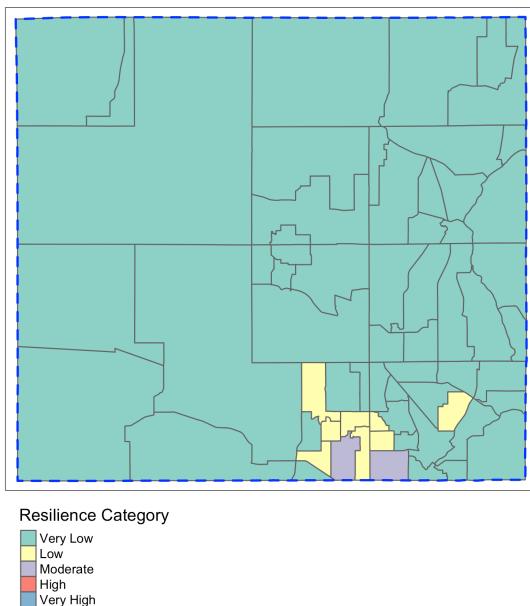


County-Level Risk Assessment: McHenry

Census Tracts within McHenry



Basic Statistics

Table 1: Basic Statistics (County level)

| Information | Value |
|-------------------------------|----------------|
| Population | 307291 persons |
| Area sq. miles | 604.54 sqm |
| Gross Density(persons/sq mil) | 508 p/sqm |
| Avg HH Size | 2.7 persons |
| Median HH Income | 90014 USD |

Count of Tracts in each Category

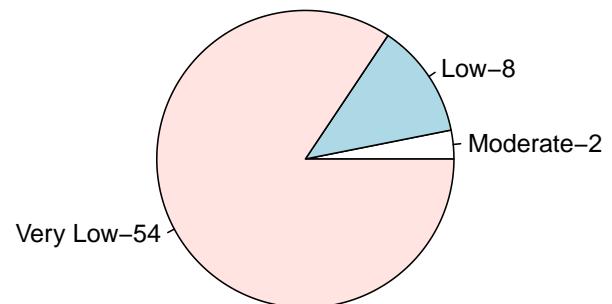
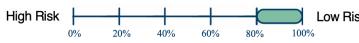


Table 2: Percentage of Census Tracts under each Resilience Category(County level)

| Very High | High | Moderate | Low | Very Low |
|-----------|------|----------|-----|----------|
| 0 | 0 | 3 | 12 | 84 |

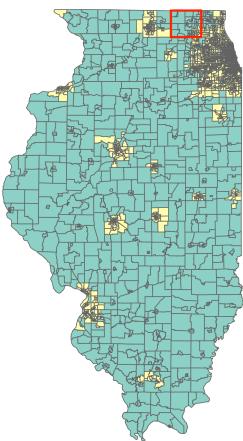
Indicator Group Rankings

| Indicator Group | High Risk Areas | Low Risk Areas |
|-----------------|--|--|
| Community |  <p>Young percent, LargeFam Percent, Avg HHsize, Percent AssistanceNeed, COVID-19 death rate</p> | <p>Females Percent, Educated percent, Skilled Percent, PrimeWorkingAge percent, Percent BachelorsDegree, Food Environment Index, Percent Exercise Access, Percent Vaccinated</p> |
| Economy |  <p>Unstable Employment Percent, Manufacturing LQ, Arts LQ, Gender Pay Gap, Percent income required for childcare expenses, CommuteTime, Recreation related business rate</p> | <p>MHHI, WorkNearby percent, MBS LQ, Sales LQ, Retail LQ, Info LQ, Management, Others, Walkability Score, Healthcare related business rate</p> |
| Housing |  <p>Units SingleFamily, Overcrowding, Percent HousingProblems</p> | <p>Homewownership, NewHomes, Renter MHHI, MedianHomeValue, Segregation Index</p> |
| Environment |  <p>NO21, O3, PM2.5, PM2Point5, pct manure acres ln, fungicide ln, Radon.x, D303 Percent ln, ALLNPDESperKM ln, Kave ln, NO3Ave.x, W As ln, W Ba ln, W CN ln</p> | <p>Avg temp, Max temp, Min temp, Precipitation, CO8, Pb3, NO2AM, PM10, PCT IRRIGATED ACRES ln</p> |
| Infrastructure |  <p>Percent PoorCondition Bridges, Percent commuters by transit, Other county workers, Workers to OtherCounties, Commuters withinCounty</p> | <p>Percent BroadbandAccess, Bridges, Freight railroad miles, Percent MediumFairCondition Bridges</p> |

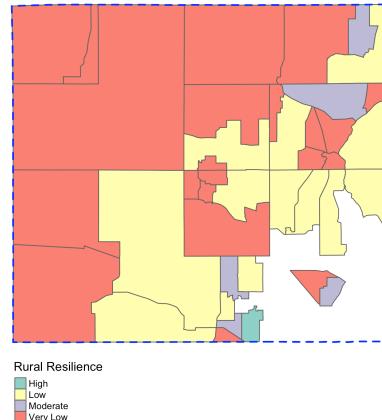
Census Tracts within McHenry

Urban and Rural Areas

Rural
Urban

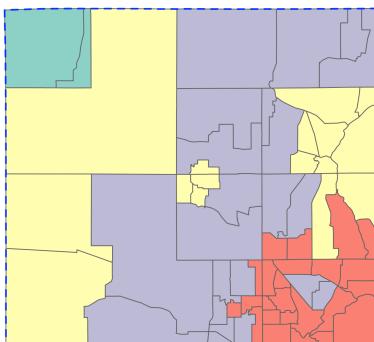


Rural Resilience within McHenry

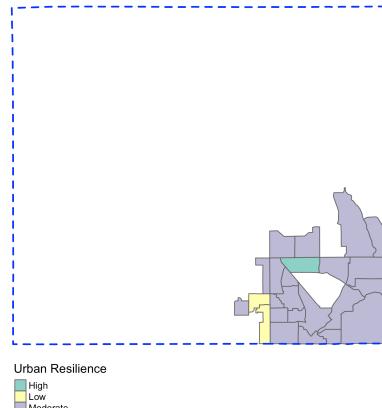


Settlement Types

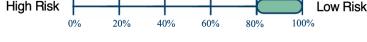
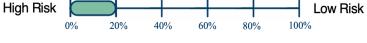
Rural Core
Rural Metro
Rural Periphery
Urban



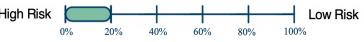
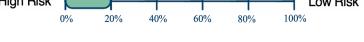
Urban Resilience within McHenry



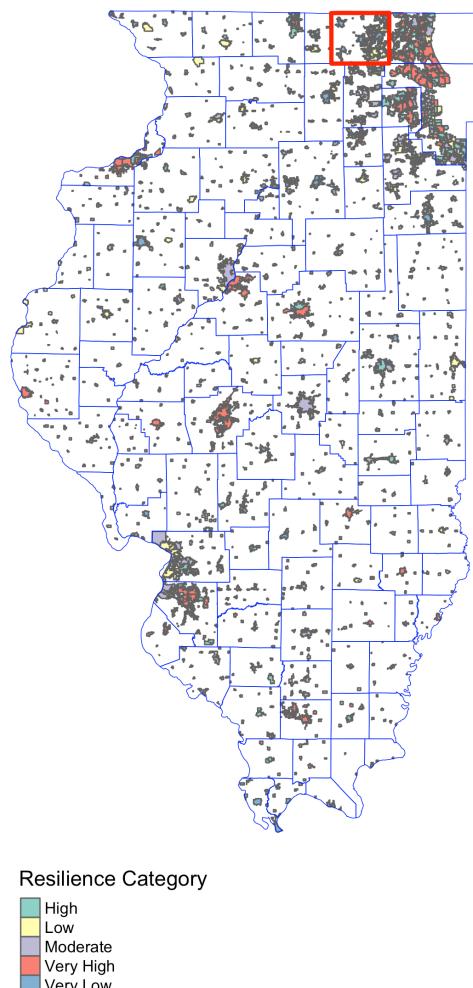
Rural Indicator Rankings

| Indicator Group | High Risk Areas | Low Risk Areas |
|-----------------|---|---|
| Community | <p>Population, Young percent, NotMarried Percent, Avg HHsize, Percent AssistanceNeed, COVID-19 death rate, Percent Food Insecure</p>  | Females Percent, Educated percent, PrimeWorkingAge percent, Food Environment Index, Percent Exercise Access, PrimaryCare Physicians Rate, Percent Vaccinated |
| Economy | <p>UnstableEmployment Percent, LowIncome Percent, PT LQ, Manufacturing, Manufacturing LQ, GINI Index, Gender Pay Gap, Percent income required for childcare expenses, CommuteTime, Recreation related business rate</p>  | MHHI, WorkNearby percent, MBS LQ, Service, Sales, construction, construction LQ, Retail, Edu LQ, Walkability Score, Education related business rate, Healthcare related business rate |
| Housing | <p>Total, OldHomes, Rented, Units SingleFamily, Percent HousingProblems</p>  | Homewownership, NewHomes, Renter MHHI, MedianHomeValue, Segregation Index |
| Environment | <p>Avg Temp, Max Temp, Min Temp, O3, PM2.5, PM2Point5, pct manure acres ln, fungicide ln, D303 Percent ln, ALLNPDESPerKM ln, Kave ln, NO3Ave.x, W As ln, W Ba ln, W CN ln</p>  | Precipitation, PCT IRRIGATED ACRES ln, std stone prim pop ln |
| Infrastructure | <p>Percent PoorCondition Bridges, Percent commuters by transit, Other county workers, Workers to OtherCounties, Commuters withinCounty</p>  | Percent BroadbandAccess, Bridges, Freight railroad miles, Percent MediumFairCondition Bridges |

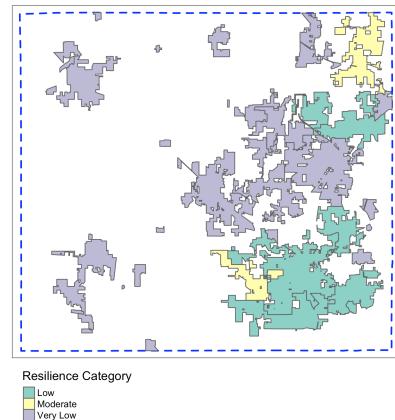
Urban Indicator Rankings

| Indicator Group | High Risk Areas | Low Risk Areas |
|-----------------|--|--|
| Community | <p>Population, Young percent, SingleParent Percent, Percent LanguageBarrier, Physically Unhealthy Days, Inadequate Facilities, COVID-19 death rate, Percent Food Insecure, Percent Limited Access to Healthy Foods</p>  | Females Percent, FemaleLaborforce percent, PrimeWorkingAge percent, Food Environment Index, PrimaryCare Physicians Rate, MentalHealth Provider Rate |
| Economy | <p>UnstableEmployment Percent, Agri LQ, Manufacturing LQ, Wholesale, Wholesale LQ, Arts LQ, GINI Index, Percent Children in Poverty, Gender Pay Gap, Percent income required for childcare expenses, CommuteTime, Recreation related business rate</p>  | WorkNearby percent, MBS LQ, Service LQ, Sales LQ, construction LQ, Transport LQ, Finance, Finance LQ, Management LQ, Edu LQ, Others LQ, Civic related business rate, Education related business rate, Healthcare related business rate |
| Housing | <p>Total, Vacancy, Percent HousingProblems, Percent Section8</p>  | Homewownership, NewHomes, Rental CostBurden below, Renter MHHI |
| Environment | <p>Avg Temp, Max Temp, Min Temp, std nonmetal prim pop ln, CaAve ln, W As ln, W Cr ln</p>  | NO21, SO21, PCT IRRIGATED ACRES ln, std sandandgravel prim pop ln, Per TotPopSS.x |
| Infrastructure | <p>Percent PoorCondition Bridges, Percent commuters by transit, Other county workers, Workers to OtherCounties, Commuters withinCounty</p>  | Bridges, Freight railroad miles |

State-Level Places Map



Places Map within McHenry County, IL



Count of Places in each Category

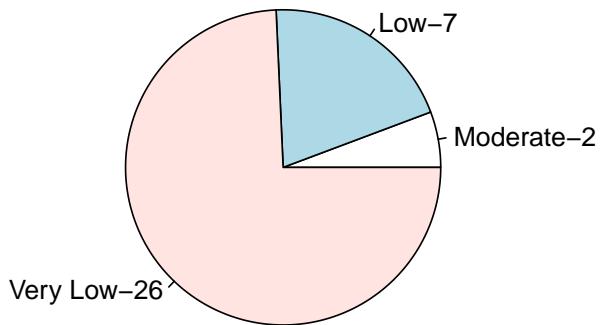


Table 6: Percentage of Census Tracts under each Resilience Category(County level)

| Very High | High | Moderate | Low | Very Low |
|-----------|------|----------|------|----------|
| 0 % | 0 % | 22 % | 78 % | 289 % |

Places Indicator Rankings

| Indicator Group | High Risk Areas | Low Risk Areas |
|-----------------|---|--|
| Community | Young percent, NotMarried Percent, LargeFam Percent, COVID-19 death rate, Percent Food Insecure, Percent Disconnected Youth | Females Percent, Educated percent, PrimeWorkingAge percent, Food Environment Index, Percent Exercise Access, PrimaryCare Physicians Rate, Percent Vaccinated |
| Economy | LowIncome Percent, PT LQ, Arts LQ, GINI Index, Percent Children in Poverty, Gender Pay Gap, Percent income required for childcare expenses, CommuteTime, Vice related business rate, Recreation related business rate | MHHI, Service LQ, construction LQ, Management, Others, Walkability Score, Civic related business rate, Education related business rate, Healthcare related business rate |
| Housing | OldHomes, Units SingleFamily, Percent HousingProblems | Homewownership, NewHomes, MedianHomeValue, Segregation Index |
| Environment | Avg Temp, Max Temp, Min Temp, O3, PM2.5, PM2Point5, pct manure acres ln, fungicide ln, D303 Percent ln, ALLNPDESPerKM ln, Kave ln, NO3Ave.x, W As ln, W Ba ln, W CN ln | Precipitation, PCT IRRIGATED ACRES ln, std stone prim pop ln |
| Infrastructure | Percent PoorCondition Bridges, Percent commuters by transit, Other county workers, Workers to OtherCounties, Commuters withinCounty | Percent BroadbandAccess, Bridges, Freight railroad miles, Percent MediumFairCondition Bridges |

Relevant Resources

The following represent key areas of concern (in order of importance) at the county level:

- **Infrastructure**

- **Environment**

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).

Infrastructure

Green Infrastructure

- **Green Infrastructure: Smart Conservation For The 21st Century**

Organization : Renewable Resources Journal

Year : 2002

Document_type : General Resource/ Foundational Research, Planning Tool

Disasters : Flood, Man-Made Disasters

Abstract : “Green infrastructure” is a term becoming more commonly used among natural resource professionals. While it means different things to different people, depending on the context in which it is used, for the purposes of this article, green infrastructure is an interconnected network of green space that conserves natural ecosystem values and functions and provides associated benefits to human populations. Green infrastructure is the ecological framework needed for environmental, social and economic sustainability- our nation’s natural life support system. Planning utilizing green infrastructure differs from conventional open space planning because it looks at conservation values in concert with land development, growth management and built infrastructure planning. This article introduces green infrastructure as a strategic approach to land conservation that addresses the ecological and social impacts of sprawl and the accelerated consumption and fragmentation of open land. It describes the concept and value of green infrastructure and presents seven principles for successful green infrastructure initiatives.

Plan_Components : Planning Processes

- **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

- **What Is Green Infrastructure?**

Organization : EPA

Year : 2022

Document_type : Web-based Resource, Manual for an Local Organization

Disasters : Flood, Drought, Extreme Weather

Abstract : Description of green infrastructure with examples of different types of green infrastructure.

Plan_Components : Strategies

- **Green Infrastructure Modeling Tools**

Organization : EPA

Year : 2022

Document_type : General Resource/ Foundational Research, Web-based Resource, Planning Tool

Disasters : Flood, Extreme Weather

Abstract : Modeling tools support planning and design decisions on a range of scales from setting a green infrastructure target for an entire watershed to designing a green infrastructure practice for a particular site.

Plan_Components : Strategies, Tools, Green Infrastructure

- **Overcoming Barriers To Green Infrastructure**

Organization : EPA

Year : 2022

Document_type : General Resource/ Foundational Research, Web-based Resource

Disasters : Flood, Drought

Abstract : Communities across the country are experiencing the benefits of green infrastructure. They have adopted performance standards or incentives promoting green infrastructure while others have built demonstration projects. Here we identify some of the barriers to adopting green infrastructure approaches and suggest strategies to overcome them.

Plan_Components : Strategies, Green Infrastructure

- **Operation And Maintenance Of Green Infrastructure Receiving Runoff From Roads And Parking Lots**

Organization : EPA

Year : 2016

Document_type : General Resource/ Foundational Research, Manual for an Local Organization

Disasters : Flood

Abstract : Operation and maintenance is a challenge that when not addressed properly can lead to failure of green infrastructure and high costs associated with restoration. This memorandum addresses common operation and maintenance questions and provides recommendations for evaluating the need and providing maintenance for green infrastructure, specifically bioretention and bioswales, that serves highly impervious roadways and parking lots.

Plan_Components : Strategies, Tools, Green Infrastructure

- **Green Infrastructure Funding Opportunities**

Organization : EPA

Year : 2022

Document_type : Web-based Resource, Funding Opportunities

Disasters : Flood, Extreme Weather, Soil Erosion/Landslides

Abstract : Federal funding sources and funding resources from the EPA for green infrastructure

Plan_Components : Funding Mechanisms, Tools

- **Green Infrastructure Grant Opportunities**

Organization : Illinois EPA

Year : 2021

Document_type : Web-based Resource, Funding Opportunities

Disasters : Flood, Drought, Soil Erosion/Landslides

Abstract : The new Green Infrastructure Grant Opportunities (GIGO) Program funds projects to construct green infrastructure best management practices (BMPs) that prevent, eliminate, or reduce water quality impairments by decreasing stormwater runoff into Illinois' rivers, streams, and lakes.

Projects that implement treatment trains (multiple BMPs in a series) and/or multiple BMPs within the same watershed may be more effective and efficient than a single large green infrastructure BMP.
Plan_Components : Funding Mechanisms, Green Infrastructure

- **Managing Wet Weather With Green Infrastructure Municipal Handbook Funding Options**

Organization : EPA

Year : 2008

Document_type : Manual for an Local Organization, Funding Opportunities

Disasters : Flood

Abstract : The Municipal Handbook is a series of documents

to help local officials implement green infrastructure in their communities. This chapter identifies and discusses the two most common funding options communities are using for green stormwater infrastructure – stormwater fees and loan programs.

Plan_Components : Strategies, Funding Mechanisms, Case Studies, Green Infrastructure

- **Managing Wet Weather With Green Infrastructure Municipal Handbook Green Infrastructure Retrofit Policies**

Organization : EPA

Year : 2008

Document_type : Planning Tool, Manual for an Local Organization, Policy

Disasters : Flood

Abstract : The Municipal Handbook is a series of documents to help local officials implement green infrastructure in their communities. This chapter is about creating policies for green infrastructure.

Plan_Components : Strategies, Planning Processes, Tools, Green Infrastructure

- **Managing Wet Weather With Green Infrastructure Municipal Handbook Green Streets**

Organization : EPA

Year : 2008

Document_type : Planning Tool, Manual for an Local Organization, Policy

Disasters : Flood

Abstract : The Municipal Handbook is a series of documents

to help local officials implement green infrastructure in their communities. This chapter looks at green streets.

Plan_Components : Strategies, Green Infrastructure

- **Managing Wet Weather With Green Infrastructure Municipal Handbook Rainwater Harvesting Policies**

Organization : EPA

Year : 2008

Document_type : Planning Tool, Manual for an Local Organization, Example Ordinances and Codes

Disasters : Flood, Drought

Abstract : The Municipal Handbook is a series of documents

to help local officials implement green infrastructure in their communities. This chapter looks at rainwater harvesting

Plan_Components : Strategies, Case Studies, Tools, Green Infrastructure

- **Managing Wet Weather With Green Infrastructure Municipal Handbook Incentive Mechanisms**

Organization : EPA

Year : 2009

Document_type : Planning Tool, Manual for an Local Organization, Example Ordinances and Codes, Funding Opportunities

Disasters : Flood

Abstract : The Municipal Handbook is a series of documents to help local officials implement green infrastructure in their communities.

This chapter looks at incentive mechanisms

Plan_Components : Funding Mechanisms, Case Studies, Green Infrastructure

- **Green Infrastructure Modeling Toolkit**

Organization : EPA

Year : 2022

Document_type : Web-based Resource

Disasters : Flood, Drought

Abstract : EPA has developed innovative models, tools, and technologies for communities to manage water runoff in urban and other environments. The resources in this toolkit incorporate green or a combination of green and gray infrastructure practices to help communities manage their water resources in a more sustainable way, increasing resilience to future changes.

Plan_Components : Tools, Green Infrastructure

- **Green Infrastructure Methods**

Organization : EPA

Document_type : General Resource/ Foundational Research, Funding Opportunities

Disasters : Flood, Drought

Abstract : FEMA is encouraging communities to incorporate methods to mitigate the impacts of climate change into eligible Hazard Mitigation Assistance (HMA) funded risk reduction activities by providing guidance on mitigating flood and drought conditions.

Plan_Components : Strategies, Funding Mechanisms, Tools, Green Infrastructure

- **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

- **Cape Cod Green Infrastructure Guide**

Organization : Tufts University

Year : 2015

Document_type : General Resource/ Foundational Research, Web-based Resource

Disasters : Flood

Abstract : In 2015, this Green Infrastructure Guide was developed by Tufts University graduate students in the Water: Systems, Science & Society program to provide accessible opportunities for stakeholders and the public to learn about green technologies and the unique benefits they offer.

Plan_Components : Green Infrastructure, Information

- **Professional Practice Green Infrastructure: Constructed Wetlands**

Organization : American Society of Landscape Architects

Document_type : General Resource/ Foundational Research, Web-based Resource

Disasters : Flood

Abstract : Constructed wetlands mimic the functions of natural wetlands to capture stormwater, reduce nutrient loads, and create diverse wildlife habitat. They are often created in engineered growth media in trenches, small islands, and pools. They are designed to contain water at all times – either standing water on the surface or water saturated just below the soil surface.

Plan_Components : Tools, Green Infrastructure, Information

- **Minnesota Green Stormwater Infrastructure Guide**

Organization : MN Department of Natural Resources, NOAA

Year : 2022

Document_type : General Resource/ Foundational Research, Planning Tool, Manual for an Local Organization

Disasters : Flood, Drought, Extreme Weather

Abstract : The purpose of this guide is to help homeowners and small business owners who are not subject to stormwater permits identify ways to improve and protect their property and the area's water quality through installation and management of green stormwater practices. The designs of these practices can be customized to fit specific needs and site-specific constraints.

Plan_Components : Strategies, Planning Processes, Tools, Green Infrastructure, Information

- **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

- **Approved Green Infrastructure Master Plan**

Organization : Prince George's County Planning Department

Year : 2002

Document_type : Specific Plan, Policy

Disasters : Flood, Drought, Man-Made Disasters

Abstract : This document contains text and maps of the Approved Countywide Green Infrastructure Plan for Prince George's County, Maryland. Green infrastructure is defined as an interconnected network of waterways, wetlands, woodlands, wildlife habitats, and other natural areas of countywide significance. The plan identifies a contiguous network of environmentally sensitive areas throughout the county and sets forth a goal, objectives, policies, and strategies to preserve, protect, and enhance these elements by the year 2025. The plan supports the desired development pattern in the General Plan. This is the first comprehensive functional master plan ever developed for environmental ecosystems in Prince George's County.

Plan_Components : Planning Processes, Green Infrastructure

- **Kane County 2040 Green Infrastructure Plan**

Organization : Kane County Board, Quality of Kane, Greening Infrastructure, IDNR

Year : 2012

Document_type : Specific Plan

Disasters : Flood, Soil Erosion/Landslides

Abstract : The ultimate goal of the Kane County 2040 Green Infrastructure Plan is to lay the groundwork for green infrastructure planning and projects at the regional, community, neighborhood and site levels addressing current issues of water resource management, biodiversity, conservation, water supply, public health,

climate change and economic development.

Plan_Components : Surveys/Assessments, Planning Processes, Funding Mechanisms, Green Infrastructure, Information

- **Green Infrastructure Partnership Opportunity Program**

Organization : Metropolitan Water Reclamation District of Greater Chicago

Year : 2022

Document_type : Specific Plan, Funding Opportunities

Disasters : Flood, Extreme Weather

Abstract : MWRD encourages and supports implementing green infrastructure (GI), which includes a range of engineered installations that store, infiltrate, and/or evaporate stormwater, thereby mimicking the natural water cycle. The MWRD recognizes that GI practices can be effective in reducing wet-weather flows to combined sewer systems, reducing combined sewer overflows to local waterways, and reducing runoff volumes and improving water quality in separate sewer service areas. The MWRD also recognizes the vital role of local government in addressing flooding concerns through the innovative use of GI.

Plan_Components : Planning Processes, Funding Mechanisms, Tools, Green Infrastructure

Environment

Environmental Resources

- **Branching Out: Agroforestry As A Climate Change Mitigation And Adaptation Tool For Agriculture**

Organization : Journal of Soil and Water Conservation

Year : 2012

Document_type : General Resource/ Foundational Research, Planning Tool

Disasters : Flood, Drought, Extreme Weather, Man-Made Disasters, Soil Erosion/Landslides, Agricultural Disasters

Abstract : US and Canadian agricultural lands are being pressed to provide more environmental and economic services, while at the same time their capacity to provide these services under potential climate change (CC) is being questioned (Field et al. 2007; CAST 2011). Producers are already experiencing weather patterns outside of climate norms (e.g., the 2011 droughts in Texas, and flooding along the Missouri River in the United States and

along the Red River in Canada) that have had significant impacts on production. Predictions of future climate conditions for the US Midwest include longer growing seasons that could potentially increase crop yields but also increase heat waves,

floods, droughts, and insect and weed issues that may then adversely impact production (USGCRP 2009). Climate change drives many stressors and interacts with many non-climatic stressors. This makes it difficult to forecast outcomes in any general way other than many existing threats to agricultural production, such as erosion and pests, which will most likely be exacerbated under shifting climate (Field et al. 2007; USGCRP 2009). Creating profitable and healthy operations under this unpredictable interplay of factors driven by shifting climate (and, along with it, shifting markets) will be a daunting task.

It will be essential that farmers, ranchers, and even communities have a variety of land management options to minimize the risks and maximize services under such uncertain conditions.

Plan_Components : Strategies

- **Green Infrastructure: Smart Conservation For The 21st Century**

Organization : Renewable Resources Journal

Year : 2002

Document_type : General Resource/ Foundational Research, Planning Tool

Disasters : Flood, Man-Made Disasters

Abstract : “Green infrastructure” is a term becoming more commonly used among natural resource professionals. While it means different things to different people, depending on the context in which it is used, for the purposes of this article, green infrastructure is an interconnected network of green space that conserves natural ecosystem values and functions and provides associated benefits to human populations. Green infrastructure is the ecological framework needed for environmental, social and economic sustainability- our nation’s natural life support system. Planning utilizing green infrastructure differs from conventional open space planning because it looks at conservation values in concert with land development, growth management and built infrastructure planning. This article introduces green infrastructure as a strategic approach to land conservation that addresses the ecological and social impacts of sprawl and the accelerated consumption and fragmentation of open land. It describes the concept and value of green infrastructure and presents seven principles for successful green infrastructure initiatives.

Plan_Components : 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

- **Questions And Answers About Drainage Water Management For The Midwest**

Organization : Purdue Extension

Document_type : General Resource/ Foundational Research

Disasters : Flood, Drought, Man-Made Disasters, Biological Disasters, Agricultural Disasters

Abstract : Subsurface tile drainage is an essential water management practice on many highly productive fields in the Midwest. However, nitrate carried in drainage water can lead to local water quality problems and contribute to hypoxia in the Gulf of Mexico, so

strategies are needed to reduce the nitrate loads while maintaining adequate drainage for crop production. Practices that can reduce nitrate loads on tile-drained soils include growing winter forage or cover crops, fine-tuning fertilizer application rates and timing,

bioreactors, treatment wetlands, and modifying drainage system design and operation. Drainage water management is one of these practices and is described in this fact sheet. Answers given here apply specifically to Midwest corn and soybean cropping systems, and not to perennial or winter annual crops.

Plan_Components : Strategies, Funding Mechanisms

- **Cover Crop Decision Tool**

Organization : Midwest Cover Crop Council

Year : 2021

Document_type : General Resource/ Foundational Research, Manual for an Local Organization

Disasters : Biological Disasters, Soil Erosion/Landslides, Agricultural Disasters

Abstract : Decision tool for deciding what cover crop to use.

Plan_Components : Strategies

- **Buffers And Vegetative Filter Strips**

Organization : EPA
Document_type : General Resource/ Foundational Research
Disasters : Flood, Drought, Biological Disasters, Soil Erosion/Landslides
Abstract : Buffers have been found to be most effective in trapping particulate pollutants. In addition, the export of soluble pollutants is expected to decrease when infiltration is maximized. Narrow buffers have also been shown to be effective in reducing the export of particulate pollutants when the integrity of the system is maintained. This highlights that one of the primary functions of buffers is to slow surface water movement which reduces the export of pollutants, particularly particulate pollutants, and narrow strips of dense grass can function in this capacity and provide water quality benefits (Dabney et al. 2006). Also, these narrow strips could be used in-field as vegetative barriers to slow pollutant movement in-field and control concentrated flow erosion.
To maximize infiltration of runoff, wider buffers or a greater buffer area to source area should be used. Research has found a significant range in buffer performance with reported sediment trapping efficiencies ranging from 41% to 100% and infiltration efficiencies ranging from 9% to 100%.
Plan_Components : Surveys/Assessments

- **Aquifer Storage And Recovery**

Organization : FEMA
Document_type : Manual for an Local Organization
Disasters : Flood, Drought
Abstract : FEMA is encouraging communities to incorporate methods to mitigate the impacts of climate change into eligible Hazard Mitigation Assistance (HMA) funded risk reduction activities by providing guidance on mitigating flood and drought conditions. FEMA has developed initial guidance on flood and drought mitigation activities including green infrastructure methods, expanded ecosystem service benefits, and three flood reduction and drought mitigation activities: Aquifer Storage and Recovery (ASR), Floodplain and Stream Restoration (FSR), and Flood Diversion and Storage (FDS).
Plan_Components : Strategies

- **The Regional Conservation Partnership Program**

Organization : USDA
Year : 2022
Document_type : Web-based Resource, Funding Opportunities
Disasters : Flood, Man-Made Disasters, Soil Erosion/Landslides, Agricultural Disasters
Abstract : The Regional Conservation Partnership Program (RCPP) promotes coordination of NRCS conservation activities with partners that offer value-added contributions to expand our collective ability to address on-farm, watershed, and regional natural resource concerns. Through RCPP, NRCS seeks to co-invest with partners to implement projects that demonstrate innovative solutions to conservation challenges and provide measurable improvements and outcomes tied to the resource concerns they seek to address.
Plan_Components : Strategies, Funding Mechanisms, Green Infrastructure

- **Volunteer Fire Assistance Program**

Organization : IDNR
Year : 2022
Document_type : Web-based Resource, Funding Opportunities
Disasters : Wildfires
Abstract : The Illinois Department of Natural Resources Division of Forestry administers the USDA Forest Service's VFA funds. The funds are for rural and small fire departments. The grant funds fire projects at 50% of the cost of a project up to \$10,000 per department. Forestry's portion is up to \$10,000, the Department may spend as much as they need to complete the project. No one item can

be \$5,000 or more. The funds can only be used for fire projects, EMS, HazMat or crash rescue are not eligible. The funds are awarded based on competitive applications. Applications will be posted on Forestry's web site. The Office of the State Fire Marshall will send out a blast email and post it on their web site and the Illinois Fire Service Institute (IFSI) will also post it on their web site. Once the application is posted, Departments will have three months to submit their applications. The types of projects that have been funded in previous grants include radios, hose, SCBA, turn out gear, wildland PPE, hand tools, chainsaws, backpack blowers, modifying federal excess vehicles and equipment and other equipment. For more information Contact Forestry's Wildland Fire Program Manager 217/782-8774.

Plan_Components : Strategies, Funding Mechanisms, Tools

- **Wildland Fire Fighter Program**

Organization : IDNR

Year : 2022

Document_type : Web-based Resource

Disasters : Wildfires

Abstract : Information about the Wildland Fire Fighter Program.

Plan_Components : Information

- **Comprehensive Environmental Review Process Manual**

Organization : IDNR

Year : 2014

Document_type : Manual for an Local Organization, Funding Opportunities

Disasters : Man-Made Disasters, Biological Disasters, Soil Erosion/Landslides, Agricultural Disasters, habitat destruction, invasive species,

Abstract : The Comprehensive Environmental Review Process (CERP) is an internal IDNR process to review:

actions that the Department performs or funds,

actions that the Department approves and a tax incentive is provided,

actions that occur on IDNR-owned or leased land.

An action is any activity that may change

existing physical, chemical or biological

conditions of air, land, or water.

Plan_Components : Surveys/Assessments, Strategies, 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

- **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

- **Upper South Branch Kishwaukee River Watershed Improvement Plan**

Organization : Applied Ecological Services Inc.

Year : 2021

Document_type : Specific Plan

Disasters : Flood, Man-Made Disasters, Soil Erosion/Landslides, Agricultural Disasters

Abstract : A RESOLUTION ADOPTING THE UPPER SOUTH BRANCH KISHWAUKEE RIVER IMPROVEMENT WATERSHED PLAN AS AN AMENDMENT TO THE STORMWATER MANAGEMENT PLAN FOR DEKALB COUNTY, IL

Plan_Components : Surveys/Assessments, Strategies, Planning Processes, Green Infrastructure

- **Kane County 2040 Green Infrastructure Plan**

Organization : Kane County Board, Quality of Kane, Greening Infrastructure, IDNR

Year : 2012

Document_type : Specific Plan

Disasters : Flood, Soil Erosion/Landslides

Abstract : The ultimate goal of the Kane County 2040 Green Infrastructure Plan is to lay the groundwork for green infrastructure planning and projects at the regional, community, neighborhood and site levels addressing current issues of water resource management, biodiversity, conservation, water supply, public health, climate change and economic development.

Plan_Components : Surveys/Assessments, Planning Processes, Funding Mechanisms, Green Infrastructure, Information

- **State Of Illinois Illinois Department Of Natural Resources Model Stormwater Management Ordinance**

Organization : Illinois Department of Natural Resources

Year : 2015

Document_type : Planning Tool, Manual for an Local Organization, Policy

Disasters : Flood, Drought, Extreme Weather, Soil Erosion/Landslides

Abstract : In June 2015, the Illinois Department of Natural Resources, Office of Water Resources (IDNR/OWR) issued a report for the Urban Flooding Awareness Act. The report recognizes that combating the damages of urban flooding requires a coordinated approach from state and local governments. A critical component in that effort is for local governmental entities to adopt sound, comprehensive stormwater management ordinances that incorporate best practices. To that end, IDNR/OWR and the Illinois State Water Survey (ISWS) developed this Model Stormwater Management Ordinance as a

resource for counties and municipalities to use when drafting or revising their own stormwater ordinances. While local development, review, and approval processes are unique, IDNR/OWR provides this document as a template containing the minimum requirements for an effective ordinance and suggestions for more advanced stormwater protection

Plan_Components : Tools, Green Infrastructure, Information

Appendix A

Interpretation of High Risk and Low Risk Areas at County Level

| Indicator | Definition | Low Risk Interpretation | High Risk Interpretation | Risk Level |
|--------------|---|---|---|------------|
| 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 High |
| 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 | Very Low |
| 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 | Very Low |
| Airports | Non-Commercial -Civil Public Use Airports and Seaplane base | A higher value is associated is low risk | It indicates access to communication and transportation infrastructure which is essential in times of disasters. A lower value is associated with high risk | High |

(continued)

| Indicator | Definition | Low Risk Interpretation | High Risk Interpretation | Risk Level |
|------------------|---|---|--|------------|
| ALLNPDESperKM ln | All NPDES permits per 1000 km of stream, as permits per 1000km stream length, log transformed | A Lower value is associated with low risk | It indicates pollution of water resources. A higher value is associated with 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 proportion of 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 High |
| 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 | Moderate |
| Avg HHsize | Average Household Size | A smaller average household size indicates a greater proportion of household 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 proportion of resources available to individuals and is therefore interpreted as a high risk | Very High |
| Avg temp | Average Temperature | A lower average temperature is associated with lower risk | A higher average temperate is associated with a higher risk | Very Low |

(continued)

| Indicator | Definition | Low Risk Interpretation | High Risk Interpretation | Risk Level |
|-----------------------------|---|--|---|------------|
| Bridges | Number of Bridges | A higher value is associated is low risk | It indicates access to transportation infrastructure which is essential in times of disasters. A lower value is associated with high riskA lower value is associated with high risk | Moderate |
| Business establishments | Number of business es-tablishments | A higher value is associated is low risk | It represents access to resources , and economic vilitatity. A lower value is associated with high risk | Very Low |
| CaAve ln | Calcium (Ca) precipitation weighted mean in mg/L, log transformed | A Lower value is associated with low risk | It is a pollutant. A higher value is associated with high risk | 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 |
| CO8 | Concentration of Pollutant | A lower concentration indicates less pollution and is associated with lower risk | A higher concentration indicates more pollution and is associated with higher risk | Very Low |
| Commuters withinCounty | Number of resident workers who commute within county | A higher value is associated is low risk | A lower commute time is assocatied with a health local economy. A lower value is associated with high risk | Very High |

(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 associated with a healthy local economy. A higher value 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 infrastructure. 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 Low |
| 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 indicates a high disaster risk | High |
| 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 High |

(continued)

| Indicator | Definition | Low Risk Interpretation | High Risk Interpretation | Risk Level |
|---------------------|--|---|--|------------|
| 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 | Moderate |
| D303 Percent ln | % of stream length impaired in county, log-transfored | A Lower value is associated with low risk | It indicates pollution of water resources. A higher value is associated with high risk | 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. | Low |
| Docks | Total Docks | A higher value is associated is low risk | It indicates access to transportation infrastructure which is essential in times of disasters. A lower value is associated with high risk | High |
| 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 Low |

(continued)

| Indicator | Definition | Low Risk Interpretation | High Risk Interpretation | Risk Level |
|---------------------------------|--|---|---|------------|
| 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 |
| 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 Low |
| 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 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 disaster risks owing to functional problems, health and medication concerns. A greater percentage of older adults represents a higher risk. | Very Low |

(continued)

| Indicator | Definition | Low Risk Interpretation | High Risk Interpretation | Risk Level |
|--------------------------|--|---|--|------------|
| 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 | High |
| FemaleLaborforce percent | Percentage of Labor Force constituted by Women | A higher participation 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 participation indicates a low disaster risk | A lower participation of women in the labour force is associated with lower household incomes and poverty. Therefore a lower female workforce participation means a higher disaster risk owing to lower economic support. | Moderate |
| 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 | High |

(continued)

| Indicator | Definition | Low Risk Interpretation | High Risk Interpretation | Risk Level |
|------------------------|--|---|--|------------|
| Finance | Percentage Employed in Finance Occupations | Finance, real estate, etc. jobs are positively correlated with high incomes, job security and high economic resilience during disasters. Therefore a greater employment in such 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 Low |
| 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 Low |
| 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 Low |
| Freight railroad miles | Route miles of freight railroad | A higher value is associated is low risk | It indicates access to transportation infrastructure which is essential in times of disasters. A lower value is associated with high risk | Low |

(continued)

| Indicator | Definition | Low Risk Interpretation | High Risk Interpretation | Risk Level |
|----------------|--|--|---|------------|
| fungicide ln | Fungicides applied in pounds, log-transformed | A Lower value is associated with low risk | It indicates soil quality and environmental pollution. During disasters, pollutants from the soil can contaminate the environment. A higher value is associated with high risk | Very High |
| Gender Pay Gap | A ratio of women's median earnings to men's median earnings for all full-time, year-round workers, presented as "cents on the dollar." | A Lower value is associated with low risk | Gender inequality determines a society's ability to develop economically and equitably. A higher value is associated with high risk | High |
| GINI Index | GINI Index for Inequality Determination | A lower GINI Index depicts lesser inequality in the industry and is associated with low risk | A higher inequality represents differential distribution of resources, greater poverty and lack of accessibility. A higher GINI Index is associated with high risk. | Low |
| GroupQuarters | Percentage of GroupQuarters as part of Total Housing Stock | A lower concentration of group quarters 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 | Very High |

(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 with low risk | Availability of health care businesses indicate access to medical resources during disasters. A lower value is associated with high risk | Low |
| 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 good 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 Low |
| herbicide ln | Herbicides applied in pounds, log-transformed | A Lower value is associated with low risk | It indicates soil quality and environmental pollution. During disasters, pollutants from the soil can contaminate the environment. A higher value is associated with high risk | Low |
| Homewownership | Percentage 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 Low |
| 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 | Very Low |

(continued)

| Indicator | Definition | Low Risk Interpretation | High Risk Interpretation | Risk Level |
|----------------|--|--|---|------------|
| 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 information industries signals a less diverse economic base and a higher susceptibility to natural disasters. It is therefore associated with higher disaster risks | Very Low |
| 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 Low |
| insecticide ln | Insecticide applied in pounds, log-transformed | A Lower value is associated with low risk | It indicates soil quality and environmental pollution. During disasters, pollutants from the soil can contaminate the environment. A higher value is associated with high risk | High |
| Kave ln | Potassium (K) precipitation weighted mean in mg/L, log transformed | A Lower value is associated with low risk | It is a pollutant. A higher value is associated with high risk | Very High |

(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 High |
| 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 Low |
| 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 | Very Low |

(continued)

| Indicator | Definition | Low Risk Interpretation | High Risk Interpretation | Risk Level |
|------------------|--|--|---|------------|
| 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 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 High |
| 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 | High |
| Marinas | Total Marinas | A higher value is associated is low risk | It indicates access to transportation infrastructure which is essential in times of disasters. A lower value is associated with high risk | NA |
| Max temp | Maximum Temperature | A lower maximum temperature is associated with lower risk | A higher maximum temperature is associated with a higher risk | Very Low |

(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 Low |
| MBS LQ | Location Quotient of Management, 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 Low |
| 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 Low |
| MentalHealth Provider Rate | Ratio of population to mental health providers. | A higher value is associated with 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 | Low |

(continued)

| Indicator | Definition | Low Risk Interpretation | High Risk Interpretation | Risk Level |
|-------------|---|---|---|------------|
| MHHI | Median Household Income | A higher income indicates greater availability of resources to cope with disasters as well as to prevent them. Therefore it is a low risk | Low income HHs tend to locate or concentrate in areas prone to natural disasters such as floodplains, because the land is cheaper. Moreover they face resource deficiencies when a disaster strikes. A lower Median Household Income is associated with a higher disaster risk. | Very Low |
| Min temp | Minimum Temperature | A higher minimum temperature is associated with lower risk | A lower minimum temperature is associated with a 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. | Very Low |
| NewHomes | Percentage of New Homes as part of Total Housing Stock | A higher proportion of new homes indicates a greater structural resilience to natural disasters and is associated with a low risk | A lower proportion of new homes indicates the possibility of greater structural damage during disasters. It is therefore associated with a high risk | Very Low |
| NO21 | Concentration of Pollutant | A lower concentration indicates less pollution and is associated with lower risk | A higher concentration indicates more pollution and is associated with higher risk | Very High |
| NO2AM | Concentration of Pollutant | A lower concentration indicates less pollution and is associated with lower risk | A higher concentration indicates more pollution and is associated with higher risk | Very Low |

(continued)

| Indicator | Definition | Low Risk Interpretation | High Risk Interpretation | Risk Level |
|--------------------|---|---|--|------------|
| NO3Ave.x | Nitrate (NO3) precipitation weighted mean in mg/L, log transformed | A Lower value is associated with low risk | It is a pollutant. A higher value is associated with high risk | Very High |
| NonWhite Percent | Percentage of Non-White Population** Minority 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. | High |
| 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. | Low |
| O3 | Concentration of Pollutant | A lower concentration indicates less pollution and is associated with lower risk | A higher concentration indicates more pollution and is associated with higher risk | Very High |

(continued)

| Indicator | Definition | Low Risk Interpretation | High Risk Interpretation | Risk Level |
|----------------------|---|---|--|------------|
| 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 Low |
| 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. | Very Low |
| Other county workers | Number of workers from other counties who commute to work in the county | A Lower value is associated with low risk | A smaller commute time is associated with a healthy local economy. A higher value is associated with high risk | Very High |
| 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 Low |
| 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 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 overcrowded 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. | High |
| Passenger railroad miles | Route miles of passenger railroad and rail transit | A higher value is associated with low risk | It indicates access to transportation infrastructure which is essential in times of disasters. A lower value is associated with high risk | Very Low |
| Pb3 | Concentration of Pollutant | A lower concentration indicates less pollution and is associated with lower risk | A higher concentration indicates more pollution and is associated with higher risk | Very Low |
| pct au ln | Animal Units, animal units per county acres , log-transformed | A Lower value is associated with low risk | It indicates soil quality and environmental pollution. During disasters, pollutants from the soil can contaminate the environment. A higher value is associated with high risk | Low |

(continued)

| Indicator | Definition | Low Risk Interpretation | High Risk Interpretation | Risk Level |
|------------------------|--|--|--|------------|
| pct disease acres ln | Chemicals used to control Diseases in crops and orchards, acres applied per county acres , log-transformed | A Lower value is associated with low risk | It indicates soil quality and environmental pollution. During disasters, pollutants from the soil can contaminate the environment. A higher value is associated with high risk | High |
| pct harvested acres ln | Harvested acres, acres harvested per county acres , log-transformed | A Lower value is associated with low risk | It indicates soil quality and environmental pollution. During disasters, pollutants from the soil can contaminate the environment. A higher value is associated with high risk | Low |
| PCT IRRIGATED ACRES ln | Irrigated acres, acres irrigated per county acres, log-transformed | A higher value is associated is low risk | A lower value is associated with high risk, since poor irrigation can lead to agricultural failure | Very Low |
| pct manure acres ln | Manure, acres applied per county acres , log-transformed | A Lower value is associated with low risk | It indicates soil quality and environmental pollution. During disasters, pollutants from the soil can contaminate the environment. A higher value is associated with high risk | Very High |
| Per PSWithSW.x | Percent of Public Supply Population which is on Surface Water | A Lower value is associated with high risk | It indicates access to water resources. A higher value is associated with low risk | High |

(continued)

| Indicator | Definition | Low Risk Interpretation | High Risk Interpretation | Risk Level |
|--------------------------------------|---|--|--|------------|
| Per TotPopSS.x | Percent of Population on Self Supply | A Lower value is associated with high risk | It indicates access to water resources. A higher value is associated with low risk | High |
| Percent Medium-FairCondition Bridges | % of Medium to Fair Condition Bridges | A higher value is associated is low risk | It indicates access to transportation infrastructure which is essential in times of disasters. A lower value is associated with high risk | High |
| Percent AssistanceNeed | Percentage of Population with Assisstance Need | A lower percentage of people with food 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. | High |
| 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 therefore lower incomes and social mobility. Therefore it is interpreted as a high risk factor | Very Low |
| Percent Children in Poverty | Percentage of people under age 18 in poverty. | A Lower value is associated with low risk | Children living in poverty indicate inadquate resources available for growth, education and development. A higher value is associated with high risk | Very Low |

(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 | High |
| Percent commuters by transit | Percent of resident workers who commute by transit | A Lower value is associated with low risk | A lower commute time is associated with a healthy local economy. A higher value is associated with high risk | Very High |
| 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, unemployment and crime. A higher value is associated with high risk | High |
| Percent Exercise Access | Percentage of population with adequate access to locations for physical activity. | A higher value is associated with low risk | Lower physical exercise increases health risks with age. A lower value is associated with high risk | Very Low |

(continued)

| Indicator | Definition | Low Risk Interpretation | High Risk Interpretation | Risk Level |
|--|---|---|--|------------|
| 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 | Low |
| Percent Housing Problems | Percentage of households with at least 1 of 4 housing problems: overcrowding, high housing costs, lack of kitchen facilities, or lack of plumbing facilities. | A Lower value is associated with low risk | Unavailability of housing infrastructure adversely affects residents' health. A higher value is associated with high risk | High |
| Percent income required for childcare expenses | Childcare costs for a household with two children as a percent of median household income | A Lower value is associated with low risk | A high burden of childcare costs indicates that a family may not be able to provide for its other necessary expenditures. A higher value is associated with high risk | Moderate |
| Percent Language Barrier | 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 High |

(continued)

| Indicator | Definition | Low Risk Interpretation | High Risk Interpretation | Risk Level |
|---|---|--|--|------------|
| 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 | 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 |
| Percent PoorCondition Bridges | % of Poor Condition Bridges | A Lower value is associated with low risk | It indicates access to quality transportation infrastructure which is essential in times of disasters. 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 geographically isolated. A higher value is associated with high risk | Low |
| 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 Low |

(continued)

| Indicator | Definition | Low Risk Interpretation | High Risk Interpretation | Risk Level |
|---------------------------|---|--|---|------------|
| 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 Low |
| Percent work at home | Resident workers who work at home | A higher value is associated is low risk | A lower commute time is associated with a healthy local economy. A lower value is associated with high risk | Very Low |
| Physically Unhealthy Days | 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 Low |
| PM10 | Concentration of Pollutant | A lower concentration indicates less pollution and is associated with lower risk | A higher concentration indicates more pollution and is associated with higher risk | Very Low |
| PM2.5 | Concentration of Pollutant | A lower concentration indicates less pollution and is associated with lower risk | A higher concentration indicates more pollution and is associated with higher risk | Very High |
| PM2Point5 | Concentration of Pollutant | A lower concentration indicates less pollution and is associated with lower risk | A higher concentration indicates more pollution and is associated with higher risk | Very High |
| 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 High |

(continued)

| Indicator | Definition | Low Risk Interpretation | High Risk Interpretation | Risk Level |
|-----------------------------|--|---|---|------------|
| 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 |
| Precipitation | Precipitation | A lower precipitation is associated with a lower risk | A higher precipitation is associated with higher risk | Very Low |
| PrimaryCare Physicians Rate | 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 | Low |
| 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 workforce and is hence a high risk. | Very Low |
| PT | Percentage Employed in Production and Transportation 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 availability of local natural resources and are therefore more susceptible to natural disasters. A higher employment in such industries signals greater disaster risk. | Very High |

(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 industry indicates a low risk | A higher LQ for the Production and Transportation Industry indicates a high risk | Very Low |
| Radon.x | Radon zone, ordinal value | A Lower value is associated with low risk | It indicates environmental quality and stability. A higher value is associated with high risk | Very High |
| Recent Immigrants Percent | Percentage of Recent Immigrant Individuals | A lower percentage of immigrants represents a lower disaster risk owing to more equitable access to local and regional resources within the community and lack of communication barriers | A higher percentage of immigrants represents a greater disaster risk owing to their immigration status, lack of English proficiency and lack of direct access to resources in comparison with native citizens | 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 heightened economic instability during disasters. A higher value is associated with high risk | Moderate |
| 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 | Moderate |

(continued)

| Indicator | Definition | Low Risk Interpretation | High Risk Interpretation | Risk Level |
|--------------------------|--|--|---|------------|
| 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 | 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 | 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 Low |
| Renters Cost IncomeRatio | 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 Low |

(continued)

| Indicator | Definition | Low Risk Interpretation | High Risk Interpretation | Risk Level |
|------------------|---|---|---|------------|
| Resident Workers | Number of resident workers | A higher value is associated is low risk | Greater number of workers represent greater economic participation. A lower value is associated with high risk | Very 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 Low |
| 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 | Low |
| 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 Low |
| 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 Low |

(continued)

| Indicator | Definition | Low Risk Interpretation | High Risk Interpretation | Risk Level |
|----------------------|---|---|--|------------|
| Segregation Index | Index of dissimilarity where higher values indicate greater residential segregation between non-white and white county residents. | A Lower value is associated with low risk | Dissimilarity or segregation indicates social inequality and differential access to resources. A higher value is associated with high risk | Moderate |
| 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 Low |
| 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 |
| 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 proportion of single parent households represents a higher disaster risk | Low |

(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 Low |
| SO4Ave ln | Sulfate (SO4) precipitation weighted mean in mg/L, log transformed | A Lower value is associated with low risk | It is a pollutant. A higher value is associated with high risk | Low |
| Social Association Rate | 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 | Very High |
| std coal prim pop ln | Primarily coal mines, mines per county population, as proportion | A Lower value is associated with low risk | It indicates mining activities and environmental stability. A higher value is associated with high risk | Low |
| std metal prim pop ln | Primarily metal mines, mines per county population, as proportion | A Lower value is associated with low risk | It indicates mining activities and environmental stability. A higher value is associated with high risk | High |
| std nonmetal prim pop ln | Primarily nonmetal mines, mines per county population, as proportion | A Lower value is associated with low risk | It indicates mining activities and environmental stability. A higher value is associated with high risk | Moderate |

(continued)

| Indicator | Definition | Low Risk Interpretation | High Risk Interpretation | Risk Level |
|-------------------------------|---|--|--|------------|
| std sandandgravel prim pop ln | Primarily sand and gravel mines, mines per county population, as proportion | A Lower value is associated with low risk | It indicates mining activities and environmental stability. A higher value is associated with high risk | High |
| std stone prim pop ln | Primarily stone mines, mines per county population, as proportion | A Lower value is associated with low risk | It indicates mining activities and environmental stability. 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 High |
| 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 Low |
| 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 | 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 | High |

(continued)

| Indicator | Definition | Low Risk Interpretation | High Risk Interpretation | Risk Level |
|-----------------------------|--|---|--|------------|
| Units SingleFamily | Percentage of Single Family Units | A lower proportion 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 High |
| Unstable Employment Percent | Percentage Population with Unstable Employment | A lower proportion of workers with unstable employment indicates greater economic stability and resilience, higher incomes and greater access to disaster recovery resources. It is therefore a low risk | Unstable employment is correlated with lower incomes, health problems, negative familial effects and other challenges lowering economic resilience post disaster. A greater proportion of workers with unstable employment indicates a higher risk | High |
| 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 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 heightened economic instability during disasters. A higher 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 | Low |
| W As ln | Arsenic in mg/L, log transformed | A Lower value is associated with low risk | It is a pollutant. A higher value is associated with high risk | Very High |
| W Ba ln | Barium in mg/L, log transformed | A Lower value is associated with low risk | It is a pollutant. A higher value is associated with high risk | Very High |
| W Cd ln | Cadmium in mg/L, log transformed | A Lower value is associated with low risk | It is a pollutant. A higher value is associated with high risk | High |
| W CN ln | Cyanide in mg/L, log transformed | A Lower value is associated with low risk | It is a pollutant. A higher value is associated with high risk | Very High |
| W Cr ln | Chromium (total) in mg/L, log transformed | A Lower value is associated with low risk | It is a pollutant. A higher value is associated with high risk | Moderate |
| W FL ln | Fluoride in mg/L, log transformed | A Lower value is associated with low risk | It is a pollutant. A higher value is associated with high risk | Moderate |
| W HG ln | Mercury (inorganic) in mg/L, log transformed | A Lower value is associated with low risk | It is a pollutant. A higher value is associated with high risk | High |
| W NO2 ln | Nitrite (as N) in mg/L, log transformed | A Lower value is associated with low risk | It is a pollutant. A higher value is associated with high risk | High |
| W NO3 ln | Nitrate (as N) in mg/L, log transformed | A Lower value is associated with low risk | It is a pollutant. A higher value is associated with high risk | Moderate |

(continued)

| Indicator | Definition | Low Risk Interpretation | High Risk Interpretation | Risk Level |
|---------------------------|--|---|---|------------|
| Walkability Score | Walkability score (ordinal) | A higher value is associated with low risk | High walkability scores indicate greater community vitality and economic accessibility. A lower value is associated with high risk | Very Low |
| 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 High |
| Wholesale LQ | Location Quotient of Wholesale Trade Occupations | A lower LQ in wholesale industries is associated with low risk | A higher LQ is associated with high risk | High |
| Workers to Other Counties | Number of resident workers who commute to work in other counties | A Lower value is associated with low risk | A lower commute time is associated with a healthy local economy. A higher value is associated with high risk | Very High |
| Working Nonworking ratio | Ratio of Working to Non-working Population | A high ratio indicates lower risk | This ratio indicates 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. | Moderate |

(continued)

| Indicator | Definition | Low Risk Interpretation | High Risk Interpretation | Risk Level |
|--------------------|--|---|---|------------|
| 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 proportion 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 | High |
| 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 | Very High |

Appendix B

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

| Indicator | Risk Level (Rural) | Risk Level (Urban) | Risk Level (Places) |
|---------------------------------|--------------------|--------------------|---------------------|
| Agri | Very Low | Moderate | Very Low |
| Agri LQ | Very Low | Very High | Very Low |
| Agro Percent | Very Low | Moderate | Very Low |
| Airports | Moderate | High | Moderate |
| ALLNPDESperKM ln | Very High | Moderate | Very High |
| Arts | Very High | Moderate | Very High |
| Arts LQ | High | High | Moderate |
| Avg HHsize | Very High | Very High | Very High |
| Avg Temp | Very High | Very High | Very High |
| Bridges | Moderate | Low | Moderate |
| Business establishments | Very Low | Low | Very Low |
| CaAve ln | High | Very High | High |
| Civic related business rate | Very High | Very High | Very High |
| CO8 | Low | Moderate | Low |
| Commuters withinCounty | Very High | Very High | Very High |
| CommuteTime | Very High | High | Very High |
| construction | Very Low | Moderate | Very Low |
| construction LQ | High | Low | High |
| Cost IncomeRatio | Low | Moderate | Very High |
| COVID-19 death rate | Moderate | Moderate | Moderate |
| D303 Percent ln | Very High | High | Very High |
| Disabled Percent | Moderate | Low | Low |
| Docks | Moderate | High | Moderate |
| Edu | Very Low | Very High | Low |
| Edu LQ | Very High | Moderate | Low |
| Educated percent | Very Low | Low | Low |
| Education related business rate | Very High | High | Very High |
| Elderly growth percent | Low | Moderate | Low |
| FemaleHeaded HHs Percent | High | High | High |
| FemaleLaborforce percent | Low | Very Low | Low |

(continued)

| Indicator | Risk Level (Rural) | Risk Level (Urban) | Risk Level (Places) |
|----------------------------------|--------------------|--------------------|---------------------|
| Females Percent | Moderate | Very High | High |
| Finance | Very Low | Very Low | Very Low |
| Finance LQ | Low | Very Low | Moderate |
| Food Environment Index | Very Low | Low | Very Low |
| Freight railroad miles | Low | High | Low |
| fungicide ln | Very High | Moderate | Very High |
| Gender Pay Gap | High | Moderate | High |
| GINI Index | Very Low | Very Low | Very Low |
| GroupQuarters | Low | Low | Low |
| Healthcare related business rate | Low | Low | Low |
| HelperPool | Moderate | Moderate | Moderate |
| herbicide ln | Low | High | Low |
| Homewownership | Very Low | High | Very Low |
| Inadequate Facilities | Very Low | Moderate | Very Low |
| Info | Low | Very Low | Very Low |
| Info LQ | Moderate | Very Low | Low |
| insecticide ln | High | Low | High |
| Kave ln | Very High | High | Very High |
| LargeFam Percent | Very High | Very Low | Very High |
| LowIncome Percent | Very Low | Very Low | Very Low |
| Management | Very Low | Moderate | Very Low |
| Management LQ | High | Moderate | High |
| Manufacturing | Very High | Moderate | Very High |
| Manufacturing LQ | High | Very High | Low |
| Max Temp | Very High | Very High | Very High |
| MBS | Very Low | Low | Very Low |
| MBS LQ | Low | Moderate | Low |
| MedianHomeValue | Very Low | Very High | Very Low |
| MentalHealth Provider Rate | Low | Low | Low |
| MHHI | Very Low | Moderate | Very Low |
| Min Temp | Very High | Very High | Very High |

(continued)

| Indicator | Risk Level (Rural) | Risk Level (Urban) | Risk Level (Places) |
|-------------------------------------|--------------------|--------------------|---------------------|
| MobileHomes | Very Low | Moderate | Very Low |
| NewHomes | Very Low | Very High | Very Low |
| NO21 | Moderate | Very Low | Moderate |
| NO2AM | Low | Moderate | Low |
| NO3Ave.x | Very High | Low | Very High |
| NonWhite Percent | High | Low | High |
| NotMarried Percent | Low | Low | Very Low |
| NoVehicle Pop | Moderate | Moderate | High |
| O3 | Very High | Moderate | Very High |
| Old percent | Very Low | Low | Very Low |
| OldHomes | Very Low | High | Very Low |
| Other county workers | Very High | Very High | Very High |
| Others | Moderate | High | Low |
| Others LQ | Very High | Very High | High |
| Overcrowding | Very High | Low | Moderate |
| Passenger railroad miles | Very Low | Very High | Very Low |
| Pb3 | Low | Moderate | Low |
| pct au ln | Low | High | Low |
| pct disease acres ln | High | Low | High |
| pct harvested acres ln | Low | Low | Low |
| PCT IRRIGATED ACRES ln | Very Low | Very Low | Very Low |
| pct manure acres ln | Very High | High | Very High |
| Per PSWithSW.x | High | Low | High |
| Per TotPopSS.x | High | Very Low | High |
| Percent MediumFairCondition Bridges | High | Low | High |
| Percent AssistanceNeed | Very High | Moderate | Low |
| Percent BachelorsDegree | Very Low | Very Low | Very Low |
| Percent BroadbandAccess | Very Low | Moderate | Very Low |
| Percent Children in Poverty | Very Low | High | Very Low |
| Percent Commuters | Low | High | Low |
| Percent commuters by transit | Very High | Very High | Very High |
| Percent Disconnected Youth | High | Moderate | High |

(continued)

| Indicator | Risk Level (Rural) | Risk Level (Urban) | Risk Level (Places) |
|--|--------------------|--------------------|---------------------|
| Percent Exercise Access | Very Low | High | Very Low |
| Percent Food Insecure | Low | High | Low |
| Percent HousingProblems | High | Moderate | High |
| Percent income required for childcare expenses | Moderate | Very High | Moderate |
| Percent LanguageBarrier | Very High | Moderate | Very High |
| Percent Limited Access to Healthy Foods | High | High | High |
| Percent NoHealthIns | High | Very Low | Low |
| Percent PoorCondition Bridges | High | Very High | High |
| Percent rural | Low | Very High | Low |
| Percent Section8 | Very Low | Very High | Very Low |
| Percent Vaccinated | Very Low | Very High | Very Low |
| Percent work at home | Very Low | Low | Very Low |
| Physically Unhealthy Days | Very Low | High | Very Low |
| PM10 | Low | High | Low |
| PM2.5 | Very High | High | Very High |
| PM2Point5 | Very High | Low | Very High |
| Population | Very High | NA | NA |
| poverty | Very High | High | Very High |
| Precipitation | Very Low | Moderate | Very Low |
| PrimaryCare Physicians Rate | Low | Moderate | Low |
| PrimeWorkingAge percent | Very Low | Low | Low |
| PT | High | Moderate | High |
| PT LQ | Low | Moderate | Very Low |
| Radon.x | High | High | High |
| Recent Immigrants Percent | Low | High | Low |
| Recreation related business rate | Moderate | Moderate | Moderate |
| Rental CostBurden below | High | Very Low | NA |
| Rental CostBurden below20000 | NA | NA | Very Low |
| Rental Overcrowding | Low | Moderate | Low |
| Rented | High | Very Low | Very Low |

(continued)

| Indicator | Risk Level (Rural) | Risk Level (Urban) | Risk Level (Places) |
|-------------------------------|--------------------|--------------------|---------------------|
| Renter MHHI | Very Low | Very Low | Very High |
| Renters Cost IncomeRatio | Low | Very Low | Very Low |
| Resident Workers | Very Low | High | Very Low |
| Retail | Very Low | Moderate | Very Low |
| Retail LQ | Low | Moderate | Moderate |
| Sales | Very Low | Moderate | Very Low |
| Sales LQ | Very Low | Low | High |
| Segregation Index | Moderate | Very High | Moderate |
| Service | Very Low | Moderate | Low |
| Service LQ | Moderate | Very Low | Very High |
| SingleParent Percent | Very Low | Very High | Very Low |
| Skilled Percent | Very Low | Moderate | Very Low |
| SO21 | Moderate | Very Low | Moderate |
| SO4Ave ln | Low | High | Low |
| Social Association Rate | Very High | Very High | Very High |
| std coal prim pop ln | Low | Moderate | Low |
| std metal prim pop ln | Low | Low | Low |
| std nonmetal prim pop ln | Low | Very High | Low |
| std sandandgravel prim pop ln | High | Very Low | High |
| std stone prim pop ln | Very Low | High | Very Low |
| Total | Very High | Very High | High |
| Transport | Low | High | Low |
| Transport LQ | Very High | Very Low | Very High |
| Unemployment percent | Moderate | Moderate | High |
| Units SingleFamily | Very High | Low | Very High |
| UnstableEmployment Percent | Moderate | Low | Low |
| Vacancy | Very Low | Very High | Very Low |
| Vice related business rate | Low | Very Low | Low |
| Violent Crime Rate | Low | Very Low | Low |
| W As ln | Very High | Very High | Very High |
| W Ba ln | Very High | High | Very High |
| W Cd ln | High | Low | High |

(continued)

| Indicator | Risk Level (Rural) | Risk Level (Urban) | Risk Level (Places) |
|---------------------------|--------------------|--------------------|---------------------|
| W CN ln | Very High | Moderate | Very High |
| W Cr ln | Moderate | Very High | Moderate |
| W FL ln | Moderate | Moderate | Moderate |
| W HG ln | Low | High | Low |
| W NO2 ln | High | High | High |
| W NO3 ln | Moderate | High | Moderate |
| Walkability Score | Very Low | High | Very Low |
| Wholesale | Very High | Very High | Very High |
| Wholesale LQ | High | Very High | High |
| Workers to Other Counties | Very High | High | Very High |
| Working Nonworking ratio | Moderate | Moderate | Moderate |
| WorkNearby percent | High | Very Low | Low |
| Young percent | High | High | Moderate |