates.[38]

2.5 Evidence matters

Sustainability initiatives identify, measure, and monitor performance indicators.[39] And rightly so, because what is measured can be more effectively managed.[40] Performance indicators help to gauge progress toward short-, medium-, and long-term goals, and can make complex systems more understandable. Sustainability indicators can measure *processes* (e.g., infrastructure investment decisions, land development regulation) and *outcomes* (e.g., water quality, walkability, cost of living). The use of the indicators by Mid-America Regional Council in Kansas City, Missouri (p.65) can be summarized as follows:

1. Develop place-based indicators and establish indicator targets
2. Establish a timeline for tracking progress
3. Report to policy makers and the public periodically on the indicator measures
4. Use the data to determine whether actions are having the desired outcome
5. If needed, adjust the plan and implementation strategy

MARC formed a *Creating Sustainable Places Partnership* that monitors indicators to gauge progress toward its regional vision, stating:[41]

> *"A few of the most important measures, with easily accessible data, are given prominence as "dashboard" indicators of regional progress. Other indicators allow users to understand the data in greater detail. Indicators are tracked over time and publicized through an annual report card that provides policy makers information on which to base decisions. If certain measurements are trending in the wrong direction, decision makers can investigate and take action to reverse the trend. This iterative process – taking action, measuring its impact and modifying actions as needed to reach sustainability goals – helps to create a learning community and build partnerships."*

Boston Metro's regional sustainability initiative also uses an online data "dashboard" and interactive web-based map, to communicate with the public. The director of the initiative advises other sustainability initiatives to develop "data crunchers" as well as "story tellers." The Chicago Metropolitan Agency for Planning (CMAP) also has an extensive regional indicator program (*MetroPulse* is the regional indicators website for the Chicago metro area).

2.6 Paradigms matter

Community infrastructure and land use patterns are the result of policy "legacies" – decisions made in previous decades. The *diffusion of innovations* – new technologies, design and construction practices, or institutional structures – occurs unevenly, both spatially and temporally (Figure 3).

Institutional innovations are as important as technological innovations in advancing sustainability.[42] Yet, advances in sustainability occur incrementally, resulting in a paradox:

> *"The future surrounds us; it's just unevenly distributed."*[43]

Impediments to sustainability may include policy

38 Capital Area Regional Planning Commission. Future Urban Development Area Planning. http://www.capitalarearpc.org/FUDA.html

39 ICLEI. 2010. *Star Community Index: Sustainability Goals and Guiding Principles.* ICLEI - Local Governments for Sustainability USA.

40 Phillips, R. 2003. *Community Indicators*. PAS report #517. Chicago: Amercian Planning Association.

41 Mid America Regional Council. http://www.marc.org/

42 Kiparsky et al., 2013.The Innovation Deficit in Urban Water: The Need for an Integrated Perspective on Institutions, Organizations, and Technology. *Environmental Engineering Science*, 30(8): 395-408.

43 Urban Land Institute. 2012. *What's Next? Getting Ahead of Change.* Washington, D.C. p. 69.

and institutional barriers, but also the attitudes and beliefs of elected and appointed officials. Organizations with the capacity for self-assessment and improvement typically have leaders who value technical advances, yet approach problems holistically. These leaders devote sufficient financial and human resources to evaluate the effectiveness and efficiency of current practices, and to investigate the costs and benefits of alternative practices.

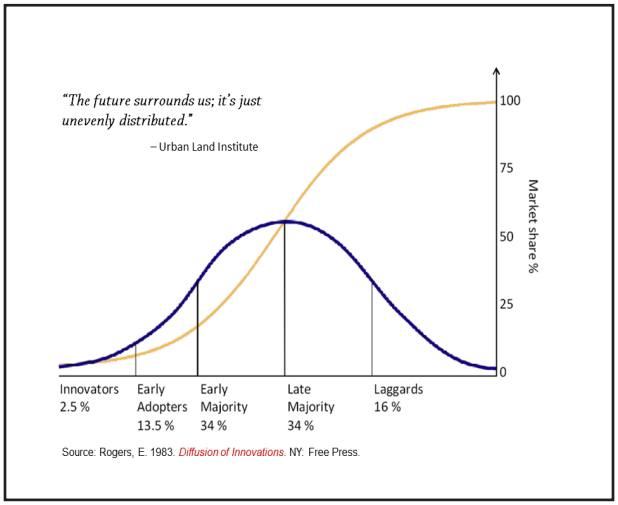

Figure 3 - The diffusion of new technologies and policy innovations occurs incrementally and, often, in uneven spatial patterns. Source: Rogers, 1995.

Many past paradigms (e.g., public housing towers, elevated urban expressways) have had unintended social, economic, and environmental impacts in major cities across the United States. Stormwater management, for example, has a long history of paradigms that have come and gone.[44] Conventional "grey" stormwater infrastructure, for example, is widely implemented in most U.S. communities (Figure 4).[45] Retrofitting communities to implement "greener" approaches to stormwater infrastructure may require changes in community policies to more fully account for the costs and benefits of civil infrastructure investment.

Paradigm change can occur when individuals' attitudes and behaviors change, and through institutional transformations. Regional sustainability coalitions can advance sustainability through peer-to-peer learning and capacity building, indicator monitoring, and more effective communication through social media. Regional sustainability advances as "early adopter" communities provide successful local models for adaptation and implementation by other communities.

Figure 4 - Concrete drainage swale (an example of "grey" infrastructure) prevents rainwater infiltration and groundwater recharge. Orgeon, WI.

Unintended consequences of infrastructure policies are more likely when these decisions are based on assumptions that reflect past, rather than future, conditions and paradigms. Climate change, for example, is increasing the frequency of extreme weather events in Wisconsin.[46] The potential risks from extreme events should be assessed, and then steps taken to reduce future vulnerabilities. That is one function of scenario-planning, which *"looks over the horizon"* to anticipate potential "*alternative futures*" and then takes steps to shape a

44 Reese, A. 2003. What's your stormwater paradigm? *Land and Water,* 47-48: 330.

45 National Academy of Sciences. 2008. *Urban Stormwater Management in the United States.* Washington, D.C.: National Academies Press.

46 Wisconsin Initiative for Climate Change Impacts. http://www.wicci.wisc.edu

preferred future.[47]

Over the next 25 years, the total area of rural land in the Capital Region converted to development could vary greatly, depending on how the region grows. Future growth is unlikely to replicate the patterns and practices of the second half of the 20th century. Yet because of variability in local-level land use plans and development regulations, the region's future growth will probably reflect a combination of development paradigms: 1) low-density housing development on rural farmlands and open spaces, 2) medium-density, mixed-use development on urban fringe farmlands and open spaces, and 3) medium- and higher-density, mixed-use redevelopment of urban and suburban sites. The proportion of future development falling within each category has significant regional sustainability implications. Annually increasing the proportion of new development on previously developed sites (paradigm #3) will significantly advance sustainability in the Capital Region.

Certification systems – for green buildings, building sites, and neighborhoods – can help to promote design excellence and raise awareness of locally-implemented best practices in the design, construction, and management of the built environment. Common certification systems include the U.S. Green Building Council's many Leadership in Energy and Environmental Design (LEED) programs, along with the American Society of Landscape Architects' Sustainable Sites Initiative, and ICLEI's STAR Community Index.

2.7 Partnerships matter

Social capital involves trust, reciprocity, common rules, norms, sanctions, and connectedness in institutions.[48] Five conditions are necessary for community initiatives to leverage social capital and maximize collective impact. These are:[49]

- a common agenda
- shared measurement systems
- mutually reinforcing activities
- continuous communication
- a backbone support organization

Collective impact[50] occurs in stages, when stakeholders with common interests:

- become informally networked
- envision collective action
- develop a strategic framework for implemention
- then carry out coordinated strategies that produce intended outcomes

The development of partnerships and community initiatives can, itself, be a leading indicator of paradigm change. For example, King County, in Washington State, offers three land stewardship planning programs: Farm Management Planning, Forest Management Planning, and Rural Stewardship Planning. Similar initiatives in the Capital Region could provide technical assistance to the communities that want it.

2.8 Communication matters

Effective communication strategies develop *aspirational* (and even *inspirational*) messages for specific audiences. Therefore, sustainability initiatives require both "data-crunchers" and "story-tellers."[51] Multi-faceted communications programs may include press-releases, real-time images, and blog entries that highlight progress and notable milestones (see the on-going riverfront revitalization in Columbus, Ohio as an example: *www.sciotomilecom*). At the completion of each milestone, update the current state of projects or

47 Bezold, C. 2009. Aspirational futures. *Journal of Future Studies*, 13(4): 81-90.

48 Folke, C., T. Hahn, P. Olsson, and J. Norberg. 2005. Adaptive governance of social-ecological systems. *Annual Review of Environmental Resources*, 30: 441-473.

49 Kania, J. and M. Kramer. 2011. Collective impact. *Stanford Social Innovation Review* (winter).

50 Easterling, D. 2013. Getting to Collective Impact: How Funders Can Contribute Over the Life Course of the Work. *Foundation Review*, (5) 2: Article 7.

51 Reconnecting America et al. 2013. *Building Capacity: Helping Communities Create Vibrant, Healthy and Economically Prosperous Neighborhoods.* Washington, D.C.: Reconnecting America.

plans with indicators; complete with overall funds spent to date, savings / benefits accrued, next-steps, and comment / question and answer session. Short videos can be distributed to the Chamber of Commerce, Convention Bureau, and other community organizations to convey key messages.

Sustainability is a concept that resonates with increasing numbers of business owners and major corporations. A culture of collective action – engaging employees with a "higher purpose" – is most likely to succeed when leaders ensure that incentives align with organizational priorities. In addition to increasing profits, businesses can enhance their image and goodwill within the community by aligning business practices with sustainability priorities. Energy conservation, for example, reduces waste and air pollution, and adds value for business owners or share-holders. In the public sector, energy conservation increases the efficient use of taxpayers' resources.

Branding provides opportunities for financial contributions to help implement project goals (e.g., sell naming rights for significant portions of a project). Recent examples of catalytic corporate sponsorship include financial support by the Cleveland Hospital for the HealthLine (bus-rapid transit corridor) and AT&T for a major plaza in Chicago's Millenium Park.

The strategic use of *champions* and outside experts can also help gain credibility, support, and visibility for sustainability initiatives. Champions may be name-recognized individuals from the private, public, or non-profit sectors. Social media (e.g., Twitter, Facebook, LinkedIn) connect communities of interest and focus community enthusiasm and volunteering toward shared sustainability priorities.

2.9 Leadership matters

Entrepreneurial leaders build trust, manage conflict, link actors, initiate partnerships, compile and generate knowledge, mobilize support, and develop and communicate visions.[52] Inter-organizational and inter-jurisdictional coordination is critical to regional, collaborative initiatives. Collaborative leadership alliances that span the public, private, and non-profit sectors have the greatest potential to drive effective and lasting strategies for enacting constructive paradigm change. Yet these alliances must be nurtured.

Leadership best practices include the following:[53]

- nurture a *culture of innovation* throughout the organization (e.g., job descriptions and performance evaluations reflect sustainability priorities)
- *model desired behavior* at the senior management level (e.g., support sustainable choices at every level to demonstrate a comprehensive and integrated commitment)
- *set clear, achievable, and measureable goals* (e.g., reduce energy use by 25% over the next 5 years)
- *dedicate sufficient resources* to make visible progress (e.g., target funding to ensure momentum and project continuity; create rewards and recognition for sustainability achievements)

The logistics of bridging diverse institutions, jurisdictions, and disciplinary "silos" are complex. For example, the facilitation of meetings, workshops, and conferences typically requires a *backbone organization* with the capacity for effective planning, communication, coordination, and outreach.

Measuring What Matters

3.1 Inputs, outputs, and outcomes

Sustainability initiatives often seek paradigm change. Consequently, they involve strategic *inputs* (such as time, money, data) and *outputs* (such as training workshops, plan and ordinance revisions) that are intended to produce desired *outcomes* (short-term, medium-term, or long-

52 Folke et al. 2005. Adaptive governance of social-ecological systems. *Annual Review of Environ. Resources*, 30: 441-473.

53 *Confessions of a Radical Industrialist* (Sustainability Learning Centre Blog (blog.sustainabilitylearningcentre.com)

term system changes in social, economic, or environmental conditions). Both inputs and outputs are actions, or *interventions,* that seek to increase what we value, such as educational opportunity or economic resilience. Or, interventions may seek to reduce threats, such as air and water pollution.

Interventions are decisions, activities, or investments that stakeholders (local governments (or community partners) make to advance toward desired outcomes."[54] Interventions include:

- education and outreach
- plan and policy adjustments
- partnerships and collaborations
- practice improvements
- programs and services
- enforcement and incentives
- facility and infrastructure improvements

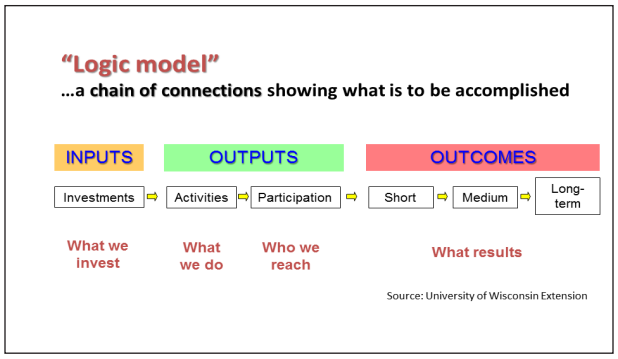

Figure 5 - Conceptual diagram of a logic model's main components. Source: University of Wisconsin-Extension.

A *logic model* graphically shows how these actions will (according to a *theory of change*) translate into desired short-term, medium-term, and long-term outcomes (Figure 5).[55] An adaptive management process implements interventions, evaluates their effectiveness, and adjusts strategies and/or targets, accordingly.[56]

3.2 Goals, indicators, and metrics

The following three concepts are fundamental to sustainability performance measurement and evaluation.[57, 58]

> ***Goal*** – an objective to be achieved. An example of a goal: *Protect the health of the Yahara lakes.* Progress toward a goal is assessed through the use of measureable indicators.
>
> ***Indicator*** – a summary measure that provides information on the state of, or change in, the people, places, or systems that are being measured. An example of an indicator for the above goal is: *Lake water quality at public beaches.*
>
> ***Metric*** – the measured value to assess an indicator. It defines the units and how the indicator is being measured. An example of a metric for the above indicator is: *Milligrams per liter of dissolved and suspended phosphorus sampled at public beaches.*

Human medicine provides a good model for the assessment and management of complex regional systems. Over the centuries, medical science has developed insights into the structure and function of the human body. In assessing human health and diagnosing illness or injuries, various indicators are measured. These metrics include blood pressure, body temperature, heart rate, and body mass index (based on height and weight). Yet the frontiers of medical science continue to expand. Scientific breakthroughs often generate new questions and areas of inquiry. For example, Western medicine

54 ICLEI. 2010. *Star Community Index: Sustainability Goals and Guiding Principles.* ICLEI - Local Governments for Sustainability USA.

55 National Center for Environmental Innovation (NCEI). 2009. *Lean Government Metrics Guide*. Washington, D.C.: U.S. EPA. EPA-100-R-09-005.

56 Reed et al. 2005. An adaptive learning process for developing and applying sustainability indicators with local communities. *Ecological Economics*, 59: 406-418.

57 National Research Council, 2011. *Sustainability and the U.S. EPA.* Washington, D.C.: The National Academies Press.

58 Fiksel et al. 2012. *A Framework for Sustainability Indicators at EPA.* National Risk Management Research Laboratory (NRML). EPA/600/R/12/687.

has relatively recently begun to examine the environmental factors that support human health and well-being.[59]

Similarly, our understanding of how social systems shape –and are shaped by – the broader natural and built environments is still rudimentary. Complex systems science is an emerging field with important implications for regional sustainability initiatives. We are slowing learning more about the causal relationships between public policies and social, economic, and environmental well-being. Monitoring sustainability indicators can improve decision-making about how the built environment is shaped at both the community and regional scales.

The purpose of monitoring community indicators is to inform decisions that advance regional sustainability priorities. Indicators can gauge progress by monitoring, for example, the speed at which best practices are being adopted and implemented. *Input* indicators, for example, focus on time, money, and other invested resources, while *output* indicators focus on the resulting plans, policies, practices, and programs. Output indicators may include the number of training workshops conducted annually or the annual number of workshop participants. Sustainability *outcome* indicators, in contrast, measure system conditions which may take several months, or even years, to noticeably change. Some system indicators can be used to measure rapid changes in conditions, such as traffic congestion or beach water quality.

Indicator measurements can reveal the direction of system changes and also the rates of change over time. *Leading indicators* measure conditions that may change relatively quickly over the short- or medium-terms, foreshadowing changes in longer-term future conditions. *Lagging indicators*, in contrast, measure system conditions that may result from an earlier set of actions, or interventions, creating the conditions for long-term sustainability (Figure 6).

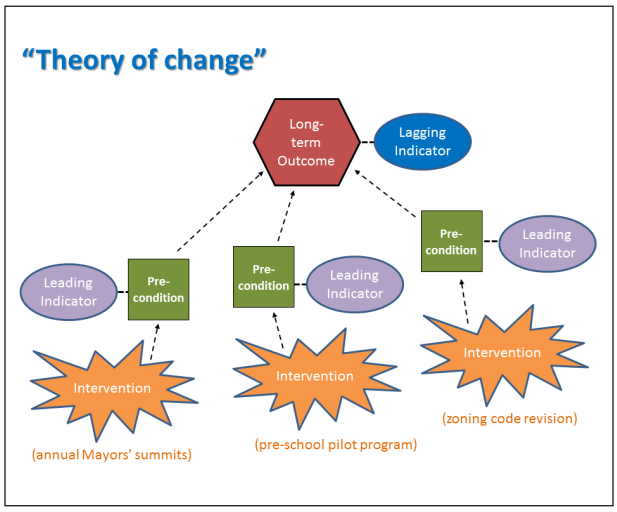

Figure 6 - Diagram of the theory of change concept, including interventions and both leading and lagging indicators.

Sustainability indicators and metrics can provide information about many different aspects of the Capital Region, including specific *places* (buildings, neighborhoods, census block groups), *infrastructure sectors* (transportation, housing, food, education/skill training), and human *behaviors* and *impacts* (travel patterns, pedestrian and bicyclist injuries and deaths). Indicators and metrics can also measure *environmental* or *economic impacts* (costs to society due to the degradation of ecosystem services), well-being of specific *populations* (ethnic, income groups), and the effectiveness of governing *institutions* (development permitting processes).[60] Local governments can use *process* and *organizational* indicators to improve operational efficiencies, employee morale, and the quality of decision-making.

3.3 Indicator and metric selection

59 Antonovsky, A. 1979. *Health, Stress and Coping*. San Francisco: Jossey-Bass.

60 Fiksel et al. 2012. *A Framework for Sustainability Indicators at EPA*. National Risk Management Research Laboratory (NRML). EPA/600/R/12/687.

The challenge of sustainability initiatives at any scale is to select the indicators that best fit the context – the immediate social, environmental, and institutional setting. Selecting goals and indicators, and indicator targets, involves ethical choices that should reflect underlying community values. When selecting performance indicators, the purpose of each indicator should be carefully considered. Performance measures can influence behavior by creating powerful incentives and disincentives. Therefore, the following questions should be answered:

What problems are we trying to solve?

What behaviors are we trying to change or reinforce?

What opportunities are we trying to capture?

Multiple selection criteria should guide the adoption and use of individual indicators and metrics. A widely used framework for choosing metrics is the "SMART" model; each selected metric should be:[61]

Simple – Metrics are easily understandable to the public and to policy makers.[62] For example, an initiative could measure days of poor air quality or estimate tons of air pollutant emissions. Air quality is easier to understand, easier to measure, and reflects what most people actually care about.

Measureable – Needed data are feasible to gather from existing sources or otherwise are easily collected at a reasonable cost. Data for indicators can come from a variety of sources, including federal agencies, such as the Census Bureau or the Energy Information Administration (EIA). For indicators that require primary data collection, this places additional demands on the agency or organization collecting the data. Standardizing data collection can increase indicator reliability and cost effectiveness.

Actionable – Can the member organizations or their partners influence the desired results? Concerns about greenhouse gas emissions, for example, might lead to national-level lobbying for higher vehicle fuel efficiency standards. But at the local and regional levels, actions might focus on modifying land use patterns and transportation infrastructure to conserve energy by reducing the average daily vehicle miles traveled per household.

Relevant – Does the information supplement common knowledge? Is it something people care deeply about? Meaningful indicators measure the region's vision and goals, and can be monitored by the region's policy makers and program managers. Measurements are *normalized* (data are expressed as units per resident or per acre, for example) to enable comparisons across demographic groups or neighborhoods and with other communities and metropolitan regions.

Timely – Can the indicator be measured frequently enough to enable timely, informed decision-making? Does the indicator refer to a change that occurs slowly over many decades, such as land use mix, or does the indicator measure a phenomenon that can change more quickly, such as air quality?

Regional sustainability initiatives monitor multiple indicators to help inform policy, planning, and investment decisions. Therefore, a set of *regional* sustainability indicators must be:

Comprehensive – all of the major sustainability priorities are addressed.

Parsimonious – the selected indicators are not redundant, ensuring the efficient use of data collection and analysis resources.

An effective set of indicators measures progress toward multiple sustainability goals. *Bellwether*

61 National Center for Environmental Innovation. 2009. *Lean Government Metrics Guide*. Washington, D.C.: U.S. Environmental Protection Agency, EPA-100-R-09-005.

62 Litman, T. 2011. *Well measured: Developing indicators for sustainable and livable transport planning.* Vancouver, Canada: Victoria Transport Policy Institute.

indicators address grand challenges, such as protecting air quality, increasing transportation and housing affordability, or reducing unemployment.[63] Many people identify with these challenges, emotionally, tapping into their core values (e.g., security, education, environment). A small number of bellwether indicators are best – those that are most appropriate and meaningful for the local and regional context.

3.4 Metric targets and units of analysis

Most sustainability indicators can be monitored for multiple units of analysis. The *optimal* unit of analysis depends on the specific indicator, the indicator's purpose, and the data available. Geographic units of analysis include minor civil divisions (i.e., township, village, city), U.S. Census tracts or block-groups, school districts, and tax-increment financing districts. Where feasible, indicators are collected at a level that allows for deeper analysis. Disaggregated data allow for "drilling down" to study issues in context, enabling comparisons between neighborhoods, for example, or between demographic groups. Comparisons can be also made between individual census tracts or block groups and the surrounding municipality, county, and region.

Collecting baseline data for each metric helps to inform the selection of actionable metric targets. Monitoring – repeatedly collecting metric data over time – provides three types of information:

- state (system status at a single point in time)
- change (rate of increase or decrease in the system over a specific time interval)
- trend (whether the system is improving, declining, or stable)

When measured for sub-regional units of analysis (e.g., municipalities), metrics can be expressed as percentages (e.g., of a total population or land area) or as ratios (e.g., people per surface area).

63 Innes, J. and D. Booher. 2000. Indicators for Sustainable Communities: A Strategy Building on Complexity Theory and Distributed Intelligence. *Planning Theory & Practice*, 1(2): 173-186.

The quantitative metric data can be evaluated and converted to categories (e.g., poor, good, excellent) or expressed as rankings (in comparison with other regions or municipalities).

Advancing Sustainability in the Capital Region

4.1 Overarching goals

Regional sustainability planning initiatives focus not only on social, economic, and environmental *outcomes*, but also on decision-making *processes* (how decisions get made and by whom). The Department of Housing and Urban Development (HUD) recommends the following *process* goals:

> ***Inclusive planning*** (populations traditionally marginalized in public planning processes participate in decision-making to develop and implement a long-range vision for the region)
>
> ***Multi-level coordination*** (*regional* transportation, housing, water, and air quality plans are linked to *local* comprehensive land use and capital investment plans; *federal* investment is aligned with *local* and *regional* sustainability strategies)

HUD's guidelines also address long-term *outcomes* for both the structure and function of the built environment:

> ***Land reuse and redevelopment*** (increase the share of residential and commercial construction on underutilized infill development sites, while minimizing household displacement in neighborhoods with significant disadvantaged populations)
>
> ***Housing and transportation affordability*** (decrease per capita vehicle miles traveled (VMT) and transportation-related emissions for the region; decrease combined housing and transportation costs per household)
>
> ***Equitable access*** (reduce social and economic disparities for low-income households and

communities of color; increase the proportion of low- and very low-income households within a 30-minute transit commute of major employment centers in urban, suburban, and rural settings)

Sustainability initiatives often use a Venn diagram with three intersecting circles to represent overlapping social, economic, and environmental concerns. This conceptual framework is useful for its simplicity, but it lacks explicit linkages to the structure of both the natural and built environments – central factors in community health, livability, and sustainability. Whether in urban, suburban, or rural settings, place-based sustainability initiatives require actions, or interventions, affecting the three following domains.

Natural environment – Healthy air, food, and water are vital ecosystem services that support human health and quality of life.[64] Protecting nature's infrastructure (lakes, wetlands, forests, aquifer recharge areas) helps communities be healthy and sustainable.

Built environment – Sustainable development is *resource-efficient* (e.g., conserves energy used for heating and cooling buildings) and also *location-efficient* (e.g., conserves energy used for transportation). It creates neighborhoods that are affordable, have a unique sense of place, and enable healthy, active living.[65]

Cultural and economic environment – Increasing lower-income households' access to early education, daycare, and job-training can build social capacity and potentially enhance the economic prosperity of entire communities and regions.

These three domains reflect concerns of stakeholders in the Capital Region. Yet the region's most pressing challenges are complex, transcending any single discipline or profession, or government department or agency. A holistic, systematic approach – leveraging diverse expertise and authority in coordinated partnerships – can advance regional sustainability through adaptive learning and continual improvement.

4.2 Sustainability priorities and indicators

CRSC assembled a diverse group of stakeholders to envision a more equitable, healthy, and resilient future for the Capital Region. Through a collaborative engagement process,[66] the CRSC considered the following questions:

What are the most pressing needs, challenges, and opportunities facing our region?

How can our region engage in mutually-beneficial partnerships that address strategic needs, challenges, and opportunities?

CRSC working groups identified dozens of goals under nine different themes that connect us as a region (Figure 7). Although well over 100 goals were identified, the CRSC eventually reached a consensus on five priority areas, summarized below. Recommended indicators and metrics for each priority have been selected from a longer list of potential indicators for the Capital Region. The smallest unit of analysis is shown in parentheses after each listed metric.

HEALTHY ECOSYSTEMS

Building communities that protect ecosystem services

Communities benefit from many "services" provided by healthy environments. These ecosystem services include the provision of food, purification of water, and opportunities for outdoor recreation. Our built environment – the buildings,

64 Millenium Ecosystem Assessment (MEA). 2005. *Ecosystems and Human Well-Being: Synthesis*. Island Press, Washington, D.C.

65 Harnik, P. and B. Welle. 2011. *From Fitness Zones to the Medical Mile: How Urban Park Systems Can Best Promote Health and Wellness.* Washington, D.C.: The Trust for Public Land.

66 Weerts, D. and L. Sandmann. 2010. Community engagement and boundary spanning roles at public research universities. *Journal of Higher Education*, 81(6): 632-657.

roads, and other infrastructure – can, if we are not careful, reduce important ecosystem services. For example, streets, parking lots, and rooftops are impervious surfaces that may reduce groundwater recharge and increase polluted runoff into our lakes, rivers, and creeks. Negative impacts include closed beaches, diminished fish habitats, and drying up of streams. Low-impact development techniques can protect surface- and ground-water, as well as other ecosystem services. Progress is being made to restore ecosystem services in rural lands through, for example, buffer strips between farm fields and streams and improved manure management. This same energy and commitment can be applied to the built environment.

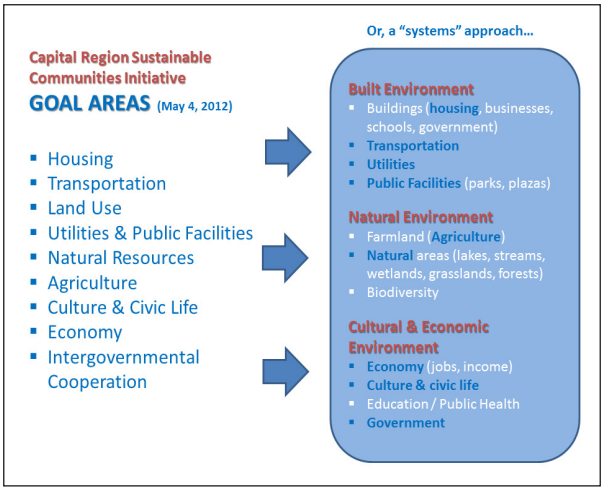

Figure 7 - CRSC working groups' nine goals can be organized into three themes or domains.

Goals: Encourage land recycling and compact, resource-efficient, mixed-use development. Ensure that municipal plans and policies protect environmental quality (e.g., lake water quality) and conserve natural resources (e.g., soil, groundwater, air quality, wildlife habitat). Use green infrastructure more effectively to provide multiple ecosystem services (e.g., reducing pollutants carried by stormwater runoff; increasing rainwater infiltration and groundwater recharge, creating opportunities for outdoor recreation) (Figure 8).

Indicator 1 - Compact, sustainable growth

Bellwether Metric:

1.1 *Developed land area per person (by municipality)*

Supplementary Metrics:

1.2 *Vehicle-miles traveled (VMT) - annual average miles per person over 16 years old (by municipality)*

1.3 *Developed percent of the region's total land area (by municipality)*

1.4 *Percent of new development located on previously developed sites (by municipality)*

Figure 8 - Trout streams and easily accessible lakes provide abundant outdoor recreational opportunities and many other important ecosystem services in the Capital Region. Photo: Dennis Franke.

Indicator 2 - Water quality in the Yahara lakes

Bellwether Metric:

2.1 *Number of public beach closings per year on the Yahara Lakes: Mendota, Monona, Waubesa, Wingra, Kegonsa (by lake)*

Supplementary Metrics:

2.2 *Impervious percent of total surface area (by municipality)*

2.3 *Phosphorus levels for the Yahara lakes (or*

Chlorophyl a – a measure of algae and other biomass in a water body (by lake)

***2.4** Percent of private wells with nitrate-nitrogen levels above the 10 mg/l level established as a drinking water standard for infants (by municipality)*

LOCAL FOOD SYSTEMS

Preserving land for food and fiber production and processing

Most of the Capital Region's land area is used for agriculture. These working landscapes are among the most productive in the world. They also give the region's residents and visitors access to the countryside and opportunities to experience the region's rural heritage. Communities, landowners, and developers can work together to manage growth in ways that preserve our working lands for long-term production and enjoyment.

Goals: Protect the structure and function of the region's working landscapes. Maintain the economic viability of high-quality farmland to support the region's agricultural industry and local food system. Enable urban farming and a robust local food system through home gardens, community gardens, and seasonal as well as year-round farmers markets (Figure 9).

Indicator 3 - Healthy, working landscapes

Bellwether Metric:

***3.1** Percent of farmland in contiguous blocks greater than 500 acres (by municipality)*

Supplementary Metrics:

***3.2** Acres of farmland, forests, and other natural areas converted to development per year (by municipality)*

Indicator 4 - Local food processing and marketing

Bellwether Metric:

***4.1** Farmers markets - number of market-days per year (or total sales in dollars) (by municipality)*

Supplementary Metrics:

***4.2** Number of community gardens per 10,000 population (by municipality)*

4.3 Number of community supported agriculture (CSA) operations (by county)

Figure 9 - Dane County Farmers Market on the Capitol Square. Photo: Bill Lubing.

AFFORDABLE MOBILITY

Providing high-capacity, regional transit within an interconnected, multi-modal transportation system

Successful metropolitan regions offer fast, frequent and user-friendly transit as part of a multi-modal, interconnected transportation system. High-capacity transit can efficiently move residents and visitors along busy corridors, lower household transportation costs, and reduce greenhouse gas emissions. Madison has an award-winning bus system that provides excellent service along and around the isthmus, and also serves many communities in and around Madison. The region has an opportunity to build on this success by providing bus rapid-transit, or BRT. A recent study found that BRT could serve 15,000 – 20,000 riders a day over the coming decades while reducing

travel times from 19% to 42%.[67] In a growing and interconnected Capital Region, highly integrated transit is essential for a thriving economy and high quality of life.

Goals: Increase the region's transportation options to improve mobility, enable active living, and provide – for all households – convenient access to affordable transportation options. Reduce the region's dependence on cars and the associated fixed and variable costs for households that own multiple vehicles. Increase the proportion of commuting and non-commuting trips taken by energy-efficient travel modes – walking, biking, and high-capacity transit (Figure 10).

Figure 10 - Multi-use pathway on a former rail line on Madison's southside provides safe and convenient transportation and opportunities for linear recreation.

Indicator 5 - Transportation choices and usage

Bellwether Metric:

5.1 *Percent of commuters walking, biking, or taking transit to work (by census block group)*

Supplementary Metrics:

5.2 *Annual (and seasonally stratified) ridership on Metro bus, express bus, bus-rapid transit, and other transit systems (by county)*

5.3 *Number of bus rapid transit stations constructed (by county)*

5.4 *Bike/pedestrian path network density - path miles per square mile (by municipality)*

Indicator 6 - Transportation affordability

Bellwether Metric:

6.1 *Average annual transportation costs per household (by census block group)*

COMPLETE COMMUNITIES

Meeting the growing demand for walkable, vibrant, mixed-use places

A growing number of households seek walkable vibrant places to live, work, and play. A market study commissioned by CRSC found that 72 percent of households over the next 25 years will prefer walkable communities.[68] Although most growth in the region is not very walkable, the Capital Region has great assets to build upon. Downtowns and older neighborhoods, especially, can be retrofitted to meet the growing need for walkable, mixed-use places.

Goals: In response to the changing real estate market, guide a significant proportion of new growth to the redevelopment of corridors and nodes to create pedestrian-friendly, distinctive places and location-efficient neighborhoods (Figure 11). High-quality urban design – integrating buildings, transportation networks, and the public realm – can increase densities in ways that reduce energy demand, increase the efficiency of public infrastructure investments, and raise the property

67 SRF Consulting Group. 2013. *Madison Transit Corridor Study: Investigating Bus Rapid Transit in the Madison Area*. Madison, WI: Madison Area Transportation Planning Board.

68 CNT, Peloton Research Partners, Seth Harry & Associates. 2014. *Dane County Market Demand Study: Bus Rapid Transit & Other Local Investments in Walkable Transit-Supportive Communities.*

tax base. A mix of restaurants, services, and retail uses (e.g., hardware, apparel, groceries) – along with easily accessed parks and greenways – enable active lifestyles and convenient living.

Indicator 7 - Location-efficiency

Bellwether Metric:

7.1 *Percent of new (or all) housing units built in active living – walkable and bikeable – areas (by municipality)*

Supplementary Metrics:

7.2 *Floor-area ratio for buildings within a ¼ mile radius of a node center, e.g., bus-rapid transit station, downtown (by node)*

7.3 *Percent of the population residing within 1/4 mile of a transit stop (by census block group)*

7.4 *Percent of the population residing within 1/2 mile of a park or greenway or bike/ pedestrian pathway (by census block group)*

7.5 *Percent of the population residing within 1/2 mile of a grocery store (by census block group)*

Figure 11 - Higher-density, mixed-use infill and redevelopment can increase walkability and location-efficiency. Photo: www.usquaremadison.com

Indicator 8 - Walkability/Bikeability

Bellwether Metric:

8.1 *WalkScore – a measure of non-residential destination clustering – for existing and potential nodes (by node center)*

Supplementary Metrics:

8.2 *Percent of street blocks smaller than 6 acres (by node)*

8.3 *Public realm index – audit of public spaces: plazas, squares, streetscapes) (by node)*

ACCESS TO OPPORTUNITY

Ensuring equitable access to opportunities to improve lives

Like the rest of the U.S., Dane County is becoming more racially and ethnically diverse. Between 2000 and 2010 the population of white, non-Hispanic people increased 7%, while the population of persons of color increased 64%. However, this fast growing segment of the region's population experiences disproportionately high levels of poverty, unemployment, incarceration, and adverse educational and health outcomes. Madison's national reputation as a great place to live does not hold true for a large number of persons of color. We cannot sustain broad prosperity – nor can we consider our region truly livable - unless access to its opportunities is open to all.

Goals: Ensure that safe and affordable housing is available in location-efficient neighborhoods with easy access to healthy food and outdoor recreational opportunities. Increase the proportion of low- and very low-income households within a 30-minute transit commute to job centers, educational institutions, and parks and recreation areas (Figure 12). Reduce critical racial/ethnic disparities by reducing the developmental impediments facing children who are raised in

poverty.[69] Every child – regardless of household income – could have access to opportunities to improve their lives.[70] The Capital Region would benefit by increasing residents' capacities to earn a living wage and to develop the knowledge and skills to fulfill their potential (e.g., through early childhood development programs, job training in construction and the trades, and lifelong learning).

Note: equity indicators are calculated for two units of analysis: a) the entire region, and b) Census tracts or block groups in which at least 50% of the households are low-to-moderate income (earning 80 percent or less of county median household income).

Figure 12 - Madison's Boys and Girls Club. Photo: PhoenixAlumni Magazine.

Indicator 9 - Access to housing and transportation affordability

Bellwether Metric:

9.1 *Housing + Transportation Affordability Index: housing and transportation costs do not exceed 45% of household income (by census block group)*

Supplementary Metrics:

9.2 *Percent of housing units affordable (cost does not exceed 30% of household income) to lower-income households, e.g., earning ≤50% of the county's median household income (by census block group)*

Indicator 10 - Access to education and employment

Bellwether Metric (by race/ethnicity):

10.1 *Percent of children achieving 3rd grade reading proficiency (by county)*

Supplementary Metrics (by race/ethnicity):

10.2 *Percent of children living in poverty, or percent of households receiving childcare support through Wisconsin Shares (by county)*

10.3 *Percent of students graduating from high school on time (by county)*

10.4 *Percent of the population in low-income neighborhoods residing within 1/2 mile of a grocery store (by census block group)*

GOOD GOVERNANCE

Increasing the efficiency and effectiveness of local, county, and regional government

In addition to the five priority areas summarized above, improvements in local and regional governance can advance sustainability by improving the coordination of plans, policies, and infrastructure investment and implementation practices. The benefits of intra- and inter-jurisdictional coordination include the sharing of best practices – which can result in improved community fiscal health and long-term economic resilience. Good governance also seeks to increase public participation in planning and policy implementation (Figure 13).

Indicator 11 - Regional collaboration and coordination

Bellwether Metric:

11.1 *Percent of the region's 60 municipalities participating in the CRSC initiative (by region)*

69 Arkin, E., P. Braveman, S. Egerter, and D. Williams, eds. 2013. *Time to Act: Investing in the Health of Our Children and Communities.* Princeton, NJ: Robert Wood Johnson Foundation Commission to Build a Healthier America.

70 Reconnecting America. 2014. *Are We There Yet? Creating Complete Communities for 21st Century America.*

Supplementary Metric:

11.2 *Number of intergovernmental agreements (e.g., plans and policies on transportation, parks and recreation, affordable housing) (by region)*

11.3 *Percent of women and racial/ethnic groups on selected decision-making bodies (e.g., commissions, boards) (by county)*

Indicator 12 – Fiscal resilience

Bellwether Metric:

12.1 *Property tax base – average assessed value per acre (by municipality)*

Supplementary Metric:

12.2 *Ratio of improved value to land value for all assessed property (by municipality)*

12.3 *Bond rating, or fund balance as percent of budget, or debt/revenue ratio (by municipality)*

Developing strategies to achieve these priority goals is a long-term process. The following section summarizes several ways to "mainstream" regional sustainability in the Capital Region.

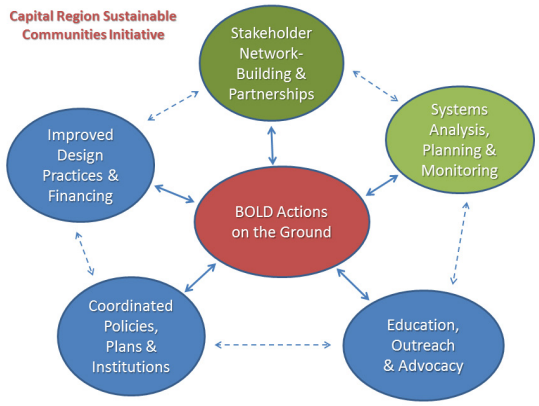

Figure 13 - Mainstreaming sustainability at the local and regional levels requires multiple, coordinated activities.

4.3 Strategies to maximize collective impact

Good governance reflects three principles that are particularly relevant to the CRSC initiative: *inclusion* (participatory decision-making with a consensus orientation, promoting accountability, transparency, and fairness); *prioritizing* (e.g., plan and implement in phases, with achievable milestone dates and deliverables for projects that have the most benefits for the most stakeholders), *cost-sharing* (between beneficiaries and jurisdictions).[71]

A recent study by the National Research Council recommended three strategies for overcoming sustainability barriers within the federal government. These strategies – reflecting the good governance principles discussed above – are also appropriate for local and regional sustainability initiatives.[72]

1. Organize communities of interest to coordinate efforts and collaborate on sustainability priorities
2. Align plans, policies, programs, and funding with sustainability priorities
3. Leverage funding from multiple sources to focus resources on widely shared sustainability priorities

When implemented systematically,[73] these coordinated strategies can help regions maximize their collective impact on sustainability priorities (Figure 14). Actions, or interventions, can have synergistic effects on more than one sustainability goal. For example, investing in high-quality transit can increase access to job-training and employment, decrease households' costs of living, and reduce air pollution. The following summary is written as if it is five to ten years into the future, and many of the necessary strategies have been implemented.

71 Graham et al. 2003. *Principles for Good Governance in the 21st Century.* Policy Brief No. 15. Ottawa, Canada: Institute on Governance.

72 Graedel et al. 2013. *Sustainability for the Nation: Resource Connections and Governance Linkages*. National Research Council. Washington, D.C.: The National Academies Press.

73 Reed et al. 2005. An adaptive learning process for developing and applying sustainability indicators with local communities. *Ecological Economics*, 59: 406-418.

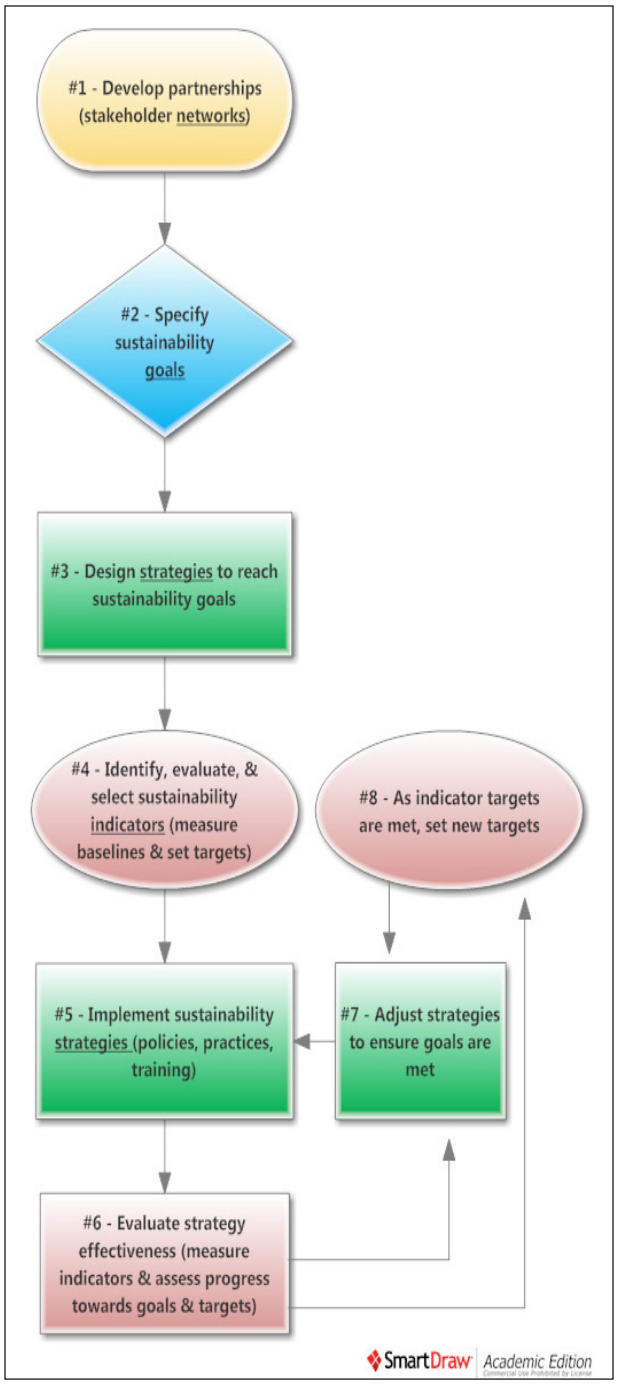

Figure 14 - Diagram of the adaptive learning process supporting the Capital Region Sustainable Communities initiative. Adapted from: Reed et al. 2005.

Stakeholder Networks and Partnerships

Leadership development programs at the neighborhood level increase social capital across age, race, ethnic, and income strata. Diverse perspectives are represented in public decision-making, reflecting the region's changing demographics. Stakeholder networks foster synergy among diverse, yet interconnected, interests (e.g., planning, public health, parks and recreation, cultural affairs).

Mayors and city managers meet on a regular basis with leaders from the business, education, and non-profit sectors to discuss regional challenges and opportunities. Community leaders engage interdisciplinary *task forces* to tackle regional sustainability priorities (e.g., develop consistent policies and technical support for green streets, transit-oriented development, and early-childhood education). "Design thinking" and *pro bono* professional alliances (e.g., Madison Design Professionals; Downtown Madison Business Association) help generate ideas and stakeholder support for catalytic community initiatives.

Systems Analysis, Planning, and Monitoring

Information-sharing and collaboration routinely occur across government units (e.g., planning, public health, housing, transportation, parks and recreation). Systematic internal assessments evaluate programs, policies, and permitting processes that shape the built environment.[74] Institutional barriers to sustainability (e.g., intra-governmental communication gaps, obsolete zoning codes and infrastructure design standards, inadequate data or funding for planning) are identified and steps taken, where needed, to improve social, economic, and environmental outcomes.

Routine data collection, analysis, and reporting procedures monitor sustainability indicators and annually or biennially assess progress toward indicator targets and long-term goals. An up-to-date online "dashboard" of indicator data, maps,

74 U.S. Environmental Protection Agency. 2010. *Sustainable Design and Green Building Toolkit for Local Governments.* EPA 904B10001. Washington, D.C.

and infographics engages the public, the media, and community leaders. Successes are celebrated by featuring innovative projects, policies, and practices, and regularly communicating achievements – and lessons learned – to stakeholders.

Education, Outreach, and Advocacy

Best practices and case studies are periodically assessed to benchmark sustainability performance metrics with other regions and learn from the nation's network of regional sustainability initiatives. Educational institutions and non-profit organizations partner with the public sector to develop case studies of sustainability best practices (e.g., cost-benefit analyses of mixed-use development projects). Collaborations include professional degree and certificate programs at UW-Madison, Edgewood College, and Madison College. Non-profit organizations (e.g., Wisconsin Bike Federation; Wisconsin Wetlands Association) provide information, training, and technical assistance to local government staff and other stakeholders.

Coordinated Policies, Plans, and Institutions

Land use and transportation planning are regionally coordinated. Investment and political support for catalytic regional transportation projects serve the public interest (e.g., *regional* high-speed transit, *regional* greenways and trail networks).[75] The regional transit authority (RTA) implements bus-rapid transit and coordinates regional transit system growth and development (e.g., express busses).

Intra-jurisdictional reforms align incentives for coordination and collaboration with sustainability priorities. Staff performance evaluations and career advancement opportunities are linked to sustainability initiative goals. Periodic assessments monitor institutional changes and inform the design of incentives and professional development programs, including leadership training (e.g., Edgewood College's Sustainability Leadership Program).

Information is routinely shared both within and across municipal governments (e.g., urban planning, transportation, parks and recreation, and public health, engineering). Cross-sector problem-solving and service-delivery is institutionalized (e.g., Dane County and City of Madison health departments). Catalytic public-private partnerships produce high visibility projects (e.g., local food processing hub; year-round public market) that foster additional investment while advancing sustainability priorities. A database of potential redevelopment sites in location-efficient corridors and nodes is regularly updated. Completed projects are catalogued and mapped on an interactive, online, regional map.

Improved Design Practices and Innovative Financing

Municipal design standards reflect best practices in sustainable development whether in urban or suburban locations. Streamlined development permitting processes encourage higher-density, mixed-use, and walkable development in targeted areas (e.g., transit-served hubs). In partnership with local banks and the Chamber of Commerce, municipalities support transit-supportive redevelopment through financing assistance, density bonuses, and other incentives that encourage green building, walkability, and sustainable site design.[76]

Policy improvements at the municipal level include:

- **Code and ordinance reforms** (e.g., form-based zoning codes; complete/green streets

75 Rall et al. 2010. *Public-Private Partnerships for Transportation: A Toolkit for Legislators*. Washington, D.C.: National Conference of State Legislatures.

76 Reconnecting America et al. 2013. *Building Capacity: Helping Communities Create Vibrant, Healthy and Economically Prosperous Neighborhoods.*

ordinances)[77]

Design guidelines and standards (e.g., green buildings; green parking lots)

Targeted infrastructure investment in the public realm (e.g., waterfronts, greenways, plazas, parks, streetscapes).

Urban design guidelines and site development standards encourage mixed-use, walkable, transit-oriented development and right-sized housing units in designated "green" or "active-living" districts.[78] Performance standards, technical assistance, incentives, and awards help to foster design excellence from the site to regional scales.

Design competitions and charrettes for major infrastructure investments (e.g., waterfront parks, public libraries) attract public attention, generate interest, and reward great ideas. Exemplary local projects and best practices serve as models for future development within the region.

Improved funding mechanisms support civil infrastructure. For example, a substantial proportion of park dedication and development fees fund improvements, furnishings, and cultural programming for existing public parks. These fees also fund a broad range of recreational facilities, including new linear parkways, and the urban public realm (e.g., streetscapes, pocket parks, plazas).

Bold Actions On-the-Ground

Ultimately, many of the CRSC initiative's objectives can be met by shaping – and reshaping – the region's built environments. One area warranting greater attention is multi-purpose civil infrastructure. Improvements in this area could have multiple benefits for public health, quality of life, economic prosperity, and the environment.

Linear park and pathway networks

As urban densities increase through regional population growth, job creation, and infill and redevelopment, major improvements are made in the region's transportation system and parks and open space system. This multi-purpose civil infrastructure enables biking, jogging, walking, and other forms of mobility and linear recreation across the urban-to-rural continuum. Regionally-connected greenway networks provide high quality transportation and outdoor recreation alternatives, and perform other important environmental functions (e.g., adaptation to climate change/ stormwater management).[79] In contrast to the mid-20th century suburban park model of large grassed areas with sport fields, urban open space systems are designed to serve contemporary needs within an urban context.[80] These systems include plazas, squares, mini-parks, and waterfront terraces – designed, programmed, and managed in ways that meet the needs of people of all ages.

Urban waterfronts

Transformative investments in the public realm ensure that urban quality of life is improved by higher-density, mixed-use development. Reclaiming urban waterfronts is a high priority for intra-jurisdictional coordination (e.g., municipal parks and open space divisions, planning and engineering departments). Public access to the region's waterways and urban lakefronts (e.g., lakes Mendota, Monona, and Wingra) is enhanced by new multi-purpose pathways, trail networks, and boardwalks (e.g., linking James Madison park with the Edgewater Hotel and Memorial Union).

Greenways

77 U.S. Environmental Protection Agency, 2010. *Sustainable Design and Green Building Toolkit for Local Governments.* EPA 904B10001. Washington, D.C.

78 Anderson, L., S. Scrimshaw, M. Fullilove and J. Fielding. 2003. The *Community Guide*'s model for linking the social environment to health. *American Journal of Preventive Medicine*, 24(35): 12-20.

79 Austin, G. 2014. *Green Infrastructure for Landscape Planning: Integrating Human and Natural Systems.* New York: Routledge.

80 LaGro, J. 2013. *Site Analysis: Informing Context-Sensitive and Sustainable Site Planning and Design*, 3rd ed. Hoboken, N.J.: John Wiley & Sons.

Green infrastructure, a decentralized approach to stormwater mangement, is widely implemented throughout the region. These green space networks include "daylighted" streams and retrofitted stormwater management areas.[81] Within these green spaces, multi-purpose path and trail systems provide easy access to both nature and active living opportunities.

Priorities for investment vary, spatially, across the region. A gap analysis of the region's multi-use path and trail network identifies priority areas for land or easement acquisition and infrastructure investment to close critical gaps and increase the network's safety, accessibility, and multi-functionality.

Green buildings, streets, and sites

Public and private sector projects can be designed to be more sustainable. Both new and repurposed buildings and parking lots, for example, can reduce impervious surfaces through low-impact approaches to architecture, landscape architecture, and site engineering. Investment in "right-sized" civil infrastructure (e.g., reduced street widths on low-traffic streets) also has multiple sustainability benefits.

Green buildings

Municipal and county governments set a high standard for green development – LEED Silver certification, or equivalent, for all new and refurbished public buildings and sites.[82] Expanded weatherization programs help household reduce energy costs.

Green streets

"Complete" (multi-modal) and "green" (low stormwater runoff) streets are the default option in planning and implementing street reconstruction projects. Hundreds of street trees are planted annually in boulevard medians and street terraces. Where feasible, conservation easements protect stream riparian areas and other major drainage ways.

Green parking lots

Green parking lots and green site design are the default option for all public facilities. Partial abatement of impact fees and stormwater utility fees create incentives for private sector green design.

Conclusions

Wisconsin's Capital Region is a complex system of interconnected social, economic, and environmental systems. The Capital Region Sustainability Consortium (CRSC) has the potential to substantially advance regional sustainability,[83] yet effective strategies will require institutional and policy reforms – or paradigm change.

Coordination – both within and across local governments – can increase the effective use of public resources. This is especially important in the planning, funding, and implementation of civil infrastructure (e.g., multi-modal transportation networks; multi-functional parks and greenways). Not all growth scenarios – or infrastructure investments – have equal costs and benefits. Targeted investment can guide new growth and shape regional change by advancing community initiatives, such as:[84]

- revitalizing downtowns and mainstreets
- reinventing older neighborhoods
- reclaiming urban waterfronts
- furnishing the public realm

Community-based sustainability initiatives have emerged across the United States. And notable

81 Bennedict, M. and E. McMahon. 2006. *Green Infrastructure: Linking Landscapes and Communities*. Washington, D.C.: Island Press.

82 US GAO. 2011. *GAO Report on Green Building in the Federal Government.* Washington, D.C.: U.S. Government Accountability Office.

83 McKinsey & Co. 2010. *Making it Work in Government: Perspectives on Transforming Performance in the Public Sector.*

84 Brown et al. 2009. *Urban Design for an Urban Century: Placemaking for People*. Hoboken, NJ: Wiley & Sons.

regional initiatives are flourishing in several metro areas, including Chicago, Kansas City, and Boston. Collectively, these initiatives are emblematic of a 21st century approach to urban and regional planning and policy-making. This holistic approach recognizes system complexity and interconnectedness, and the value of a systematic, adaptive learning process in planning, implementing, and measuring sustainability.[85]

Evidence-based decision-making can leverage public and private resources to jointly accomplish multiple policy objectives. Information-sharing, targeted-reinvestment, and institutional reforms can generate multiple benefits. Advancing multiple, yet integrated, pathways to sustainability is, perhaps, the Capital Region's greatest sustainability challenge.

85 Reed et al. 2006. An adaptive learning process for developing and applying sustainability indicators with local communities. *Ecological Economics*, 59: 406-418.

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