County-Level Risk Assessment: Alexander County, Illinois

Guide to the Report

Table 1: This table contains basic statistics of the county as a whole which helps set the context for the rest of the analysis and visualizations as described below.

Table 2: This table describes the number of census tracts grouped by their computed resilience levels. The basic resilience values of each tract are grouped into 5 quantiles (resilience levels), where 5 (very high resilience) covers counties having resilience values in the top 20

Table 3: This table contains the Indicator Group Rankings, which contain a five-point rating across five indicator themes: housing, economy, community health, infrastructure, and environment. It shows where the current county falls compared to other counties in the state (Low Risk means the resilience value for the current county is in the top 20

Table 4: This table contains the Indicator Group Rankings computed across all tracts in the county which correspond to rural areas, similar to Table 3. The resilience values across all tracts are aggregated at the county level, which is then converted into quantiles which serve as rankings.

Table 5: This table describes the Census Places in the county grouped by their resilience categories. This is similar to Table 2, the resilience values are categorized into 5 levels and aggregated over all the Census Places over the county.

Table 6: This table contains the Indicator Group Rankings computed across all census places in the county, similar to Table 3. The resilience values across all census places are aggregated at the county level, which is then converted into quantiles which serve as rankings.

Figure 1: This maps plots each census tract in the entire county and color-codes each tract with its computed resilience levels.

Figure 2: This pie chart shows the composition of the county on the basis of percentage of census tracts in each resilience category.

Figure 3: This map shows the rural resilience of all tracts which can be classified as 'rural', i.e. they are assigned a USDA RUCA code different from 1. Rural resilience is computed across all rural tracts in the state.

Figure 4: In this map, the census places within the state are shown and the subject county is h ighlighted using a red border that outlines the county boundary.

Figure 5: This figure is a map of the subject county showing all the census places inside it, color coded with the places resilience levels. Place resilience is computed across all census places in the state, similar to rural resilience.

Figure 6: This is a pie chart and table showing composition of the county on the basis of percentage of census places in each disaster resilience category.

Appendix A: This table contains the different indicators used in the analysis, their definition, what it means when the indicator is said to be at low or high risk, and the risk level computed for this indicator at the county level. The risk level is computed by comparing the value of the indicator across all counties in the state and converting the raw values into quantiles: Very High, High, Moderate, Low, and Very Low.

Appendix B: This table contains the different indicators used in the analysis and their computed risk level for all rural census tracts as well as the census places present inside the county. The risk level is computed across all counties in the state and converted into quantiles: Very High, High, Moderate, Low, Very Low.

Disclaimer: Variables from County health patterns, EQI and County transportation patterns might have aggregation errors at the tract, rural and census place levels owing to unavailability of data beyond the county level.

Census Tracts within Alexander County, Illinois

Figure 1

Basic Statistics

Table 1: Basic Statistics (County level)

Information	Value
Population	6011 persons
Area sq. miles	235.84 sqm
Gross Density(persons/sq mil)	25 p/sqm
Avg HH Size	2.6 persons
Median HH Income	34709 USD

Count of Tracts in each Category

Figure 2

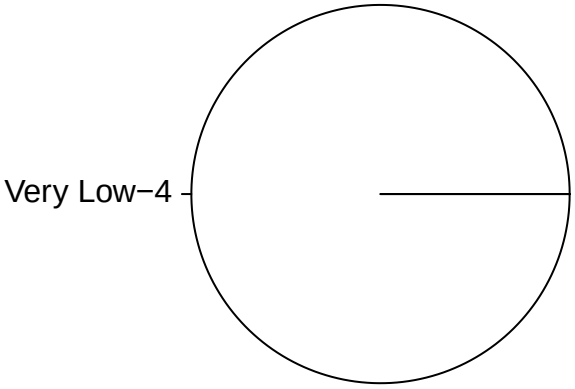
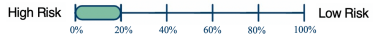


Table 2: Percentage of Census Tracts under each Resilience Category(County level)

Very High	High	Moderate	Low	Very Low
0	0	0	0	100

Indicator Group Rankings

Table 3: Overall Indicator Group Rankings

Indicator Group	High Risk Areas	Low Risk Areas
Community 	Population, Females Percent, LargeFam Percent, Percent LanguageBarrier, MentalHealth Provider Rate	
Economy 	PT, PT LQ, Manufacturing, Manufacturing LQ, Arts, Arts LQ, Percent Children in Poverty.x, Percent income required for childcare expenses.x, Walkability Score	
Housing 	Rented, Units SingleFamily, Cost IncomeRatio, Rental CostBurden below20000, Percent Children in Poverty.y, Percent income required for childcare expenses.y	GroupQuarters
Environment 	o3, std metal prim pop, std nonmetal prim pop, std stone prim pop, Radon, Pct Unemp total, ClAve, HgAve	Per TotPopSS, Kave
Infrastructure 	No CommunicationSources	

Rural Resilience within Alexander County, Illinois

Figure 3

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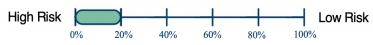
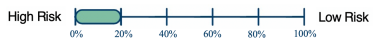
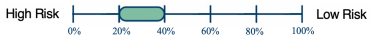
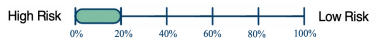
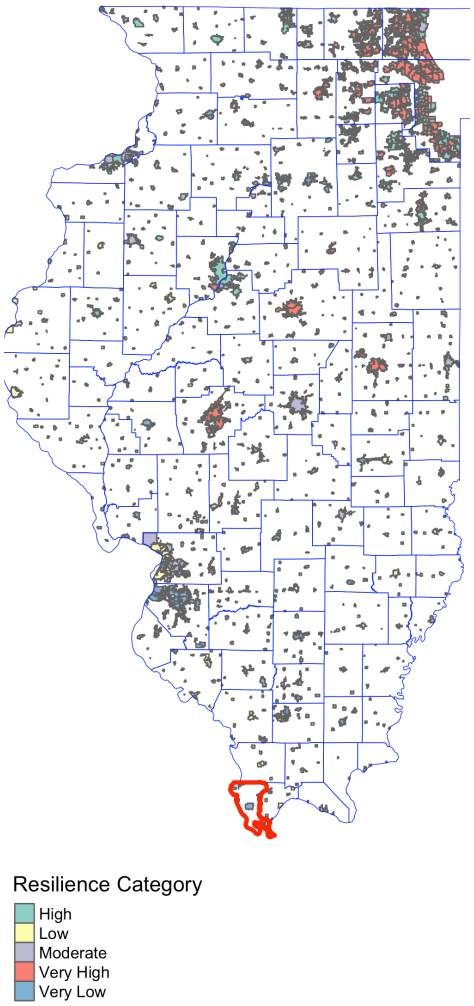
Rural Indicator Rankings

Table 4: Rural Indicator Group Rankings

Indicator Group	High Risk Areas	Low Risk Areas
Community 	Population, Females Percent, Disabled Percent, FemaleHeaded HHs Percent, LargeFam Percent, FemaleLaborforce percent, MentalHealth Provider Rate	Percent NoHealthIns
Economy 	PT, PT LQ, Manufacturing, Wholesale, Arts, Arts LQ, Percent Children in Poverty.x, Percent income required for childcare expenses.x, Walkability Score, Education related business rate	Agro Percent, Unemployment percent, Agri LQ
Housing 	Total, Units SingleFamily, Cost IncomeRatio, Percent Children in Poverty.y, Percent income required for childcare expenses.y	Renter MHHI
Environment 	o3, std metal prim pop, std nonmetal prim pop, std stone prim pop, Radon, Pct Unemp total, ClAve, HgAve	nox, Per TotPopSS, W PCB, Primary RUCA, Secondary Ruca
Infrastructure 	No CommunicationSources	No Pubtrans

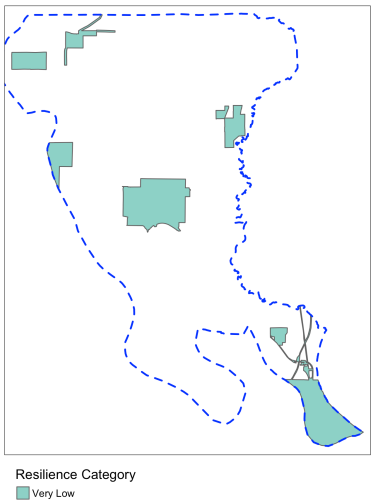
State-Level Places Map

Figure 4



Places Map within Alexander County, Illinois County, IL

Figure 5



Count of Places in each Category

Figure 6

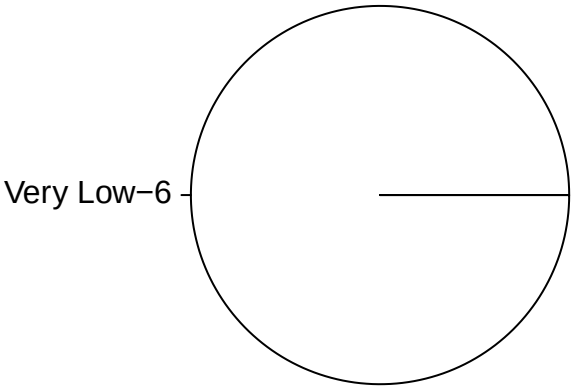
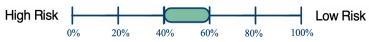


Table 5: Percentage of Census Tracts under each Resilience Category(County level)

Very High	High	Moderate	Low	Very Low
0 %	0 %	0 %	0 %	100 %

Places Indicator Rankings

Table 6: Places Indicator Group Rankings

Indicator Group	High Risk Areas	Low Risk Areas
Community 	LargeFam Percent, MentalHealth Provider Rate	
Economy 	PT LQ, Management LQ, Arts LQ, Percent Children in Poverty.x, Percent income required for childcare expenses.x, Walkability Score	
Housing 	Units SingleFamily, Percent Children in Poverty.y, Percent income required for childcare expenses.y	
Environment 	o3, std metal prim pop, std nonmetal prim pop, std stone prim pop, Radon, Pct Unemp total, ClAve, HgAve	Per TotPopSS, Kave
Infrastructure 	No CommunicationSources	

Relevant Resources

The following represent key areas of concern (in order of importance) at the county level:
- **Community and Health**
The resources below have been extracted from the Disaster Planning Library to facilitate planning for high-risk areas observed through the assessment. Please go through the following tools as a starting point for your planning process and feel free to search the Disaster Planning Library for further information, if required. The resources here are included to facilitate the process of hazard mitigation planning, through the Planning for a Purpose Model of Illinois Extension (see Toolkit).

Community and Health

Emergency Preparedness

- **Danr Guide To Disaster Preparedness**
  Organization : University of California, Division of Agriculture and Natural Resources, Veterinary Medicine Extension
  Year : 1999
  Document_type : Planning Tool, Manual for an Local Organization
  Disasters : Any disaster that may affect domestic animals
  Abstract : This guide is intended to provide useful information about developing a disaster response plan, about disaster preparedness training and resources, and to stimulate your thoughts on how Cooperative Extension can engage in local disaster mitigation activities or become involved in training youth to responsibly support community needs.
  The document has a few things specific to California, but also has good planning resources and checklists that can be applied to anywhere for disasters. It is focused on animal care and preparedness related to disasters.
  Plan_Components : Strategies, Planning Processes

- **Disaster Risk Management Systems Analysis A Guide Book**
  Organization : Food and Agriculture Organization of the United Nations FAO
  Year : 2008
  Document_type : Planning Tool, Manual for an Local Organization
  Disasters : Tornado, Flood, Drought, Extreme Weather, Earthquakes, Wildfires, Man-Made Disasters, Biological Disasters, Soil Erosion/Landslides, Agricultural Disasters, economic shock
  Abstract : The Disaster Risk Management (DRM) Systems Analysis Guide provides a set of tools and methods to assess existing structures and capacities of national, district and local institutions with responsibilities for Disaster Risk Management (DRM) in order to
  improve their effectiveness and the integration of DRM concerns into development planning, with particular reference to disaster-prone areas, vulnerable sectors and population groups. The strategic use of the Guide is expected to enhance understanding of
  the strengths, weaknesses, opportunities and threats facing existing DRM institutional structures and their implications for on-going institutional change processes. It will also highlight the complex institutional linkages among various actors and sectors at different levels. Finally, it will help identify gaps within the existing DRM institutions and/or systems including sectoral line agencies that are often responsible for implementing the technical aspects of DRM (e.g. agriculture, water and health sectors).
  Plan_Components : Strategies, Planning Processes

- **Emergency Support Function #11**
  Organization : Department of Agriculture
  Year : 2016
  Document_type : General Resource/ Foundational Research

Disasters : Agricultural Disasters
Abstract : Emergency Support Function (ESF) #11 – Agriculture and Natural Resources organizes and coordinates Federal support for the protection of the Nation's agricultural and natural and cultural resources during national emergencies. ESF #11 works during
actual and potential incidents to provide nutrition assistance; respond to animal and agricultural health issues; provide technical expertise, coordination and support of animal and agricultural emergency management; ensure the safety and defense of the
Nation's supply of meat, poultry, and processed egg products; and ensure the protection of natural and cultural resources and historic properties
Plan_Components : Strategies

- **Building Codes Save: A Nationwide Study**
  Organization : FEMA
  Year : 2020
  Document_type : General Resource/ Foundational Research
  Disasters : Tornado, Flood, Drought, Extreme Weather, Earthquakes, Wildfires, Soil Erosion/Landslides
  Abstract : The findings of the MAT investigations, the magnitude of recent hazard events,
  and the escalating cost of natural disasters together revealed a compelling need to quantify the value of building codes in reducing damage from natural disasters nationwide.
  Plan_Components : Surveys/Assessments

- **Nature-Based Solutions To Disasters**
  Organization : IUCN
  Year : 2017
  Document_type : General Resource/ Foundational Research
  Disasters : Flood, Drought, Extreme Weather, Earthquakes, Soil Erosion/Landslides
  Abstract : A short PDF about nature-based solutions to disasters going over the issues, importance, and what can be done.
  Plan_Components : Strategies

- **Municipal Code Of The Village Of Morton**
  Organization : Village of Morton
  Year : 2018
  Document_type : Manual for an Local Organization, Example ordinances and codes
  Disasters : Tornado, Flood, Drought, Extreme Weather, Earthquakes, Wildfires, Man-Made Disasters
  Abstract : Example codes and ordinances for a local rural town in Illinois that use disaster codes
  Plan_Components : Strategies

- **All Lands Wildfire Risk Portal**
  Organization : USDA Forest Service
  Document_type : General Resource/ Foundational Research, Web-based Resource, Planning Tool
  Disasters : Wildfires
  Abstract : This web portal explores the risk of large wildfires in the western US from social and ecological perspectives. The tabs at the top of the page are organized around two objectives: (A) an explanatory narrative; (B) an exploratory analysis of communities and Forest Service lands. To that end this portal both communicates the nature of potential wildfire risk from surrounding wildlands and prioritizes state and federal assistance to local communities.
  Plan_Components : Surveys/Assessments, Strategies, Tools, Information

- **Resilience Strategies For Wildfire**
  Organization : Center for Climate and Energy Solutions
  Year : 2018
  Document_type : Planning Tool, Example Ordinances and Codes

Disasters : Wildfires
Abstract : The risk of wildfire is expected to grow across the United States due to reduced precipitation in some regions, and higher temperatures caused by climate change. Wildfire has far-reaching impacts that can ripple through communities, regions, watersheds, and ecosystems. This paper overviews a number of adaptation strategies for areas with a projected increase in wildfire conditions. For each strategy, it will discuss design and operation costs, and primary and co-benefits. The paper includes a community case
study of Austin, Texas, which has used a number of these strategies, and a list of publications and interactive tools to help communities become more resilient to wildfire
Plan_Components : Strategies, Planning Processes, Case Studies, Tools, Information

- **Preparing For A Tornado**
Organization : CDC
Year : 2022
Document_type : Web-based Resource, Planning Tool
Disasters : Tornado
Abstract : Tornadoes impact locations across the country every year, bringing massive winds and destruction in their paths. Although tornadoes are most common in the Central Plains, the Midwest, and the Southeast, they have been reported in all 50 states. Keep yourself and your loved ones safe by preparing in advance for tornadoes.
Plan_Components : Strategies, Planning Processes, Information

- **Tornado Risks And Hazards In The Midwest United States**
Organization : FEMA
Year : 2007
Document_type : General Resource/ Foundational Research, Planning Tool
Disasters : Tornado
Abstract : The purpose of this Tornado Recovery Advisory (RA) is to summarize facts about the Midwest tornado hazard, specifically the area served by FEMA Region VII. Region VII includes Iowa, Kansas, Missouri, and Nebraska. The general population, specifically homeowners and renters, policy makers, local officials, builders, and building officials know and understand
that tornado occurrence in the Midwest is not a rare event. In fact, more than half of the 20 states with the highest frequency of tornado occurrence on record, and 4 of the top 5 (Texas, Oklahoma, Kansas, and Nebraska) are located in the Midwest
Plan_Components : Surveys/Assessments, Strategies, Tools, Information

- **Flood Risk Overview For Illinois**
Organization : Flood Factor
Document_type : Web-based Resource, Planning Tool
Disasters : Flood, Extreme Weather
Abstract : There are 492,334 properties in Illinois that have greater than a 26% chance of being severely affected by flooding over the next 30 years. This represents 10% of all properties in the state. In addition to damage on properties, flooding can also cut off access to utilities, emergency services, transportation, and may impact the overall economic well-being of an area. Explore the maps below to learn more about the homes, roads, businesses, and services at risk in Illinois.
Plan_Components : Strategies, Tools, Green Infrastructure, Information

- **Nature-Based Solutions For Disaster Risk Reduction**
Organization : UNDRR
Year : 2021
Document_type : Specific Plan, Planning Tool, Manual for an Local Organization
Disasters : Flood, Drought, Extreme Weather, Earthquakes, Wildfires, Man-Made Disasters, Soil Erosion/Landslides
Abstract : This guide aims to give practical, how-to-do information on setting up and implementing

nature-based solutions (NbS), especially for disaster risk reduction (DRR), but also for climate change adaptation (CCA). It is designed to help implement the Sendai Framework for Disaster Risk Reduction 2015-2030 (Hereafter referred to as the Sendai Framework). The Sendai Framework recognizes that environmental degradation can
cause hazards and that disasters also have an impact on the environment. It recognizes that environmental management
is a key component that can reduce disaster risk and increase
resilience:
- Poor land management, unsustainable use of natural
resources and degrading ecosystems are highlighted
as underlying drivers of disaster risk
- Environmental impacts of disasters are recognized
- Countries are explicitly encouraged to strengthen the
sustainable use and management of ecosystems for
building resilience to disasters

Plan_Components : Surveys/Assessments, Strategies, Planning Processes, Funding Mechanisms, Case Studies, Tools, Green Infrastructure, Information

- **Hazard Mitigation Assistance Cost Share Guide**
Organization : FEMA
Year : 2016
Document_type : General Resource/ Foundational Research, Manual for an Local Organization, Funding Opportunities
Disasters : Tornado, Flood, Extreme Weather, Earthquakes, Wildfires, Soil Erosion/Landslides
Abstract : The Federal Emergency Management Agency (FEMA) offers three Hazard Mitigation Assistance (HMA) grant programs: the Hazard Mitigation Grant Program (HMGP), the Pre-Disaster Mitigation (PDM) Program, and the Flood Mitigation Assistance (FMA) Program. Each of the HMA programs have specific non-Federal, cost share contribution requirements administered in accordance with the Federal cost-sharing requirements outlined in Title 2 of the Code of Federal Regulations (CFR), Sections 200.29, 200.306, and 200.434 and consistent with Title 44 of the CFR, the Robert T. Stafford Disaster Relief and Emergency Assistance Act, as amended, and the National Flood Insurance Act, as amended.
This Guide is intended to provide a brief overview that will be helpful to grant Applicants in making cost share decisions and meeting Federal cost share requirements in the context of HMA grant programs
Plan_Components : Funding Mechanisms, Tools

- **Local Mitigation Planning Handbook**
Organization : FEMA
Year : 2013
Document_type : Planning Tool, Manual for an Local Organization
Disasters : Tornado, Flood, Drought, Extreme Weather, Earthquakes, Wildfires, Soil Erosion/Landslides
Abstract : The Local Mitigation Planning Handbook is a tool for local governments
to use in developing or updating a local hazard mitigation plan.
The purpose of the Handbook is the following:

1. To provide guidance to local governments on developing or
updating hazard mitigation plans to meet the requirements
of Title 44 Code of Federal Regulations (CFR) §201.6 for
FEMA approval and eligibility to apply for FEMA Hazard
Mitigation Assistance grant programs; and

2. To offer practical approaches and examples for how communities can engage in effective planning to reduce long-term risk from natural hazards and disasters.
   Plan_Components : Strategies, Planning Processes, Funding Mechanisms

- **Mitigation Ideas A Resource For Reducing Risk To Natural Hazards**
  Organization : FEMA
  Year : 2013
  Document_type : Planning Tool
  Disasters : Tornado, Flood, Drought, Extreme Weather, Earthquakes, Wildfires, Soil Erosion/Landslides
  Abstract : The purpose of this document is to provide a resource that communities can use to identify and evaluate a range of potential mitigation actions for reducing risk to natural hazards and disasters. The focus of this document is mitigation, which is action taken to reduce or eliminate long-term risk to hazards. Mitigation is different from preparedness, which is action taken to improve emergency response or operational preparedness.
  Plan_Components : Strategies, Green Infrastructure, Information

- **Iema Public Assistance Program**
  Organization : IEMA
  Year : 2022
  Document_type : General Resource/ Foundational Research, Web-based Resource, Funding Opportunities
  Disasters : Tornado, Flood, Drought, Extreme Weather, Earthquakes, Wildfires, Soil Erosion/Landslides
  Abstract : The Public Assistance (PA) Program provides federal disaster assistance to states, local units of government, and certain private non-profit organizations, for debris removal, emergency protective measures and the permanent restoration or replacement of public facilities as a result of a major disaster or emergency declaration being made by the President.
  Plan_Components : Funding Mechanisms, Information

- **Hazard Mitigation Plan, Macon County, Illinois**
  Organization : Macon County, Illinois
  Year : 2013
  Document_type : Specific Plan, Example Ordinances and Codes
  Disasters : Tornado, Flood, Drought, Extreme Weather, Earthquakes, Man-Made Disasters, extreme heat, dam failure
  Abstract : An example hazard mitigation plan and goal setting agenda meeting from Macon County.
  Plan_Components : Surveys/Assessments, Strategies, Planning Processes

- **Code Of Ordinances Village Of Thomasboro, Illinois**
  Organization : Order of the Board of Trustees, Village of Thomasboro
  Document_type : Example Ordinances and Codes
  Disasters : Tornado, Flood, Drought, Extreme Weather, Earthquakes, Man-Made Disasters
  Abstract : Code of Ordinances for a small rural town in Illinois.
  Plan_Components : Strategies, Funding Mechanisms, Information

- **He Illinois Technological Hazards Mitigation Plan (Ithmp)**
  Organization : Illinois Emergency Management Agency (IEMA)
  Document_type : Specific Plan
  Disasters : Man-Made Disasters, Biological Disasters
  Abstract : The contents of this Illinois Technological Hazard Mitigation Plan (ITHMP) are intended to provide the framework for technological hazard mitigation not only during the recovery and

reconstruction process, but also on a year-round basis to identify current and proposed mitigation projects that will reduce the potential for future losses and decrease the costs to the taxpayers. The overall goals of this plan, and of the four documents comprising the Illinois Multi-Hazard Mitigation Plan (IMHMP), are universal in that they center on the need to protect lives and property, reduce the costs of disaster response, and minimize disruption to the state following a disaster. The IMHMP is comprised of four documents: three planning documents addressing
natural hazards, technological hazards and human-caused hazards, respectively, along with the Illinois Multi-Hazard Mitigation Strategy (IMHMS) document. The Illinois Natural Hazard Mitigation Plan (INHMP) is the original mitigation plan for the State of Illinois, and is the comprehensive expression of the mitigation processes, programs, projects and strategies employed in the State of Illinois for hazard mitigation planning and plan implementations.
Plan_Components : Surveys/Assessments, Strategies, Planning Processes

- **The Flood Resilience Action Plan Guidebook For Planners**
  Organization : ASTIG Planning, Iowa Wter Shed Approach, University of Iowa, IIHR UIOWA, Iowa Flood Center,
  Year : 2021
  Document_type : Planning Tool, Manual for an Local Organization
  Disasters : Flood
  Abstract : Flooding is not simply an environmental issue; it is also a social justice issue. Floods have increased in frequency and magnitude due to climate change across the United States and abroad. This is bad news for everyone. However, socially vulnerable populations generally face greater concentrations of losses and have the least capacity to recover. As we mitigate floods, we also need to account for communities with varying resources. In other words, we must build community resilience in socially vulnerable populations to effectively address flood impacts. For communities where floods are becoming frequent, the need to act immediately is often at odds with acting equitably—which takes time. This is particularly true for rural and small communities, where resources are
  already limited and where existing national resilience frameworks might not take into account a rural context. In this planning guide, we will discuss an approach for implementing a Flood Resilience Action Plan (FRAP) and provide additional examples on how to do so within a context of compounded disasters.
  Compounded disasters occur when communities are faced with multiple threats
  one after the other. The most recent examples include the derecho storm in Iowa during the COVID-19 pandemic or the heavy winter storms and loss of power in Texas that also occurred during the pandemic. Compounded disasters overburden limited resources, especially in small rural communities. This guide aims to help planners build strategies that are innovative, flexible, and engaging to build community resilience during challenging times. After reading this guidebook, planners will have a set of initial tools and, most important, an
  understanding of the conceptual approach necessary to build community resilience to floods in rural communities.
  Plan_Components : Strategies, Planning Processes, Case Studies

- **All Hazards**
  Organization : Iowa State Univesity
  Year : 2018
  Document_type : General Resource/ Foundational Research, Web-based Resource, Planning Tool
  Disasters : Tornado, Flood, Drought, Extreme Weather, Wildfires, Man-Made Disasters, Biological Disasters, Soil Erosion/Landslides, Agricultural Disasters
  Abstract : The educational materials found on this site are the compilation of many resources currently available on-line. The information has been gathered from federal agencies such as the Centers for Disease Control and Prevention (CDC), Environmental Protection Agency, the Federal Emergency Management System (FEMA), the U.S. Department of Agriculture (USDA), the Food and Drug Administration, and the National Oceanic and Atmospheric Administration (NOAA). Many non-governmental groups, such as the American Red Cross and the National Safety Council, as well

as various Cooperative Extension agencies also have resources and information for preparedness that are provided through this website.
Plan_Components : Surveys/Assessments, Planning Processes, Tools, Information

- **Plan Today For Tomorrow's Flood**
  Organization : Purdue University
  Year : 2010
  Document_type : Planning Tool
  Disasters : Flood
  Abstract : This publication raises the awareness of how floodwaters pose risks to both agricultural retailers and their communities. It includes the lessons many retail managers learned from their flooding experiences, and helps retailers examine what they need to do to create a flood preparation plan.
  Plan_Components : Planning Processes, Information

- **Cleaning Up After A Flood**
  Organization : University of Minnesota Extension
  Year : 2018
  Document_type : General Resource/ Foundational Research, Web-based Resource
  Disasters : Flood
  Abstract : Cleaning up from a flood can seem like a daunting task. It's important to prepare and plan for how you're going to deal with the damage. Use the following guidelines to get your home back to livable standards as soon as possible.
  Plan_Components : Strategies, Planning Processes, Information

- **Start An Emergency Fund Before Disaster Strikes**
  Organization : University of Minnesota Extension
  Year : 2020
  Document_type : Web-based Resource, Planning Tool
  Disasters : Disasters in general
  Abstract : It takes discipline and planning to save. Saving means putting off using money today so you have money for future needs. An emergency fund is very useful in getting immediate needs met after a disaster.
  Plan_Components : Strategies, Funding Mechanisms, Information

- **Create A Family Plan Before Disaster Strikes**
  Organization : University of Minnesota Extension
  Year : 2020
  Document_type : Web-based Resource
  Disasters : Disasters in general
  Abstract : Does your family have a plan for what to do in the event of a disaster? A disaster plan takes into account all family members, giving clear guidance for what to do in different disaster situations.
  Plan_Components : Planning Processes

- **Disaster Preparedness Plan**
  Organization : American Red Cross
  Year : 2022
  Document_type : General Resource/ Foundational Research, Web-based Resource, Planning Tool
  Disasters : disasters in general
  Abstract : Create and practice an emergency plan so your family will know what to do in a crisis.
  Plan_Components : Planning Processes, Tools

- **Preparing For Livestock Emergencies**

Organization : University of Minnesota Extension
Year : 2022
Document_type : Web-based Resource, Planning Tool
Disasters : Disasters in general
Abstract : Forms and guides to prepare livestock owners in the presence of a disaster.
Plan_Components : Planning Processes, Tools

- **Storm Recovery Guide**
  Organization : Louisiana State University, Iowa State University Extension and Outreach
  Year : 2005
  Document_type : Planning Tool, Manual for an Local Organization
  Disasters : Tornado, Flood, Extreme Weather
  Abstract : A guide focused on recovery from a storm disaster
  Plan_Components : Strategies

- **Food Safety And Storage For Emergency Preparedness**
  Organization : Colorado State University Extension
  Year : 2022
  Document_type : General Resource/ Foundational Research, Web-based Resource, Planning Tool
  Disasters : Tornado, Flood, Extreme Weather, Biological Disasters, disasters in general
  Abstract : Below are some tips for planning ahead for such emergencies as a tornado, ice storm, flooding, blizzard, power failure, or illness that would prevent you from getting to the store. An emergency may also result from loss of employment, therefore decreasing financial resources available to purchase foods. Whatever the situation, knowledge of food safety and storage is important.
  Plan_Components : Strategies, Information

- **Dairy And Livestock Farm Disaster Preparedness And Recovery Guide For Maine Farmers**
  Organization : University of Maine Cooperative Extension
  Year : 2018
  Document_type : General Resource/ Foundational Research, Web-based Resource, Planning Tool, Manual for an Local Organization
  Disasters : Flood, Extreme Weather, Wildfires, Man-Made Disasters, Biological Disasters, Agricultural Disasters
  Abstract : This fact sheet contains tip sheets and checklists
  to help you prepare for and recover from an
  on-farm or community disaster, especially if
  you are unfamiliar with emergency management
  limitations regarding livestock.
  Plan_Components : Strategies, Planning Processes, Tools, Information

- **Disaster Communication Ecology And Community Resilience Perceptions Following The 2013 Central Illinois Tornadoes**
  Year : 2016
  Document_type : Scientific Article
  Disasters : Tornado
  Abstract : On November 17, 2013, a series of tornadoes struck several communities in central Illinois. Approximately four months following these tornadoes we surveyed residents in Washington and Pekin, Illinois to examine the relationships between disaster communication (i.e., tornado media use, tornado social media use, tornado talk, and tornado mental health talk) and community resilience perceptions. Results indicate disaster communication positively influences perceptions of communities as caring and capable of learning how to improve from a disaster. Our results advance the theorization of disaster communication ecologies and provide practical implications for public health and emergency management officials working to foster resilience at the community level.

Plan_Components : Research

- **Navigating Complexity Through Knowledge Coproduction: Mainstreaming Ecosystem Services Into Disaster Risk Reduction**
  Year : 2015
  Document_type : Scientific Article
  Disasters : Flood, Drought, Extreme Weather, Wildfires
  Abstract : Achieving the policy and practice shifts needed to secure ecosystem services is hampered by the inherent complexities of ecosystem services and their management. Methods for the participatory production and exchange of knowledge offer an avenue to navigate this complexity together with the beneficiaries and managers of ecosystem services. We develop and apply a knowledge coproduction approach based on social–ecological systems research and assess its utility in generating shared knowledge and action for ecosystem services. The approach was piloted in South Africa across four case studies aimed at reducing the risk of disasters associated with floods, wildfires, storm waves, and droughts. Different configurations of stakeholders (knowledge brokers, assessment teams, implementers, and bridging agents) were involved in collaboratively designing each study, generating and exchanging knowledge, and planning for implementation. The approach proved useful in the development of shared knowledge on the sizable contribution of ecosystem services to disaster risk reduction. This knowledge was used by stakeholders to design and implement several actions to enhance ecosystem services, including new investments in ecosystem restoration, institutional changes in the private and public sector, and innovative partnerships of science, practice, and policy. By bringing together multiple disciplines, sectors, and stakeholders to jointly produce the knowledge needed to understand and manage a complex system, knowledge coproduction approaches offer an effective avenue for the improved integration of ecosystem services into decision making.
  Plan_Components : Research

- **The Role Of Ecosystem Services In Climate Change Adaptation And Disaster Risk Reduction**
  Year : 2013
  Document_type : Scientific Article
  Disasters : Biological Disasters, climate related disasters
  Abstract : This paper analyzes the vicious spiral between climate change impacts, ecosystem degradation and increased risk of climate-related disasters; secondly, it defines the central role of ecosystem management in climate change adaptation and disaster risk reduction and their multifaceted linkages; and thirdly, it assesses the challenges for enhanced ecosystem management for climate change adaptation and disaster risk reduction. Given the increasing importance of ecosystem services and management in adapting and responding to climate change impacts and associated disaster risks, the paper concludes that political commitment at the highest level is urgently needed if ecosystem management is to have the adequate weight it deserves in the post-2012 climate change agreement. It is further recommended that adequate financial, technological and knowledge resources be allocated for integrating ecosystem management in the climate change and disaster risk reduction portfolios, including within national policy-setting, capacity building, planning and practices, particularly in developing countries vulnerable to climate change impacts and increased risks of climate-related disasters.
  Plan_Components : Research

- **Here Comes The Rain: Assessing Storm Hazards Vulnerability In Northeast Ohio**
  Year : 2017
  Document_type : Scientific Article
  Disasters : Flood, Extreme Weather
  Abstract : The frequency and intensity of coastal storm events in the Great Lakes region, USA is predicted to increase in the coming decades, exposing at-risk populations to potential hazards including flooding, erosion, and combined sewer overflows. In response, applied research is needed to identify communities that are most vulnerable to storm hazards, and to support municipal officials and local

residents with building capacity for resilience. This study analyzes the storm hazards vulnerability of 42 communities that are located within the Northeast Ohio Regional Sewer District (NEORSD), including the city of Cleveland and its inner and outer ring suburbs. Communities are ranked against each other for vulnerability according to a social and environmental indicator, each of which is comprised of five variables that operationalize the sociodemographic and biophysical challenges facing local populations. The indicators are combined to produce a composite Storm Hazards Vulnerability Index (SHVI). Results suggest that the most environmentally vulnerable communities are not always home to the most socially vulnerable populations. Overall storm hazards vulnerability correlates more closely with the environmental indicator than the social, especially among the most vulnerable communities.

Plan_Components : Research

Community and Health

- **Mitigation Assistance: Building Resilient Infrastructure And Communities**
  Organization : FEMA
  Year : 2022
  Document_type : Policy
  Disasters : Tornado, Flood, Drought, Extreme Weather, Earthquakes, Wildfires, Man-Made Disasters, Biological Disasters, Soil Erosion/Landslides
  Abstract : The purpose of this policy is to establish the framework and requirements for BRIC while allowing flexibility to promote continuous program improvement through priorities and criteria set forth in the annual Notice of Funding Opportunity (NOFO). The BRIC program is designed to promote a national culture of preparedness and public safety through encouraging investments to protect the nation's communities and infrastructure and through strengthening national mitigation capabilities to foster resilience.
  Plan_Components : Strategies, Funding Mechanisms

- **Building Codes Toolkit**
  Organization : FEMA
  Year : 2021
  Document_type : Manual for an Local Organization
  Disasters : Tornado, Flood, Extreme Weather, Earthquakes, Wildfires, Soil Erosion/Landslides
  Abstract : The new FEMA Building Science Branch Building Codes Toolkit offers basic guidance and tools to help building owners and occupants learn about building codes and the process of making a building stronger against natural hazards.
  Plan_Components : Strategies, Planning Processes, Funding Mechanisms

- **Protecting Communities And Saving Money**
  Organization : FEMA
  Year : 2020
  Document_type : General Resource/ Foundational Research
  Disasters : Tornado, Flood, Drought, Extreme Weather, Earthquakes, Wildfires, Soil Erosion/Landslides
  Abstract : One of the most cost-effective ways to safeguard our communities against natural disasters is to adopt and follow hazard-resistant building codes. Not only are casualties reduced, but the cost of building damage is also reduced during a natural disaster. Building codes also help communities get back on their feet faster by minimizing indirect costs such as business interruptions and lost income. A new FEMA study has made the impact of building codes on sustainability clear. The cost of not adopting building codes is too high.
  Plan_Components : Surveys/Assessments, Strategies, Planning Processes, Funding Mechanisms, Case Studies

- **Resilience Toolkit**
  Organization : ICC (International Code Council)
  Year : 2022
  Document_type : Web-based Resource
  Disasters : Tornado, Flood, Drought, Extreme Weather, Earthquakes, Wildfires, Soil Erosion/Landslides
  Abstract : Over the past twenty years communities worldwide have experienced disaster events that have significantly impacted their society, economy, and culture. As populations grow, urban areas expand, and interconnectedness increases, the potential for a disaster event to have deeper and further-reaching consequences also increases. As a result, there is a need to implement measures that increase resilience across the social, organizational, and infrastructural aspects of communities - community resilience.
  Plan_Components : Strategies, Planning Processes

- **Building American Wildfire Resiliency**
  Organization : Bipartisan Policy Center
  Year : 2021
  Document_type : Planning Tool, Policy, Funding Opportunities
  Disasters : Wildfires
  Abstract : Last year marked one of the worst wildfire seasons in United States history. More than 10 million acres burned across the country, forcing hundreds of thousands of Americans from their homes and costing the nation $16.5 billion in damages. Climate change contributed to a historically dry period for the Southwest U.S. in recent decades, making devastating wildfire seasons longer and more frequent. Since 2000, wildfires have burned an average of 7 million acres per year, more than double the average annual acres burned in the 1990s. Images of burnt orange skies spanning the Western U.S. are increasingly commonplace, and the costs of catastrophic yearly wildfires are becoming unbearable. While the impact of wildfires is mostly visible—burnt forests and communities, unhealthy air, and mass evacuations—they also have a less obvious effect: carbon dioxide emissions.
  Plan_Components : Strategies, Funding Mechanisms, Information

- **Fire Safety Program Toolkit**
  Organization : HHS, CDC, DHS, FEMA, US Fire Administration, Fire is Everyone's Fight
  Document_type : Planning Tool, Manual for an Local Organization, Funding Opportunities
  Disasters : Wildfires
  Abstract : This toolkit was designed with fire safety education personnel in mind and aims to provide free tools and materials to assist in the development of educational programs. The toolkit breaks down the program development process into five basic steps to create or enhance a fire safety education program for your community. Additionally, a "Beyond the Basics" in each section has even more resources, strategies, and tools. This overview gives you a snapshot of the process for developing a successful program
  Plan_Components : Surveys/Assessments, Strategies, Planning Processes, Funding Mechanisms, Tools, Information

- **Soil Health Matrix Decision Tool**
  Organization : North Central Region Water Network
  Year : 2022
  Document_type : Web-based Resource, Planning Tool
  Disasters : Man-Made Disasters, Agricultural Disasters
  Abstract : This tool is designed to serve as a 101 tool for producers who are considering implementing new soil health practices on their operation. It is not meant to provide specific metrics on the impact of practice implementation. Instead, it is designed to give producers an overall feel for the soil health benefits of a range of management decisions and help narrow down which practices might be the best fit for their operation. After using this tool, it is critical for producers to work with advisors and

educators about the specifics of their operation prior to implementation. The values in this tool are regional in nature.
Plan_Components : Tools

- **Equity Guide For Green Stormwater Infrastructure Practitioners**
  Organization : Greenprint Partners
  Year : 2022
  Document_type : General Resource/ Foundational Research, Planning Tool, Manual for an Local Organization, Policy
  Disasters : Flood, Drought
  Abstract : The Equity Guide for Green Stormwater Infrastructure Practitioners is a resource developed by and for green infrastructure program managers representing local public sector stormwater management organizations across the United States and Canada. It offers an action and evaluation roadmap that defines: our industry's shared long-term equity goals, best practices that will move the needle, and sample metrics that help us track progress toward those goals over time. It also offers a variety of tools to support practitioners in customizing community- informed equity work plans and evaluation plans to local
  contexts
  Plan_Components : Surveys/Assessments, Strategies, Planning Processes, Tools, Green Infrastructure, Information

- **Community Flood Resilience In Vinton: Engaging Residents Affected By The Floods Of 2008 And 2016**
  Organization : Iowa Watershed Approach, U.S. Department of Housing and Urban Development (HUD)
  Year : 2020
  Document_type : Planning Tool, Manual for an Local Organization
  Disasters : Flood
  Abstract : Vinton was selected to be included in the Iowa Watershed Approach's
  Flood Resilience Program, which recognizes that social resources are
  often absent or minimally evident when it comes to flood resiliency.
  The program strives to improve the use of social resources in
  watersheds by connecting local partners and stakeholders, enhancing
  the presence of social resources in watershed planning efforts, and
  increasing the awareness and communication about established and
  novel flood resilience initiatives.
  Plan_Components : Surveys/Assessments, Strategies, Planning Processes, Case Studies

- **Indiana Coad Guidance Manual**
  Organization : Purdue University
  Year : 2012
  Document_type : Planning Tool, Manual for an Local Organization
  Disasters : disasters in general
  Abstract : This document was written to help all community organizations and individuals understand how collaborative efforts can prepare communities for disaster. The main goals of these collaborations are to help communities avoid some disasters and recover from other unavoidable disasters.
  Plan_Components : Strategies, Planning Processes, Information

- **Sustainable Communities Extension Program**
  Organization : Purdue University Extension, Illinois-Indiana Sea Grant
  Document_type : General Resource/ Foundational Research, Web-based Resource
  Disasters : Flood, Man-Made Disasters, Soil Erosion/Landslides
  Abstract : The efforts of the Illinois-Indiana Sea Grant and Purdue University Extension Sustainable Communities Extension Program support community planning and sustainable development strategies

in communities across Indiana and Great Lakes states.
Plan_Components : Strategies, Planning Processes, Green Infrastructure

- **The Green Infrastructure Guide Planning For A Healthy Urban And Community Forest**
  Organization : The Regional Planning Partnership
  Year : 2001
  Document_type : General Resource/ Foundational Research, Planning Tool, Manual for an Local Organization
  Disasters : Flood, Drought, Biological Disasters, Soil Erosion/Landslides
  Abstract : This handbook builds the case for the value of green infrastructure and provides suggestions about how to integrate green infrastructure planning with planning for development.
  Plan_Components : Planning Processes, Tools, Green Infrastructure, Information

- **Individual Residence Wastewater Wetland Construction In Indiana**
  Organization : Purdue University and the Indiana State Department of Health
  Year : 1999
  Document_type : Specific Plan, Planning Tool, Manual for an Local Organization
  Disasters : Flood, Drought, Soil Erosion/Landslides, Agricultural Disasters
  Abstract : This publication describes general procedures for developing a constructed wetland for a single family residence. This guide is designed to be used with the diagrams included. It is intended for use by homeowners, regulatory personnel and installers of residential on-site systems.
  Plan_Components : Strategies, Planning Processes, Green Infrastructure, Information

- **The Sustainable Sites Initiative**
  Organization : SITES
  Year : 2022
  Document_type : General Resource/ Foundational Research, Web-based Resource
  Disasters : Flood, Drought, Extreme Weather, Man-Made Disasters, Biological Disasters, Soil Erosion/Landslides
  Abstract : SITES offers a comprehensive rating system designed to distinguish sustainable landscapes, measure their performance and elevate their value. SITES is used by landscape architects, designers, engineers, planners, ecologists, architects, developers, and policy-makers to align land development and management with innovative sustainable design.
  Plan_Components : Strategies, Tools

- **Zoning And Disaster Recovery**
  Organization : American Planning Association
  Year : 2021
  Document_type : General Resource/ Foundational Research
  Disasters : Tornado, Flood, Extreme Weather, Earthquakes, Man-Made Disasters, Soil Erosion/Landslides
  Abstract : What if substantial portions of your community were suddenly and severely damaged by a catastrophic flood, earthquake, industrial accident, or other disaster? What role would the local planning agency play in the rebuilding and recovery process? What challenges would you face as you attempted to help residents and business owners rebuild their lives and livelihoods? How effective would your efforts be?

An effective recovery process means more than merely rebuilding what existed before. Disasters also provide important opportunities for proactive planning in which the community emerges more resilient to subsequent hazard events. This opportunity is fleeting, and local policies and ordinances like the zoning code can either facilitate or impede effective and resilient recovery.

This issue of Zoning Practice summarizes some of the zoning-related challenges planners face in post-disaster situations, discusses how communities might think about preparing now for future disasters, and highlights what other communities have achieved by modifying zoning procedures and standards.

Plan_Components : Strategies, Information
- **Invasive Species**
Organization : UDSA Forest Service
Document_type : General Resource/ Foundational Research
Disasters : Man-Made Disasters, Biological Disasters, Agricultural Disasters
Abstract : Invasive species have two main characteristics: they are non-native (exotic/alien) to the ecosystem that they occupy, and their existence in that ecosystem causes or is likely to cause harm to the economy, environment, or human health. If left unchecked, invasive species can threaten native species, biodiversity, ecosystem services, recreation, water resources, agricultural and forest production, cultural resources, economies and property values, public safety, and infrastructure.
Plan_Components : Strategies, Information
- **Green Infrastructure: A Landscape Approach**
Organization : American Planning Association
Year : 2013
Document_type : General Resource/ Foundational Research, Planning Tool
Disasters : Flood, Extreme Weather, Man-Made Disasters, Biological Disasters, Soil Erosion/Landslides
Abstract : From the beginning, the landscape has determined where and how people live. Over time, people embellished the natural landscape with an infrastructure of roads, aqueducts, bridges, ports, power plants, and more. Now communities are turning their attention to the central planning challenge of our time: sustainability. And they are discovering, or rediscovering, the benefits of green infrastructure — infrastructure that takes advantage of the natural landscape.
This well-grounded report shows how green infrastructure cleans the air and water, replenishes aquifers, reduces flooding, and moderates the climate. And the benefits go beyond improving the environment. Green infrastructure also promotes healthy exercise and access to more locally grown food. It makes communities safer and even helps reduce crime. It also boosts the economy as it attracts business, raises property values, and lowers energy and healthcare costs.
Plan_Components : Green Infrastructure, Information
- **Funding Opportunities**
Organization : EDEN
Year : 2021
Document_type : Funding Opportunities
Disasters : Tornado, Flood, Drought, Extreme Weather, Earthquakes, Wildfires, Man-Made Disasters, Biological Disasters, Soil Erosion/Landslides, Agricultural Disasters
Abstract : The purpose of the Extension Disaster Education Network (EDEN) Development Grants Program is to invest in the development of innovative educational resources and Extension initiatives that can advance the work of EDEN and the broader land-grant and sea-grant systems across the nation in addressing the preparation for, response to, and recovery from hazards and disasters. The program is interested in a wide array of topics and issues. This document outlines the key information for applicants planning to submit grant proposals.
Plan_Components : Funding Mechanisms
- **Hazard Resources**
Organization : EDEN
Year : 2021
Document_type : General Resource/ Foundational Research, Planning Tool
Disasters : Tornado, Flood, Drought, Extreme Weather, Earthquakes, Wildfires, Man-Made Disasters, Biological Disasters, Soil Erosion/Landslides, Agricultural Disasters
Abstract : Hazard resource database that can be used to search for hazard related resources.
Plan_Components : Tools
- **2013 Comprehensive Plan**
Organization : Houseal Lavigne Associates, Gewalt Hamilton Associates, Conservation Design Forum
Year : 2013
Document_type : Specific Plan, Manual for an Local Organization, Example Ordinances and Codes
Disasters : Flood, Man-Made Disasters, Soil Erosion/Landslides
Abstract : The City has commissioned this Comprehensive Plan in order to uphold this mission statement.

The last Comprehensive Plan was adopted in 1996. Major changes that have occurred since the last plan's adoption include the First Street Redevelopment (2006), adoption of an Inclusionary Housing Ordinance (2008), and an updated Zoning Ordinance (2006).
Plan_Components : Surveys/Assessments, Strategies, Planning Processes, Green Infrastructure

- **Des Plaines Comprehensive Plan**

Year : 2019
Document_type : Specific Plan
Disasters : Flood, Soil Erosion/Landslides
Abstract : A comprehensive plan establishes the 10-year vision of a community's desired physical environment and outlines the process by which the community can realize that vision. In addition to serving as a framework for future reinvestment and redevelopment
in the community, the plan seeks to explore and promote new opportunities that reflect changes in the community and surrounding socioeconomic landscape.This plan serves as a guide for elected and appointed officials, City staff, community residents, local business owners, and potential investors, allowing each to make informed administrative and implementation choices regarding land use, transportation, infrastructure, and capital improvements throughout the City. The comprehensive plan is a statement of policy; it is not a regulatory document. This plan should be flexible and able to adapt to change. At any time, this plan can be updated to better match shifting local needs, interests, and opportunities. It is recommended that the plan be reviewed every five years to ensure the document remains relevant.
Plan_Components : Strategies, Planning Processes, Green Infrastructure

- **2010 – 2035 Comprehensive Plan**

Organization : Sangamon County Regional Planning Commision
Year : 2011
Document_type : Specific Plan
Disasters : Tornado, Flood, Drought, Extreme Weather, Earthquakes, Soil Erosion/Landslides
Abstract : The plan is designed to show the Village's past and present
conditions and also to highlight scenarios that the Village may pursue to
further enhance our community in the future years. We have studied the
plan and have worked to offer long term guidance in the critical planning
areas that will enhance our community.
Plan_Components : Planning Processes, Green Infrastructure

- **Ahead Of The Curve – Implementing Green Infrastructure In Rural And Growing Communities**

Organization : EPA
Year : 2015
Document_type : General Resource/ Foundational Research
Disasters : Flood
Abstract : Green infrastructure is often framed as an approach to improving communities and addressing water quality in large urban areas, where high concentrations of impervious surfaces can result in large volumes of stormwater runoff. However, green infrastructure can also provide multiple benefits for small, growing communities and communities in rural areas. This webcast will showcase two such communities, Monona, Iowa and Clarkesville, Georgia, that are ahead of the curve in using green infrastructure to address some of their stormwater management challenges. Rural communities and small MS4s in particular will want to tune in to learn how to replicate these projects at home.
Plan_Components : Green Infrastructure, Information

- **Sustainable Hazard Mitigation: Exploring The Importance Of Green Infrastructure In Building Disaster Resilient Communities**

Organization : Columbia University
Year : 2016
Document_type : Scientific Article
Disasters : Flood
Abstract : Natural disasters continue to plague the United States, undermining the nation's ability to build disaster resilient communities. Although structural and non-structural mitigation measures are currently in place to lessen the impact natural disasters have on society, little attention has been given to the construction

of green infrastructure as a sustainable hazard mitigation strategy. The purpose of this article is to explore the benefits of green infrastructure as a sustainable hazard mitigation strategy and offer recommendations to public sector entities to build disaster resilient communities.
Plan_Components : Research

Appendix A

Interpretation of High Risk and Low Risk Areas at County Level

Indicator	Definition	Low Risk Interpretation	High Risk Interpretation	Risk Level
Population	Total Population	A small number of people will be affected by a disaster	A large number of persons will be affected by the disaster	Very Low
Young_percent	Percentage of Young Persons	A small percentage of children would mean less vulnerability to disasters	A large percentage of children would indicate a greater vulnerability to disasters	High
Old_percent	Percentage of Elders**	A lower percentage population of elders indicates a lower vulnerability.	A higher percentage of elder population indicates a greater vulnerability, owing to physical infirmities, functional limitations and care needs.	Very High
NonWhite_Percent	Percentage of Non-White Popula-tion**Minority Populations, add Hispanic Population	A lower population of ethnic minorities might indicate a less diverse population. However, in case of disaster vulnerability, a lower population of racial minorities has been represented as a lower vulnerability, owing to its correlations with poverty and health care outcomes.	Race and ethnicity are highly correlated with poverty and thus often with health outcomes. Owing to historical, systemic and structural barriers, racial minorities are often more susceptible to disasters and often lack the support mechanisms required to cope. As a result, a higher population of racial or ethnic minorities might (in conjunction with income, poverty, employment, education and other indicators) represent a greater vulnerability.	Very High

(continued)

Indicator	Definition	Low Risk Interpretation	High Risk Interpretation	Risk Level
Females_Percent	Percentage of Females	A good percentage of women represent a stable sex ratio for the area and is therefore a positive indicator	A low percentage of women could indicate an unstable sex ratio, thereby showing that there are fewer opportunities for women in the area. This could have negative consequences during a disaster	Very Low
NotMarried_Percent	Percentage of Unmarried Persons	A lower percentage of unmarried individuals could indicate a lower vulnerability to disasters owing to the availability of social support that comes with having a family	A higher percentage of unmarried individuals could indicate lack of family and social support.	Very High
Disabled_Percent	Percentage of Disabled Persons	A lower percentage of disabled individuals in the community indicates a lower risk owing to reduced requirements for preparation, disaster and accessibility planning	A higher percentage of disabled individuals is associated with a high risk. They are disproportionately affected owing to inaccessible evacuation, response and recovery efforts and could often be left behind.	Very Low
FemaleHeaded_HHs_Percent	Percentage of Households with Female Householder	A lower percentage of female headed households indicates a lower disaster risk, a more stable family and household structure, greater social integration and family support, and higher socio-economic status at the community level	A higher percentage of female headed households could indicate a higher disaster risk owing to greater chances of poverty, and particular risk from housing shocks and stresses, hunger and food insecurity owing to gender discrimination	Very Low

(continued)

Indicator	Definition	Low Risk Interpretation	High Risk Interpretation	Risk Level
LargeFam_Percent	Percentage of Large Families as part of all Families	In case of smaller family sizes, a greater investment of the family's resources is possible leading to greater achievements. Therefore a smaller proportion of big families is a reduced social vulnerability during disasters	In case of large families, the same limited resources are shared by a large group of individuals owing to less investment per person. This can result in differential academic achievements and occupational performance. Thus prevalence of a bigger family size would indicate a higher disaster risk.	Very Low
SingleParent_Percent	Percentage of Single Parent Households	A lower proportion of single parent households indicates a lower disaster vulnerability, owing to lesser probability of financial, academic and behavioural problems which have been correlated with single parent households.	Children living in single-parent households have greater risks to their physical and social health and wellbeing compared with other family structures such as two parent or grandparent headed households. Thus, a greater proprotion of single parent households represents a higher disaster risk	Very High
Educated_percent	Percentage of Educated Persons	A greater person of educated individuals is interpreted as low disaster risk	Lack of education is associated with social marginalization, lack of preparation and disaster planning. Therefore a lower percentage of educated individuals is interpreted as high risk.	Very High

(continued)

Indicator	Definition	Low Risk Interpretation	High Risk Interpretation	Risk Level
Skilled_Percent	Percentage of Skilled Persons	A higher number of skilled individuals represents a lower disaster risk	Lack of occupational skill is associated with lower incomes and employment benefits and therefore less resources for disaster recovery. Therefore, a lower percentage of skilled workers indicates a greater disaster risk.	Very High
Elderly_growth_percent	Growth Percent of Elderly Population	A lower percentage of older adults represents a lower disaster risk.	Older adults are more vulnerable to dosaster risks owing to functional problems, health and medication concerns. A greater percentage of older adults represents a higher risk.	Low
Working_Nonworking_ratio	Ratio of Working to Non-working Population	A high ratio indicates lower risk	This ratio indocates the amount of labor resources available in the market, and signals unemployment, income and other economic factors. A low ratio indicates a lower economic resilience to market shocks and is therefore high risk.	Very High
HelperPool	Percentage of Helpers in a time of crisis	A higher proportion of helpers indicates a lower risk, since a greater number of persons will be available for disaster recovery and mitigation efforts.	A goood number of participants in the helper pool could indicate greater support and emergency management in the community. A lower percentage of helpers represents a high risk.	Very High

(continued)

Indicator	Definition	Low Risk Interpretation	High Risk Interpretation	Risk Level
FemaleLaborforce_percent	Percentage of Labor Force constituted by Women	A higher particpation of females in the workforce indicates increased incomes, and lowers or leads to sharing of unpaid care-work with other members of the family, leading to a more economically resilient community. Thus a higher female workforce particpation indicates a low disaster risk	A lower particpation of women in the labour force is associated with lower household incomes and poverty. Therefore a lower female workforce particpation means a higher disaster risk owing to lower economic support.	High
PrimeWorkingAge_percent	Percentage of population in Prime Working Age	A greater number of persons of working age indicates a greater labour pool available for the local economy. Therefore a higher ratio indicates a lower risk.	A lower number of persons of working age represents a greater number of dependents on the existing workfore and is hence a high risk.	Very High
Avg_HHsize	Average Household Size	A smaller average household size indicates a greater proportion ofhousehold resources available to every individual in the household and is therefore a lower risk	Household sizes relate with the distribution of resources among individuals with the household. A greater average household size indicates a lesser proprotion of resources available to individuals and is therefore interpreted as a high risk	Very High

(continued)

Indicator	Definition	Low Risk Interpretation	High Risk Interpretation	Risk Level
Percent_BachelorsDegree	Percentage of Population with Bachelors' Degree	A greater proportion of persons with bachelors' degree indicates a greater likelihood of being employed by a variety of employers, along with a higher concentration of high skilled high income positions. Therefore it is interpreted as a lowrisk	A lower porportion of persons with a bachelor's degree indicates a lower number of persons with skills for career advancement. It indicates lack of skilled labour in the workforce and tehrefore lower incomes and social mobility. Therefore it is interpreted as a high risk factor	Very High
Percent_LanguageBarrier	Percentage of Population facing Language Barrier	A lower proportion of persons with language problems indicates greater accessibility to disaster relief efforts and is therefore an area of lowe risk	A higher proportion of persons with language barriers could indicate a higher percentage of people suffering due to communication problems, interpretation of instructions and emergency rescue operations. Therefore it is interpreted as a high risk	Very Low
Percent_AssistanceNeed	Percentage of Population with Assisstance Need	A lower percentage of people withfood assistance indicates higher incomes and economic resilience, and is therefore a low risk area	A high proportion of persons with assistance needs indicates poverty and lack of socio-economic resilience. Therefore it is interpreted as a high risk.	Very High

(continued)

Indicator	Definition	Low Risk Interpretation	High Risk Interpretation	Risk Level
Percent_Commuters	Percentage of Population who Commute to work regularly	A lower percentage of commuters indicates that most workers live near where they work and can continue their jobs irrespective of transportation network disruptions. Therefore it is an area of low risk	Natural disasters invariably affect transportation routes and make it difficult for persons requiring commutes to their workplace to continue their employment. Therefore a greater proportion of commuters indicates a disaster risk	Very High
Percent_NoHealthIns	Percentage of Population without Health Insurance	Greater health insurance coverage is correlated with better health conditions and higher economic productivity. Therefore a higher number of persons with health insurance is a low risk	Lack of health insurance coverage has negative impacts on health as patients are less likely to receive preventive health care, or affordable medical care during a disaster. A greater proportion of persons without health insurance indicates a higher disaster risk.	High
Physically_UnhealthyDays	Average number of physically unhealthy days per year for the population	A Lower value is associated with low risk	A higher value is associated with high risk because people are more prone to being affected by disaster risks	Very High
Food_Environment_Index	Index of factors that contribute to a healthy food environment, from 0 (worst) to 10 (best).	A higher value is associated is low risk	A poor food environment reduces the physical and mental vitality of a community. A lower value is associated with high risk.	Very High

(continued)

Indicator	Definition	Low Risk Interpretation	High Risk Interpretation	Risk Level
Percent_Exercise_Access	Percentage of population with adequate access to locations for physical activity.	A higher value is associated is low risk	Lower physical exercise increases health risks with age. A lower value is associated with high risk	High
PrimaryCare_PhysicianRate	Ratio of population to primary care physicians.	A higher value is associated is low risk	A lower proportion of physicians indicates that community members may not have access to medical help during disasters and have to rely on external support. A lower value is associated with high risk	Very High
MentalHealth_ProviderRate	Ratio of population to mental health providers.	A higher value is associated is low risk	A lower proportion of physicians indicates that community members may not have access to mental health resources during disasters. A lower value is associated with high risk	Very Low
Percent_Vaccinated	Percentage of Households vaccinated against Covid-19 and other diseases	A higher value is associated is low risk	A high proportion of vaccination indicates that the community is safe against the Covid-19 pandemic. A lower value is associated with high risk	Very High
Social_AssociationRate	Number of membership associations per 10,000 population.	A higher value is associated is low risk	A high rate of social associations indicates healthy relationships and community life. A lower value is associated with high risk	Low

(continued)

Indicator	Definition	Low Risk Interpretation	High Risk Interpretation	Risk Level
Violent_Crime_Rate	Number of reported violent crime offenses per 100,000 population.	A Lower value is associated with low risk	A high of crimes indicates safety issues within the community. A higher value is associated with high risk	Very High
Inadequate_Facilities	Percentage of households with inadequate infrastructure within their housing unit	A Lower value is associated with low risk	Inadequate infrastructure within the household lowers quality of life and residents' health. A higher value is associated with high risk	Low
COVID-19_death_rate	All deaths occurring between January 1, 2020 and December 31, 2020 due to COVID-19, per 100,000 population (age-adjusted).	A Lower value is associated with low risk	A greater number of deaths owing to Covid-19 indicates pre-existing health conditions and comorbidities within the community. A higher value is associated with high risk	High
Percent_Food_Insecure	Percentage of population who lack adequate access to food.	A Lower value is associated with low risk	Access to food indicates community health. A higher value is associated with high risk	Very High
Percent_Limited_Access_to_Healthy_Foods	Percentage of population who are low-income and do not live close to a grocery store.	A Lower value is associated with low risk	Persons who are low income lack access to healthy food, especially if they live away from grocery stores and lack transportation. A higher value is associated with high risk	Very High

(continued)

Indicator	Definition	Low Risk Interpretation	High Risk Interpretation	Risk Level
Percent_Disconnected_Youth	Percentage of teens and young adults ages 16-19 who are neither working nor in school.	A Lower value is associated with low risk	Teens and young adults need to either be in school, or part of the workforce, to be able to cultivate a healthy, self-sufficient lifestyle, involved hopeful and forward looking endeavours. Disconnected youth have been positively associated with poverty, unempoyment and crime. A higher value is associated with high risk	High
Percent_rural	Percentage of population living in rural areas	A Lower value is associated with low risk	Rural areas often lack access to resources and are geogrpahically isolated. A higher value is associated with high risk	High
Agro_Percent	Percentage Employment in Agriculture and related Sectors	A lower percentage of workers in the agricultural sector indicates a greater economic diversity, lower dependence on weather conditions, higher resilience and lower risk	Agricultural sector is most directly affected by natural disasters and extreme weather events such that their productivity goes down drastically. Therefore a predominantly agrarian economy represents lower economic resilience and greater disaster risk	High

(continued)

Indicator	Definition	Low Risk Interpretation	High Risk Interpretation	Risk Level
LowIncome_Percent	Percentage Low Income Population	A lower proportion of low income families indicates a greater access to resources for preparation and recovery from disasters and is hence a low disaster risk	A higher proportion of low income households lack of adequate access to resources to prepare for and recover from disasters, contingency funds, personal vehicles and abilities to arrange for alternate housing arrangements during disasters. It is therefore a high risk.	Very High
poverty	Percentage Below Poverty Line	A lower poverty indicates less exposure to disaster risks and greater accessibility to exigency funds. It is therefore a low risk	Poverty can be both a cause and consequence of disaster risk. A greater poverty is associated with a higher risk	Very High
Unemployment_percent	Percentage of Unemployed Persons	A lower rate of unemployment indicates a more stable and resilient economic environment and is therefore associated with lower disaster risks	A high rate of unemployment could indicate a range of socio-economic vulnerabilities and political struggles. It indicates lower economic resilience during disasters and is therefore associated with high risk	Low
WorkNearby_percent	Percentage Workers who live near their place of work	A greater proportion of persons who live near their place of work indicates a lower dependence on commute and transportation networks and a more robust resilient economy. Therefore it is a low risk	A lower proprotion of persons who live near their place of work indicates a high dependence on transportation networks for economic activities and a greater risk of disruption during disasters. It is therefore a high risk	Very High

(continued)

Indicator	Definition	Low Risk Interpretation	High Risk Interpretation	Risk Level
MBS	Percentage Employed in Management, Business and Science Occupations	Management, Business and Science jobs are invariably correlated with greater incomes, social mobility and lower dependence on place-based work. Therefore they are more resilient during disasters and higher employment in these sector represent lower risks	A lower proportion of employees in Management, Business and Science professions indicates lower incomes and a low skill economy and is therefore indicative of higher disaster risks	Very High
MBS_LQ	Location Quaotient of Managemnt, Business and Science Occupations	A high Location Quotient for Management, Business and Science professions indicates a more specialized, high income economy. It is indicative of low disaster risk	A low LQ for Management, Business and Science professions indicates a less specialized economy and is therefore indicative of lower economic diversity, lower incomes and high risk	Very High
Service	Percentage Employed in Service	Service sector is a huge contributor to the economic productivity and bolsters the primary and secondary economic sectors as well and provides a huge source of employment. A higher employment in the service sector signals greater economic resilience and lower risk.	A lower proportion of workers in the service sector indicates a less developed and resilient economy with greater dependence on place-based work. It is therefore an area of high risk.	Very High
Service_LQ	Location Quotient of Service Occupations	A higher LQ for the service sector indicates a high risk	A lower LQ for the service sector indicates a lower resilience and higher risk	Very High

(continued)

Indicator	Definition	Low Risk Interpretation	High Risk Interpretation	Risk Level
Sales	Percentage Employed in Sales Occupations	Employment in sales is associated with higher pay greater skills and organizational support. It signals greater economic resilience and low risk	A lower employment in sales industries could indicate a less entrepreneurial economy, lower resilience and therefore higher disaster risk	Very High
Sales_LQ	Location Quotient of Service Occupations	A higher LQ for the service sector indicates a low risk	A lower LQ for sales industries is associated with high risk	Very High
construction	Percentage Employed in Construction Occupations	Construction and allied industries represent possibilities for robust economic growth and government investment. A greater employment in the construction industry also signals potential for development of local infrastrcuture. A higher employment in this sector is therefore a low risk	Lower employment in the construction sector indicates lower investment in built environment and infrastructure and high disaster risks	Very High
construction_LQ	Location Quotient of Construction Occupations	A higher LQ for the construction industry indicates a low disaster risk	A lower LQ for the construction industry indictes a high disaster risk	Very High
PT	Percentage Employed in Production and Trans-portation Occupations	A lower concentration of production and transportation industries indicates a lower dependence of the economic base on land, location and natural resources. It is therefore more economically resilient and a low risk	Both production and transportation industries are dependent on avaibality of local natural resources and are therefore more susceptible to natural disasters. A higher employment in such industries signals greater disater risk.	Very Low

(continued)

Indicator	Definition	Low Risk Interpretation	High Risk Interpretation	Risk Level
PT_LQ	Location Quotient of Production and Transportation Occupations	A lower concentration of the production and transportation idnustry indicates a low risk	A higher LQ for the Production and Transportation Industry indicates a high risk	Very Low
Agri	Percentage Employed in Agricultural Occupations	A lower percentage of workers in the agricultural sector indicates a greater economic diversity, lower dependence on weather conditions, higher resilience and lower risk	Agricultural sector is most directly affected by natural disasters and extreme weather events such that their productivity goes down drastically. Therefore a predominantly agrarian economy represents lower economic resilience and greater disaster risk	Very Low
Agri_LQ	Location Quotient of Agricultural Occupations	A lower LQ for the Agricultural Sector indicates a low risk	A higher LQ for Agricultural Businesses indicates a higher risk	High
Manufacturing	Percentage Employed in Manufacturing Occupations	A lower concentration of manufacturing industries/employment indicates lower chances of disruption during disasters. It is therefore an area of low risk	Manufacturing industries are directly affected by natural disasters. Extreme events cause great damage to the manufacturing units and their associated supply chains. A higher concentration of Manufacturing Industries is associated with high risk	Very Low
Manufacturing_LQ	Location Quotient of Manufacturing Occupations	A lower LQ for manufacturing industries indicates a low risk	A higher LQ for manufacturing industries indicates a high risk	Very Low

(continued)

Indicator	Definition	Low Risk Interpretation	High Risk Interpretation	Risk Level
Wholesale	Percentage Employed in Wholesale Trade	A lower employment in wholesale businesses signals a greater economic resilience and low risk	Wholesale and retail businesses are more vulnerable to natural disasters and are more likely to close after disasters. They are also more likely to be low mitigators. A higher proportion of employment in the wholesale industry signals a high disaster risk	Very Low
Wholesale_LQ	Location Quotient of Wholesale Trade Occupations	A lower LQ in wholesale industries is associated with low risk	A higher LQ is wholesale industries is associated with high risk	Low
Retail	Percentage Employed in Retail Occupations	Although prone to natural disasters, retail industries generally show a higher resilience to natural disasters than wholesale industries. This is because they are less likely to be low mitigators and often associated with having a plan unlike wholesale industries. Thus a higher employment in retail industries is associated with low risk.	A lower employment in retail industries signals lower economic resilience and is associated with higher risk	Very High
Retail_LQ	Location Quotient of Retail Occupations	A higher LQ in retail industries is associated with low risk	A lower LQ in retail industries is associated with high risk	High

(continued)

Indicator	Definition	Low Risk Interpretation	High Risk Interpretation	Risk Level
Transport	Percentage Employed in Transportation Occupations	Like retail, transportation businesses are often associated with having business plans, more structurally sound and meets standards. Thus a higher employment in transportation indicates a low risk	A lower employment in transportation business could mean that the businesses are not widely spread out and less economically resilient. It is interpreted as a high risk.	Very High
Transport_LQ	Location Quotient of Transportation Occupations	A higher LQ in transportation industries is associated with low risk	A lower LQ in transportation industries associated with high risk	Very High
Info	Percentage Employed in Information-based Occupations	Information industries are positively associated with mitigation planning and have the ability to shift to remote working during a disaster. Therefore, such a higher employment in such industries poses a low risk	A lower employment in infirmation industries signals a less diverse economic base and a higher susceptibility to natural disasters. It is therefore associated with higher disaster risks	Very High
Info_LQ	Location Quotient of Information-based Occupations	A lower LQ in the information sector signals a low risk	A lower LQ in information sector signals a high risk	Very High

(continued)

Indicator	Definition	Low Risk Interpretation	High Risk Interpretation	Risk Level
Finance	Percentage Employed in Finance Occupations	Finance, realestate, etc. jobs are positively correlated with high incomes, job security and high economic resilience during disasters. Therefore a greater employment ins uch industries poses a low risk and indicates a diverse economic base. A higher employment in such industries is associated with a low risk	A lower employment in finance, real estate etc. signals lower incomes and less resilient jobs. Therefore, a lower employment in this sector is associated with high risk	Very High
Finance_LQ	Location Quotient of Finance Occupations	A high LQ in finance, real estate, etc. signals a low risk	A low LQ in finance, real estate, etc. signals a high risk	Very High
Management	Percentage Employed in Management Occupations	Management, Business and Science jobs are invariably correlated with greater incomes, social mobility and lower dependence on place-based work. Therefore they are more resilient during disasters and higher employment in these sector represent lower risks	A lower proportion of employees in Management, Business and Science professions indicates lower incomes and a low skill economy and is therefore indicative of higher disaster risks	High
Management_LQ	Location Quotient of Management Occupations	A higher LQ in management, business, or science indicates a low risk	A lower LQ in Management, business or science indicates a high risk	Very Low

(continued)

Indicator	Definition	Low Risk Interpretation	High Risk Interpretation	Risk Level
Edu	Percentage Employed in Education-related Occupations	A higher employment in the education sector signals a more skilled economy, which is typically more resilient to natural disasters. It is therefore a low risk	A lower employment in the education sector signals a less resilient, less skilled economy, and is therefore associated with high risk	Very High
Edu_LQ	Location Quotient of Education-related Occupations	A high LQ in the education sector signals a higher economic resilience and low risk	A lower LQ in education sector signals a lower economic resilience and high risk	Very High
Arts	Percentage Employed in Arts Occupations	A lower employment in the arts sector could indicate higher resilience to economic shocks and higher incomes and is therefore associated with lower risk	Although a higher proportionof artists could signal a greater economic diversity, arts occupations are highly susceptible to natural disasters. Therefore a greater employment in arts industries could signal a higher disaster risk.	Very Low
Arts_LQ	Location Quotient of Arts Occupations	A low LQ in the arts sector is associated with low risk	A high LQ in the arts sector is associated with higher risk	Very Low
Others	Percentage Employed in Other Occupations	Employment across other sectors represents diversification of the economic base and is therefore positively correlated with economic resilience. It is therefore a low risk	A lower employment in other sectors represents a less diverse and creative economy. It is therefore associated with high risks	Very High
Others_LQ	Location Quotient of Other Occupations	A higher LQ in other industries is associated with low risk	A lower LQ in other industries is associated with high risk	Very Low

(continued)

Indicator	Definition	Low Risk Interpretation	High Risk Interpretation	Risk Level
CommuteTime	Time it takes from home to go to work in minutes	A Lower value is associated with low risk	Time spent in commute is associated with lack of productivity and extra expenses. A lower commute time is assocatied with a health local economy. A higher value is associated with high risk	Very High
Walkability_Score	Walkability score (ordinal)	A higher value is associated is low risk	High walkability scores indicate greater community vitality and economic accessibility. A lower value is associated with high risk	Very Low
Vice_related_business_rate	Rate of vice-related businesses per county as proportion of total businesses	A Lower value is associated with low risk	Greater proportion of vice-related business indicate hightened economic instability during disasters. A higher value is associated with high risk	Very High
Civic_related_business_rate	Rate of civic-related business per county	A higher value is associated is low risk	Civic-related businesses indicate a strong, built-environment and development industry. A lower value is associated with high risk	Very High
Education_related_business_rate	Rate of education-related business per county	A higher value is associated is low risk	Education-related businesses enable a community to obtain access to education and child development resources. A lower value is associated with high risk	Very Low

(continued)

Indicator	Definition	Low Risk Interpretation	High Risk Interpretation	Risk Level
Healthcare_related_business_rate	Rate of healthcare-related businesses per county	A higher value is associated is low risk	Availability of health care businesses indicate access to medical resources during disasters. A lower value is associated with high risk	Low
Recreation_related_business_rate	Rate of recreation-related businesses per county	A lower value is associated with low risk	Greater proportion of recreation-related business indicate hightened economic instability during disasters. A higher value is associated with high risk	Low
Total	Total Housing Stock	A lower number of housing units indicates less damage during a disaster and is associated with low risk	A higher number of housing units indicates the possibility of greater risk during disasters	Very Low
Homewownership	Perecentage Homewowners	A higher percentage of homeownership is associated with greater income and family stability and greater access to relief during a disaster. It is therefore a low risk	A lower percentage of homeownership signals lower incomes and support during disasters. It is therefore a higher risk.	Very High
OldHomes	Percentage of Old Homes as part of Total Housing Stock	A lower proportion of old homes signals new construction that is more structurally resilient to natural disasters. It is therefore associated with low disaster risk	A higher proportion of houses that are built more than 30 years ago signals an old housing stock in need of repair and reconstruction. It is therefore associated with high disaster risk.	High

(continued)

Indicator	Definition	Low Risk Interpretation	High Risk Interpretation	Risk Level
NewHomes	Percentage of New Homes as part of Total Housing Stock	A higher proprotion of new homes indicates a greater structural resilience to natural disasters and is associated with a low risk	A lower porportion of new homes indicates the possibility of greater structural damage during disasters. It is therefore associated with a high risk	High
Rented	Percentage Renters	A lower proportion of renters signals greater homeownership, higher incomes and access to resources. This is therefore an area of low risk	Renters are associated with higher vulnerability during disasters owing to lower incomes, and lesser accessibility to disaster relief. A high proportion of renters is therefore associated with a higher risk	Very Low
Vacancy	Percentage Vacant Units	A lower proportion of vacant units signals greater utilization of available built environment resources, greater maintenance and lower probability of structural damage. It is therefore associated with low risk	A high proportion of vacant units signals a weak economic base and possibilities of blight and structural damage. It is therefore associated with a high risk	Very High
Units_SingleFamily	Percentage of Single Family Units	A lower porportion of single family units signals greater housing mix, affordability and greater housing resilience. It is therefore associated with low risk	A greater proportion of single family homes signals lesser housing diversity and therefore higher risks for low income populations. It is associated with higher risk	Very Low
MobileHomes	Percentage of Mobile Homes as part of Total Housing Stock	A lower proportion of mobile homes indicates greater structural resilience of the housing sector and more stable economy	A greater proportion of mobile homes is associated with greater risk owing to structural problems and lower incomes.	High

(continued)

Indicator	Definition	Low Risk Interpretation	High Risk Interpretation	Risk Level
Overcrowding	Percentage of Overcrowded Homes as part of Total Housing Stock	A lower proportion of vercrowded units signals higher incomes and well-maintained, structurally sound housing units which are resilient to disasters. It is therefore associated with low risk	In an overcrowded housing unit, available resources are distributed among a higher than average number of individuals which could lead to familial, socio-economic and structural inadequacies over a period of time. It is therefore associated with high risk.	Very Low
Rental_Overcrowding	Percentage of Rental Units that are Overcrowded	A lower proportion of overcrowded rental units indicates a more affordable rental housing stock, and a more resilient rental population. It is a low risk	A higher proportion of rental units which are overcrowded signals lower incomes, structural and maintenance issues associated with the rental housing stock. It indicates that the rental stock is inadequate and unaffordable and is therefore associated with high risk	Very Low
Cost_IncomeRatio	Ratio of Housing Cost to Household Income	A lower cost to income ratio indicates that households are successfully able to meet their financial demands and are more resilient to disasters. It is therefore a low risk.	A higher cost to income ratio indicates that households are unable to meet their financial needs and are more likely to suffer adversely during disasters. It is therefore associated with high risk.	Very Low

(continued)

Indicator	Definition	Low Risk Interpretation	High Risk Interpretation	Risk Level
Renters_Cost_Income_Ratio	Ratio of Renter Housing Cost to Household Income	A lower cost to income ratio for renters indicates that rental households are successfully able to meet their financial demands and are more resilient to disasters. It is therefore a low risk.	A higher cost to income ratio for renters indicates that rental households are unable to meet their financial needs and are more likely to suffer adversely during disasters. It is therefore associated with high risk.	Very High
Rental_CostBurden_Below20000	Housing Cost Burden on renters whose incomes are below 20,000 USD	A lower proportion of cost-burdened low income households indicates greater economic resilience among low-income renters. This is an asset during natural disasters and is a low risk area	A higher proportion of low income rental households who are housing cost burdened signals a higher concentration of highly vulnerable households in the community. This is an area of high risk, structurally, financially and socially	Very Low
Renter_MHHI	Monthly Household Income of Renters	A higher income indicates greater capacity to cope with disasters. It is therefore associated with low risk.	A lower income indicates a lower capacity to cope with disasters and is associated with high risk	Very High
MedianHomeValue	Median Home Value	A higher home value indicates higher incomes, higher accessibility to funds during disaster and is therefore associated with low risk	A lower home value indicates lower incomes and is therefore associated with high risk	Very High
NoVehicle_Pop	Percentage of Households without a Vehicle	A lower percentage of households without a vehicle indicates greater socio-economic stability within the community and is therefor associated with low risk	Vehicles count as additional economic assets which add to household mobility. A higher percentage of households without a vehicle is therefore associated with a high risk	High

(continued)

Indicator	Definition	Low Risk Interpretation	High Risk Interpretation	Risk Level
GroupQuarters	Percentage of GroupQuarters as part of Total Housing Stock	A lower concentration of group quarter residents is a low risk owing to greater access to recovery resources and social support	Group quarters consist of unrelated persons sharing a living space, either in institutionalized or non-institutionalized settings. Thus they lack the social support of a family and a high percentage of group quarter population is associated with high risk	Moderate
Percent_Section8	Rate of low-rent + section-eight units in county	A Lower value is associated with low risk	Greater proportion of low income housing indicates poverty and declining housing quality. A higher value is associated with high risk	Very High

Appendix B

High Risk and Low Risk Areas at Rural and Census Place Levels

Indicator	Risk Level (Rural)	Risk Level (Places)
Population	Very Low	Moderate
Young_percent	Low	Very High
Old_percent	High	Low
NonWhite_Percent	Very High	Very High
Females_Percent	Very Low	Very Low
NotMarried_Percent	Very High	High
Disabled_Percent	Very Low	Moderate
FemaleHeaded_HHs_Percent	Very Low	Moderate
LargeFam_Percent	Very Low	Very Low
SingleParent_Percent	Very High	Very High
Educated_percent	Very High	Very High
Skilled_Percent	Very High	Very High
Elderly_growth_percent	High	Low
Working_Nonworking_ratio	Very High	Very High
HelperPool	Very High	Very High
FemaleLaborforce_percent	Very Low	Very High
PrimeWorkingAge_percent	Very High	Very High
Avg_HHsize	Very High	Very High
Percent_BachelorsDegree	Very High	High
Percent_LanguageBarrier	Low	High
Percent_AssistanceNeed	Very High	Very High
Percent_Commuters	Very High	Very High
Percent_NoHealthIns	Moderate	Very High
Physically_Unhealthy_Days	Very High	Very High
Food_Environment_Index	Very High	Very High
Percent_Exercise_Access	High	High
PrimaryCare_Physicians_Rate	High	Very High
MentalHealth_Provider_Rate	Very Low	Very Low
Percent_Vaccinated	High	Very High
Social_Association_Rate	Low	Low

(continued)

Indicator	Risk Level (Rural)	Risk Level (Places)
Violent_Crime_Rate	Very High	Very High
Inadequate_Facilities	Low	Low
COVID-19_death_rate	High	High
Percent_Food_Insecure	Very High	Very High
Percent_Limited_Access_to_Healthy_	Very High	Very High
Percent_Disconnected_Youth	High	High
Segregation_index	Very High	Very High
Percent_rural	High	High
Income	Very High	High
Agro_Percent	Moderate	Low
UnstableEmployment_percent	Very High	High
LowIncome_Percent	Very High	Very High
poverty	Very High	Very High
Unemployment_percent	Moderate	Moderate
WorkNearby_percent	Very High	Very High
MBS	Very High	Very High
MBS_LQ	Very High	High
Service	Very High	Very High
Service_LQ	Very High	Very High
Sales	Very High	High
Sales_LQ	Very High	High
construction	Very High	Very High
construction_LQ	Very High	Very High
PT	Very Low	Very Low
PT_LQ	Very Low	Very Low
Agri	Very Low	Moderate
Agri_LQ	Moderate	Low
Manufacturing	Very Low	Very Low
Manufacturing_LQ	Very Low	Very Low
Wholesale	Very Low	Low
Wholesale_LQ	Very Low	Low

(continued)

Indicator	Risk Level (Rural)	Risk Level (Places)
Retail	High	High
Retail_LQ	High	High
Transport	Very High	Very High
Transport_LQ	Very High	Very High
Info	Very High	High
Info_LQ	Very High	High
Finance	Very High	Very High
Finance_LQ	Very High	Very High
Management	Very High	Moderate
Management_LQ	Very High	Very Low
Edu	Very High	Very High
Edu_LQ	Very High	High
Arts	Very Low	Low
Arts_LQ	Very Low	Very Low
Others	Very High	Very High
Others_LQ	Very High	Very High
Percent_Children_in_Poverty.x	Very Low	Very Low
Gender_Pay_Gap.x	High	High
Percent_income_required_for_childca	Very Low	Very Low
CommuteTime	Very High	Very High
Walkability_Score	Very Low	Very Low
Vice_related_business_rate	Very High	Very High
Civic_related_business_rate	Very High	Very High
Education_related_business_rate	Very Low	Very Low
Healthcare_related_business_rate	Very Low	Low
Recreation_related_business_rate	Low	Low
Total	Very Low	Moderate
Homewownership	Very High	Very High
OldHomes	Very High	Low
NewHomes	Very High	Low
Rented	Low	Very Low
Vacancy	Very High	Very High

(continued)

Indicator	Risk Level (Rural)	Risk Level (Places)
Units_SingleFamily	Very Low	Very Low
MobileHomes	High	Very High
Overcrowding	Very Low	Moderate
Rental_Overcrowding	Moderate	Very High
Cost_IncomeRatio	Very Low	Moderate
Renters_Cost_IncomeRatio	High	Low
Rental_CostBurden_below20000	Very Low	Very Low
Renter_MHHI	Moderate	Very High
MedianHomeValue	Very High	Very High
NoVehicle_Pop	Low	High
GroupQuarters	Very High	Very High
Percent_Children_in_Poverty.y	Very Low	Very Low
Gender_Pay_Gap.y	Very High	Very High
Percent_income_required_for_childca	Very Low	Very Low
Percent_Section8	Very High	Very High
Pubtrans_Dependent	Very High	Very High
Pubtrans_heavilyDependent	Very High	Very High
No_Pubtrans	Moderate	Very High
No_CommunicationSources	Very Low	Very Low
Protective_Services	Very High	Very High
Percent_BroadbandAccess	Very High	Very High
pm10	High	High
pm25	Low	Low
o3	Very Low	Very Low
so2	High	High
nox	Moderate	High
co	Moderate	Moderate
PCT_IRRIGATED_ACRES	Very High	Very High
pct_nematode_acres	High	High
pct_manure_acres	High	High
pct_disease_acres	Low	Low
pct_defoliate_acres	Moderate	Moderate

(continued)

Indicator	Risk Level (Rural)	Risk Level (Places)
pct_harvested_acres	Very High	Very High
pct_au	Very Low	Low
fungicide	Very High	Very High
herbicide	Very High	Very High
insecticide	Very High	Very High
std_coal_prim_pop	Very High	Very High
std_metal_prim_pop	Very Low	Very Low
std_nonmetal_prim_pop	Very Low	Very Low
std_sandandgravel_prim_pop	Very High	Very High
std_stone_prim_pop	Very Low	Very Low
Radon	Very Low	Very Low
Facilities_Rate	Very Low	Very Low
Pct_BS	Very High	Very High
Pct_Unemp_total	Very Low	Very Low
Pct_Fam_Pov	Very Low	Very Low
Per_TotPopSS	Moderate	Moderate
Per_PSWithSW	Low	Low
D303_Percent	Very Low	Very Low
ALLNPDESperKM	High	High
CaAve	Very High	Very High
Kave	Moderate	Moderate
NO3Ave	Very High	Very High
ClAve	Very Low	Very Low
SO4Ave	Very High	Very High
HgAve	Very Low	Very Low
AvgOfD3_ave	Very High	Very High
W_As	Very High	Very High
W_Ba	Very High	Very High
W_Cd	Very High	Very High
W_Cr	Very High	Very High
W_CN	Very High	Very High

(continued)

Indicator	Risk Level (Rural)	Risk Level (Places)
W_FL	Moderate	Moderate
W_HG	Very High	Very High
W_NO3	Very High	Very High
W_NO2	Very High	Very High
W_SE	Very High	Very High
W_SB	Very High	Very High
W_ENDRIN	High	High
W_METHOXYCHLOR	High	High
W_DALAPON	High	High
W_DEHA	High	High
W_SIMAZINE	High	High
W_DEHP	High	High
W_PICLORAM	High	High
W_DINOSEB	High	High
W_ATRAZINE	High	High
W_24D	High	High
W_BENZOAP	High	High
W_PCP	High	High
W_PCB	Moderate	High
W_DBCP	High	High
W_EDB	High	High
W_XYLENES	Very High	Very High
W_CHLORDANE	High	High
W_DCM	High	Very High