Examining the Intersection of Sustainability and Resilience

6

"But, whatever our resources of primary energy may be in the future, we must, to be rational, obtain it without consumption of any material. Long ago I came to this conclusion, and to arrive at this result only two ways, as before indicated, appeared possible- either to turn to use the energy of the sun stored in the ambient medium, or to transmit, through the medium, the sun's energy to distant places from some locality where it was obtainable without consumption of material." Page 199 of Tesla, N. (1900). The problem of increasing human energy: With special reference to the harnessing of the sun's energy. The Century Magazine

Key Questions

The goal of the sixth chapter of this book is to answer the following underlying assumptions and questions:

- What are the climate resilience, resilience, climate preparedness, climate mitigation, and climate adaptation strategies?
- How is resilience planning connected to sustainability planning within organizations?
- What strategies can local governments utilize to integrate climate resilience into organizational planning, including short- and long-term objectives?
- How do local governments plan for climate change threats?
- What are the appropriate steps to integrate climate change strategies into emergency preparedness and disaster mitigation?
- What do communities need to look at in addressing the impact of climate change?
- What are the economic effects of climate change?

Introduction

Local government administrators face daily challenges as they manage the provision of services to residents and businesses in their communities. The new global and regional realities of climate change and extreme weather are going to affect localities and most importantly local governments in their provision of an array of critical services, such as public safety, infrastructure, water, and waste management to name a few. Local units of governments are attempting to address the vital vulnerabilities of communities to the climate change, the issue of greenhouse gas emissions, and symptoms related to an increased environmental pollution. In recent years, climate change generated additional challenges for local government officials exemplified through extreme and unpredictable weather patterns, including but not limited to heat waves, intense rain events, more frequent flooding, changes in temperatures, snowstorms, hurricanes, and droughts. While the impacts of the climate change are region specific and are diverse in intensity and the impact levels, they affect all facets of healthy communities.

Most notable impacts include water quality and freshwater resources, power outages and disruptions as demand for cooling increases during heat wave events, demands on first responders, increased stressors on infrastructure, economy, service delivery, and vulnerable population. Local government leaders plan for and imple-

H. Alibašić, *Sustainability and Resilience Planning for Local Governments*, Sustainable Development Goals Series, https://doi.org/10.1007/978-3-319-72568-0_6

ment robust climate mitigation, adaptation, and climate preparedness strategies to ensure maximum community and organizational resilience. Cities are the most vulnerable to climate change, and the implementation of climate adaptation and mitigation strategies is most effective on a localized scale.

Some of those measures may include:

- Developing energy conservation and efficiency strategies to reduce energy consumption and demand throughout the organization and plan for peak load demands in collaboration with power utilities.
- Setting a 100% renewable energy target for the city's operations by target year. Diversified energy sources and decentralized power delivery are essential for local resilience and greenhouse gas reduction.
- Reducing total fuel consumption in fleet and operations.
- Setting a goal to increase the tree canopy cover and to diversify the type of tree species planted to increase resilience to urban heat island effects and heat waves.
- Effectively managing waste minimization, reduction, and recycling of materials.
- Providing exceptional public safety services and developing and implementing emergency and disaster preparedness plans and strategies.
- Reducing water consumption and protect water and other natural resources.
- Ensuring economic development, planning, and engineering services are provided in the system-wide, holistic approach, in partnership with local and regional business and economic development agencies and other institutions for maximum outcomes.

As noted in the diagram, in recognizing the completeness and complexities of the systems, the elements of climate resilience are implemented through existing sustainability and climate action plans (Fig. 6.1).

It is compelling for local governments to adopt and undertake various approaches to mitigate and adapt to the impact of climate change. Hallegatte et al. (2011) suggested "climate change mitigation strategies may also lead to a diversification of energy sources, which in turn would decrease systemic losses due to a disruption of supply (not necessarily due to climate change)" (p. 80). A starting point to climate resilience planning is the completion of the regional or local resilience report, with a specific and detailed understanding of climate change data, weather patterns, and localization of the climate change impact.

Defining Resilience

Resilience may be characterized as "an attempt to prepare for the worst and to be able to rebuild from disaster," and "in the context of effective strategies undertaken by communities to prepare for unforeseen and unpredicted events as a result of climate change and extreme weather events, and their ability to revive after the disaster in a sustainable manner" (Alibašić 2014). The consequences of not planning and adequately preparing for potential disasters can be devastating for human resources, services, buildings, and infrastructure. Fiksel (2003) explained the system resilience in light of "significant disruptions or discontinuities" shifting "the system away from its current equilibrium state" (p. 5333). Fiscal constraints and the impact of a global economy on local governance and the ability to deliver outcomes may be viewed as significant disruptions. Local governments engaged in sustainability and resilience planning can adapt and transform and accept discontinuities as they continue to provide services without interruptions. In a crisis, sustainability-related efforts become an opportunity and a tool for local governments as then they need to change their priorities, reporting, measuring, and outcomes of the budget process.

Preferably to waiting for national leadership on climate change, cities, villages, townships, counties, and other localities take proactive climate preparedness actions in pursuit of the interest of their constituents and residents. Cities have a unique role to provide services and to decide on their own what policy options best

Fig. 6.1 Diagram – resilience and sustainability initiatives

fit the organizational and community framework. In addition to vulnerabilities to climate change and extreme weather event, cities are some of the most prominent contributors to carbon pollution. As Fitzgerald et al. (2012) suggested the "emissions of greenhouse gases leading to climate change, represents the most important current environmental challenge" (p. 371). As such, local government administrators should strive to reduce the carbon impact on the society. Byrne et al. (2006) argued that cities of industrial and more developed nations play an important role in addressing the negative consequences of pollution, specifically in attempting to cease "the currently destructive relationship between urban industrial society and the global environment" (p. 87). The evidence of impacts and consequences of climate change on the environment and societies is global in scope.

Climate Change Concerns for Organizations and Communities

An extensive body of scientific research points to the undeniable and indisputable evidence of the harmful effects of the industrial activities on climate, causing environmental and social disruptions. Extreme weather events, increases in global temperatures, sea level rise, economic disruption, infrastructure damage, species extinction, and weather pattern changes are some of the ongoing and well-documented concerns and challenges for communities, population, and the society as a result of the changes in the climate (Fletcher 2013; Hallegatte et al. 2011; IPCC 2014; Karl et al. 2009; Lindfield 2010; Mach et al. 2016; Malcolm et al. 2006; Pecl et al. 2017; Segan et al. 2015; Stott et al. 2016; The World Bank 2012; Urban 2015; USGRCRP 2017; Visser et al. 2014). Dong et al. (2014) and Silva et al. (2013) examined the linkages between the human-produced carbon emissions, climate change effects, and mortality rate. Beyond the sea level rise and acidification of the oceans, the threats to the most extensive body of freshwater, Great Lakes, are well documented (Kling et al. 2003).

The global community has been hesitantly reacting to the threats of climate and changes. The failure of national governments to address climate prompted leadership actions on subnational level, mainly by local governments. With direct consequences forecasted, cities are at the forefront of those efforts to effusively deal with climate change.

Community-Wide Resilience

Community-wide resilience preparedness considers emergency preparedness, energy planning, health, human resources, and public safety issues. Besides, the "chief features of climate change actions at the local governments' level are the cities' ability to prepare their respective communities to be more agile and adaptive to extreme weather events and disasters" (Alibašić 2018a, p.4). The benefits of addressing and taking the climate change trends into consideration far outweigh the costs associated for climate resilience and preparedness planning. Furthermore, "the resiliency to crisis and disaster is the capacity and adaptability of systems not only to withstand stresses and shocks but also to continue to thrive during and after the disaster" (Alibašić 2018b, p.1). Weather patterns cannot any longer be predicated upon existing models, and the impact on regions, cities, and especially urban areas are already immense. Besides, the more frequent sever weather events and changes in precipitation and temperature patterns impede the social system, governing, ecosystem, and the economy. Moreover, the major climate trends such as air and water temperature variations and increases, droughts and dry seasons, the frequency and intensity of storms, and floods impact the spectrum of sectors.

Climate Change and Emergency Preparedness

Climate change represents a whole set of extra challenges in emergency planning, preparedness, and disaster mitigation for municipalities. At a minimum, emergency plans incorporate the latest science to understand impacts of such changes better and develop various alternatives. A changing climate generates many challenges for state, local, and tribal governments as elected leaders, planners, and resource managers consider mechanisms for ensuring community resilience and preparedness.

In response to heat wave events, cities made adjustments to their emergency action guidelines to coordinate services with the nonprofit agencies and utilities, in regard to resources, facilities, and cooling centers. Local governments respond more holistically to heat waves and hazardous rain events and have more control over the events arising from climate change and extreme events by tying the sustainability and resilience plan directly to emergency planning. Having the accurate climate data, information about the history of weather patterns and events and infrastructure are critical components of resilience planning (Fig. 6.2).

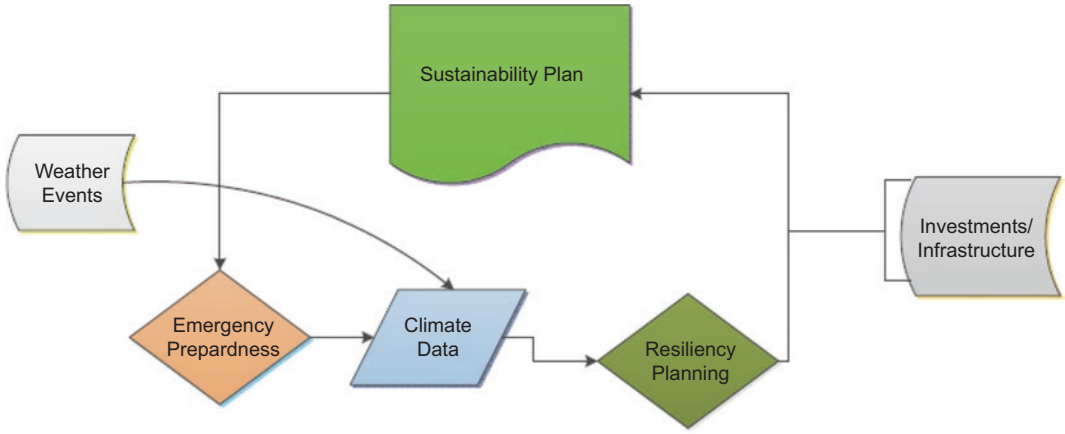

Fig. 6.2 Combining sustainability and resilience planning with emergency preparedness

National Versus Subnational Climate Resilience Policies

A lack of national resilience policies and programs enables decentralized approaches to climate resilience planning, bringing to light the relevance of local governments and their policies toward sustainability, resilience, and climate preparedness. In discussing scaling climate adaptation strategies in urban settings, Brugmann (2012) defined resilience as "the ability of an urban asset, location and system to provide predictable performance" (p. 217). In examining three municipalities in Canada, Burch (2010) reviewed the "varying levels of success at reducing greenhouse gas emissions and enhancing resiliency" in those localities (p. 7575). In the United States, in the period prior and post President Obama's administration, the policies to address the threats of climate change have been nonexistent. During the first decade of the twenty-first century, the US Conference of Mayors established the Climate Protection Agreement with an overarching goal to encourage cities to deploy climate mitigation strategies and reduce the organizational carbon footprint of city organizations. The commitment to reduce carbon footprint was endorsed and actively pursued by over one thousand US mayors, leading to increased leadership by local governments in the United States in the absence of US federal leadership (USCM 2005).

Under President Obama, local and state leaders had a prominent role in planning for the climate preparedness, working directly with the White House staff. In 2013, by Executive Order 136531, Preparing the United States for the Impacts of Climate Change, President Obama established the State, Local, and Tribal Leaders Task Force on Climate Preparedness and Resilience (Task Force 2014). The task force members were asked to examine all venues of responses and preparedness to address climate change trends and threats and recommend climate strategies for federal government to better support local and state actions to make communities more resilient. Additionally, task force members reached out to thousands of government organizations, universities, and other stakeholders, seeking recommendations, focusing on scientific and policy approaches to climate preparedness and resilience strategies (Task Force 2014).

However, under the current administration, not only did the United States announce its intent to withdraw from Paris Climate Accord, but other environmental protections and climate change work are being rolled back under the assault from the current administration (Davenport 2017; United State Department 2017). Many local government and some state leaders in the US declared their intent to continue fulfilling pledges of the international climate agreement. Local and state governments continue to pursue climate preparedness and resilience strategies. As observed by Gordon (2016), cities have undertaken a myriad of actions in addressing the climate change-related threats. The scaling of the climate resilience efforts to local government levels is

underscored in the ability to measure and track the progress of outcomes from those activities. Many initiatives by local governments and in some states in the United States are aimed at reducing the GHG emissions, mitigating the impact of climate change or adapting to new climate realities. Recently, 364 US mayors agreed to cut GHG emissions per Paris Climate Accord requirements (Climate Mayors 2017).

Furthermore, over 250 cities adopted the 100% renewable energy targets. Moreover, the EPA top 30 lists are regularly updated, showing significant renewable energy commitments from local governments and other organizations (USCM 2017; EPA 2018). The 100% renewable energy targets are intended to enable cities to mitigate and reduce impacts from energy consumption in city operations by switching energy demand to greener energy. These efforts within and outside organizations engaged in climate resilience and preparedness are necessary to prepare for the next natural disaster that will inescapably occur. Constituents at a local level, cities and communities, expect their appointed and elected officials to meet their challenges and objectives to address concerns and prepare for the climate change-related impacts.

Local Government Roles Reinvented

As cities take a more active role in climate preparedness and resilience, the local zoning and land-use policies are reinvented; new approaches to the procurement of energy and power supply and production procure are adopted. By taking a more proactive role and in some cases partnering with the private sector or academic institutions, local units of government are less dependent on federal and state funding. The reinvented role of local governments and the interaction on subnational, national, and international scale are critical to creating synergies in concerted attempts to reduce, minimize, and ultimately remove the adverse impacts of climate change. The collective body of local government policies, projects, and programs leaves an impressive impact on the environment, society, economy, and good governance. Local leaders and administrators draw from the shared experience of cities around the world leading to better governance of local resources. Environmental, economic, social, and governance issues through the climate change lens are no longer viewed as localized issues. Cities continue to pursue resilience policies, perhaps best described through the combination of sustainability-related efforts copulated with the impacts of climate change and weather events as the combination of resistance and survival strategies.

The local governments' cutting-edge planning for climate resilience in the United States is evident in cities like Austin, TX; Baltimore, MD; Boston, MA; Chicago, IL; Dubuque, IA; Eugene, OR; city and county of Los Angeles and San Francisco in California; Portland, OR; Philadelphia, PA; New Orleans, LA; Broward, Miami-Dade, Monroe, and Palm Beach Counties in Florida; and New York City, NY to name a few (City of Austin 2014 & 2015; Baltimore Office of Sustainability 2013; Broward County 2015; City of Boston 2014; City of Chicago 2008; City of Dubuque 2013 & 2017; City of Eugene n.d.; City of Los Angeles 2015a & 2015b; County of Los Angeles 2015; City of New Orleans 2017; City of New York 2017; City of Philadelphia 2016 & 2017; City of Portland and Mulnomanh County 2017; City and County of San Francisco 2013 & 2017; Southeast Florida Regional Climate Change Compact Counties 2012). Other cities in the US and Canada and around the world are making significant inroads and progress toward climate resilience planning. For instance, the Pensacola City Council in Florida appointed the task force on climate adaptation and mitigation to recommend climate resilience strategies to the council members to aid climate change in the city and region (Baucum 2017). In Arkansas, the City of Fayetteville elected officials published a document entitled Arkansans Can Take Steps to Respond to Climate Change as a call to the state residents to be proactive in combating the threats of a changing climate (City of Fayetteville n.d.). The table lists some of most operational climate resilience plans, climate preparedness, and climate mitigation and adaptation action strategies, with a sample of related programs and departments overseeing them (Table 6.1).

Table 6.1 A sample of local governments with operational climate resilience plans and strategies

Local government	State	Year of release	Title of the plan	Department	Programs
City of Austin	Texas	2015	Austin Community Climate Plan	Office of Sustainability	Climate change, sustainability
City of Baltimore	Maryland	2013	Baltimore Climate Action Plan	Office of Sustainability	Climate action, sustainability
City of Boston	Massachusetts	2014	Greenovate Boston 2014 Climate Action Plan Update	Environment	Sustainable development, climate protection, environment
Broward County	Florida	2015	Climate Action Plan: Local Strategy to Address Climate Change	Environmental Planning and Community Resilience Division	Climate and energy program
City of Chicago	Illinois	2008	Climate Action Plan: Our City, Our Future	Department of Planning and Development/ Sustainable Development Division	Environment and sustainability
City of Dubuque	Iowa	2013	Dubuque Community Climate Action and Resiliency Plan 2013	Sustainable Dubuque	Climate action, energy
City of Eugene	Oregon	2010	A Community Climate and Energy Action Plan for Eugene	Office of Sustainability	Climate recovery
City of Los Angeles	California	2015	The pLAn and Los Angeles Climate Action Report: Updated 1990 Baseline and 2013 Emissions Inventory Summary	Office of Los Angeles Mayor Eric Garcetti	Sustainability, resiliency, and preparedness
Los Angeles County	Los Angeles	2015	Final Unincorporated Los Angeles County Community Climate Action Plan (CCAP) 2020	Department of Regional Planning	Planning, climate action
City of New Orleans	Louisiana	2017	Climate action for a Resilient New Orleans	Mayor's Office of Resilience and Sustainability	Resilience and sustainability
City of New York	New York	2017	1.5 °C: Aligning New York City with the Paris Climate Agreement	Mayor's Office of Sustainability	Climate and Energy
City of Philadelphia	PA	2016	Growing Stronger: Toward a Climate-Ready Philadelphia	Office of Sustainability	Energy benchmarking, climate adaptation planning
City of Portland	Oregon	2015	Climate Action Plan: Local Strategies to Address Climate Change (Portland and Multnomah County 2015 Climate Action Plan)	Portland Bureau of Planning and Sustainability	Planning, sustainability, climate action

(continued)

Table 6.1 (continued)

Local government	State	Year of release	Title of the plan	Department	Programs
City and County of San Francisco	California	2013	San Francisco Climate Action Strategy Department of Environment: 2013 Update	Department of Environment	Climate, energy, transportation, zero waste, urban forest and greening
Southeast Florida Regional Climate Change Compact Counties	Florida	2012	Southeast Florida Regional Climate Change Compact Counties - Regional Climate Action Plan	Southeast Florida Regional Climate Change Compact is a regional collaborative including Broward, Miami-Dade, Monroe, and Palm Beach Counties	Climate change

Resilience Spotlight: Michigan Cities Climate Preparedness and Planning

In contrasting Michigan cities approaches to climate resilience, there are apparent similarities and differences. Communities of Grand Haven, Grand Rapids, Ann Arbor, and Traverse City in Michigan among others have noteworthy climate resilience initiatives. To illustrate, City of Grand Rapids' sustainability plan encompasses all the aspects of sustainability and climate resilience planning, including climate adaptation and mitigation strategies (City of Grand Rapids 2016). To illustrate climate preparedness recommendations from a multi-stakeholder, long-term Grand Rapids' Climate Resiliency Report were incorporated into the city's 5-year sustainability plan (Alibašić 2017; City of Grand Rapids 2016).

On the other end of the spectrum, the City of Ann Arbor has a climate action plan and sustainability plan (City of Ann Abor 2012, 2013, 2015). Moreover, the City of Ann Arbor poured significant funding and staffing into sustainability and climate action planning (City of Ann Arbor 2015; Powers 2015; Stanton 2015). In Ann Arbor, the climate action plan includes greenhouse gas emissions inventory and climate action categories, setting goals to reduce community-wide greenhouse gas (GHG) emissions to 25% by 2025 and 90% by 2050 (City of Ann Arbor 2012, 2013). The Sustainability Action Plan includes direct climate mitigation and adaptation implications as it includes climate and energy outcomes and goals (City of Ann Arbor 2015). While approaches to climate resilience planning by these two cities appear divergent, the end goals and results are similar as both cities focus on climate change using both climate mitigation and adaptation strategies by embedding climate resilience in their plans. In the words of Matthew Naud, Environmental Manager for the City of Ann Arbor, "climate resilience and sustainability planning are inseparable, and our community values the city's attempting to address both climate adaptation and climate mitigation" (Email communication with author, January 25, 2018).

Traverse City developed a climate action plan with SEEDS, Inc., with funding from Department of Energy (City of Traverse City 2011). The program includes "ten strategies for action" and acts as:

> "a roadmap to meeting the climate and energy goals and objectives, while also being a living process that is adapted to changing needs," with "specific strategies for reducing GHGs, through fiscally sound methods, while also acting as a framework for decision making, thus acting as a guide to meeting established climate goals and objectives." (City of Traverse City 2011, p. 8)

Recently, the city leaders of Traverse City committed to a 100% renewable energy goal by 2020 (MCAN 2016).

In Grand Haven, local planners and administrators have developed a comprehensive and an impressive resilient master plan. The master plan among other issues covers climate change threats

to the Great Lakes, using well-document and scientifically backed research to support the findings and recommendations. Some of the noted trends and risks are increased precipitation and storminess, a variability of lake water levels, and water temperature. As a coastal city, it is necessary to look at long-term trends and develop planning mechanism to deal with those obstacles in a comprehensive and dynamic, holistic approach. Embedding climate resilience strategies into the master plan is a practical, resilient planning approach. Moreover, in addition to featuring Grand Haven, resilient Michigan organization lists other communities in Michigan with resilient master plans in place, including cities of Holland, Beaver Island, Bridgman, East Jordan, Ludington, Macomb/St. Clair, and St. Joseph (Resilient Michigan n.d.). To illustrate, Resilient Monroe Resource Atlas is a land-use master planning and community design project for the City of Monroe, Frenchtown Charter Township, and Monroe Charter Township. It includes, among other tools and analyses, a review of the urban heat island effect, heat sensitivity and exposure assessment, flood vulnerability assessment, and drainage stormwater management (Resilient Monroe 2013). Authors of the report noted that:

> climate scientists say that the Monroe Community and southeast Michigan can expect more frequent storms of increasing severity in the decades ahead. The total amount of rainfall is also likely to increase. However, climate models suggest that the precipitation will be more concentrated in the winter, spring and fall seasons as well as localized intense storms at almost any time. (Resilient Monroe 2013, pp. 8–10)

In the recent years, both the planning and investments in infrastructure made by cities were tested with the flood events and the extreme heat waves in the summers. Communities have made preemptive investments, in sustainability and emergency planning to avoid further costly damages to the infrastructure and resources and implementing a variety of climate mitigation and adaptation strategies, including but not limited to:

- Developing energy conservation and efficiency strategies to reduce energy consumption and demand throughout the organization.
- Moving the power demand to purchase and production from renewable sources, as an attempt to diversify energy sources, as an essential step toward local resilience and for greenhouse gas reduction.
- Reducing total fuel consumption.
- Setting a goal to increase its tree canopy cover and diversify the type of tree species planted.

Local governments have been partnering with local nonprofits, grass root organizations, residents, and academic institutions and developing climate change assessments, data reports, and resilience plans to further concentrate on climate, energy issues, economy, transportation, and infrastructure and to inform decision-makers in the areas of sustainability, ordinances, policies, and adaptation and mitigation strategies. The resilience plans acknowledge the facts of climate change and serve to prepare the community and make it more agile and adaptive to extreme events and disasters.

Climate Resilience and Economic Development

There are potential positive outcomes from linking resilience planning, sustainability, and organizational efficiency to promote resilience and policies to decrease carbon emissions and lower costs and improve economic development and growth opportunities. Fitzgerald (2010) suggested the "cities can employ economic development strategies to support the development of renewable energy and clean carbon-reducing technologies" and moreover note the linkages between the sustainability and climate change initiatives (pp. 8, 178). Importantly, it is incumbent for local governments to recognize the realities of climate change in resilience reports and plans. As a way of illustration, in its resilience plan, the Resilient Macomb (2016) included the following statement "climatologists are project-

ing that extreme weather events will increase in frequency and intensity in Southeast Michigan" (p. 2). Linking those climate change concerns, supported with data by the realities of impact on jobs, business, and economic development, is essential to resilience planning. As noted in the Resilient Macomb (2016) plan, "Lake St. Clair enables about 660,000 jobs in manufacturing, farming, mining, and energy production to exist. Tourism is responsible for about 57,000 additional jobs" (p. 3).

Embracing New Technologies and Systems

The importance of adopting new technology and system improvement is exemplified through local governments' ability to continue providing services in time of crises. The local units of government regularly evaluate the technological advancements and are willing to embrace new technologies. However, it was clear that willingness to serve as a beta site for new technologies diminished with the potential that the city may incur risk as a result of testing new systems or technologies. Fiksel (2006) argued that the assessment of "interactions among interdependent systems requires new tools to capture the emergent behaviors and dynamic relationships that characterize complex, adaptive systems" (p. 17). A greater level of collaboration in the technological systems deliver synergies and improvement to organizations, from sharing of knowledge, training opportunities, engineering practices, and cost-savings from measures to increase resilience.

Building Resilience Through Transformation and Awareness

There are compelling reasons local governments to embrace and benefit from climate resilience planning from sustainable energy outcomes, change in culture, and a transformation in operations and service delivery. There is an overall belief that sustainable energy management has a positive impact on operations and meets community expectations for change. Policy makers and administrators embrace ambiguities in adopting transformational changes and strategies in organizations. Transformative measures are undertaken by organizations to build a stronger and more resilient community ready to respond to changing demands and surrounding economic and environmental threats and uncertainty. The transformation toward sustainability is viewed as an opportunity for building more resilient organizations and communities.

Resilient County Spotlight: Broward County Embedding Climate Resilience

A vital component of a successful implementation of sustainability and resilience planning is the organizational commitment. In the organizational chart of the Broward County, Climate Change Program is featured under the Environmental Planning and Community Resilience Division (Broward County 2017). Among many different initiatives, the division overseas climate change, Go Green, energy and sustainability programs (Broward County 2015). Dr. Jennifer Jurado, Director of the Environmental Planning and Community Resilience Division, finds the Broward County's "staffing and financial commitment to climate resilience and sustainability planning a critical element to a more resilient county and the region" (Email to the author, January 29, 2018).

Summary

The focus of this chapter was the interconnection between sustainability and resilience planning and strategies in local governments. If properly utilized, tracked, measured, and compared to actual budgetary results and fiscal performance, resilience and sustainability strategies produce a tangible, long-term effects on the overall effectiveness of service delivery. The ultimate goals of

resilience planning are an improvement of the governance, reduction of the cost of operations, a decrease of the environmental impact, and positive social effects on communities. Analyzing the overall effectiveness of climate preparedness and its implications on social, economic, ecological, and governance of organizations leads to better understanding of and confidence in local governments' resilience planning.

Moving resilience planning to a regional level allows for outcome-driven partnership and sharing of responsibilities and resources. By using a dynamic approach to resilience planning, local governments steadily adapt to shifting economic, environmental, social, and governing conditions. Resilient organizations and communities continually build upon existing plans, layering and preparing to adapt and mitigate. Accordingly, public service practitioners examine the current policies in place to identify strategies and targets to meet climate resilience outcomes. Embedding climate resilience strategies into existing plans is an efficient way of committing to the climate resilience action, as long as local governments tie the implementation and projects to their budget process.

The climate preparedness, readiness, and resilience planning have come to the forefront for local government to create a more resilient future for communities. Resilience is observed and implemented contextually as an instrument leading to an improved governance of environmental, social, and economic resources. Moreover, the commitment to sustainability and resilience will predictably lead to improved social and environmental outcomes. Worrell and Appleby (2000) defined stewardship as the concept of "responsible use of natural resources" and acceptance of "significant answerability to society" (p. 275). There is a balance, and an argument may be made that similar to the private sector, sustainability and resilience for municipalities begin with the economic bottom line. As the layers of the organization embrace sustainability and resilience strategies and polices, embedding them within structures, good governance, along with culture change and transformation lead to improvements and micro- and macro-level solutions to climate-related issues and problems. The local governments in their capacity play an crucial role in the policy development, program implementation and the practical applications of climate resilience plans and strategies.

Further Discussions

- Define and examine climate resilience, climate preparedness, climate mitigation and adaptation, and sustainable and resilient communities.
- Analyze communities' plans to reduce greenhouse gas emissions and to address the climate change threats.
- Discuss the impact of climate change on the nation, state, and region.
- Assess the necessary elements for climate preparedness and resilience planning in communities.

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