DEFINING **VULNERABLE COMMUNITIES** IN THE CONTEXT OF **CLIMATE ADAPTATION**

A resource guide developed through the Integrated Climate Adaptation and Resiliency Program (ICARP), with guidance from the ICARP Technical Advisory Council

GOVERNOR'S OFFICE OF PLANNING AND RESEARCH

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This resource guide includes information on publicly-available tools and resources that may be used to define vulnerable communities in an adaptation context. This information is provided to public agencies and the public in general as materials that may be helpful. This information should not be construed as OPR providing any legal advice. Users of this information can access and use any of this information at their sole discretion. This resource guide was developed with input from the Integrated Climate Adaptation and Resiliency Program's Technical Advisory Council, which provides guidance to OPR and does not have any regulatory authority or mandate, as established through Senate Bill 246 (2015, Wieckowski).

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EXECUTIVE SUMMARY

The Integrated Climate Adaptation and Resiliency Program (ICARP) was established by Senate Bill 246. Through its activities, the Program aims to develop holistic strategies to coordinate climate activities at the state, regional, and local levels. One of the Program's main components is the Technical Advisory Council (TAC), which brings together state and local government, non-profit and private sector practitioners, scientists, and community leaders to help coordinate activities that better prepare California for the impacts of a changing climate.

In 2017, the ICARP Technical Advisory Council developed a vision statement that expresses the characteristics of a resilient California, as well as principles that guide how adaptation actions should be implemented to achieve this vision. The Council adopted the Vision and Principles at the September 2017 meeting with the condition that the Council define "vulnerable communities", a term that is referenced throughout the Vision and Principles. Following a series of workgroup meetings, the TAC adopted a definition at the April 2018 Council Meeting.

While the Council's definition of "vulnerable communities" provides clarity on the underlying factors of community vulnerability, and how these are exacerbated by climate impacts, a definition alone may not provide the level of detail needed to take actionable steps within the context of climate adaptation plans and implementation actions.

The California Governor's Office of Planning and Research, with input from the ICARP Technical Advisory Council, developed this resource guide as a starting point for practitioners to use when first considering how to define vulnerable communities in an adaptation context.

The document includes:

- The ICARP Technical Advisory Council's definition of climate-vulnerable communities
- A summary of existing statewide assessment tools that can be used to identify vulnerable communities in a climate adaptation context, including a crosswalk with the indicators that are required elements of an SB 1000 analysis
- Additional indicators that could be used to assess underlying vulnerability on a case-by-case basis
- A list of process guides that can serve to aid agencies undertaking efforts to define vulnerable communities

ADAPTATION VISION & PRINCIPLES

VISION

Adopted by the ICARP Technical Advisory Council

"All Californians thrive in the face of a changing climate. Leading with innovation, California meets the challenge of climate change by taking bold actions to protect our economy, our quality of life, and all people. The state's most vulnerable communities are prioritized in these actions. Working across all levels of government, the state is prepared for both gradual changes and extreme events. Climate change adaptation and mitigation is standard practice in government and business throughout the state. California meets these goals with urgency, while achieving the following long-term outcomes:

- All people and communities respond to changing average conditions, shocks, and stresses in a manner that minimizes risks to public health, safety, and economic disruption and maximizes equity and protection of the most vulnerable.
- Natural systems adjust and maintain functioning ecosystems in the face of change.
- Infrastructure and built systems withstand changing conditions and shocks, including changes in climate, while continuing to provide essential services."

PRINCIPLES

1. Prioritize integrated climate actions, those that both reduce greenhouse gas emissions and build resilience to climate impacts, as well as actions that provide multiple benefits.
2. Prioritize actions that promote equity, foster community resilience, and protect the most vulnerable. Explicitly include communities that are disproportionately vulnerable to climate impacts.
3. Prioritize natural and green infrastructure solutions to enhance and protect natural resources, as well as urban environments. Preserve and restore ecological systems (or engineered systems that use ecological processes) that enhance natural system functions, services, and quality and that reduce risk, including but not limited to actions that improve water and food security, habitat for fish and wildlife, coastal resources, human health, recreation and jobs.
4. Avoid maladaptation by making decisions that do not worsen the situation or transfer the challenge from one area, sector, or social group to another. Identify and take all opportunities to prepare for climate change in all planning and investment decisions.
5. Base all planning, policy, and investment decisions on the best-available science, including local and traditional knowledge, including consideration of future climate conditions out to 2050 and 2100, and beyond.
6. Employ adaptive and flexible governance approaches by utilizing collaborative partnership across scales and between sectors to accelerate effective problem solving. Promote mitigation and adaptation actions at the regional and landscape scales.
7. Take immediate actions to reduce present and near future (within 20 years) climate change risks for all Californians; do so while also thinking in the long term and responding to continual changes in climate, ecology, and economics using adaptive management that incorporates regular monitoring.

DEFINING VULNERABLE COMMUNITIES

> Climate vulnerability describes the degree to which natural, built, and human systems are at risk of exposure to climate change impacts...

The following definition was developed by the ICARP Technical Advisory Council (TAC) and is meant to provide a clear understanding of the multiple components that characterize vulnerable communities in an adaptation context. This definition draws upon the work of the International Panel on Climate Change[1] and the California Climate Justice Working Group[2].

1. IPCC, 2014
2. Climate Justice Working Group, 20173

ICARP TECHNICAL ADVISORY COUNCIL'S ADOPTED **DEFINITION**

Climate vulnerability describes the degree to which natural, built, and human systems are at risk of exposure to climate change impacts. Vulnerable communities experience heightened risk and increased sensitivity[3] to climate change and have less capacity[4] and fewer resources to cope with, adapt to, or recover from climate impacts. These disproportionate effects are caused by physical (built and environmental), social, political, and/or economic factor(s), which are exacerbated by climate impacts. These factors[5] include, but are not limited to, race, class, sexual orientation and identification, national origin, and income inequality.

3. IPCC, 2014
4. Ibid
5. Governor's Office of Planning and Research, 2017

RELATIONSHIP TO LOCAL PLANNING REQUIREMENTS

While the definition above provides clarity on the factors that should be assessed when defining vulnerable communities in an adaptation context, it can be tailored to address the needs of different types of projects, scales, and communities. For example, this definition could be incorporated into a diverse suite of local planning activities, including informing the development of a vulnerability assessment for a General Plan update. It should be noted, however, the use or application of this definition and the resources referenced throughout this guide, is not mandated and should not be considered formal legal guidance (see OPR's General Plan Guidelines for the most recent guidance).While use of this definition is not mandated, Section 2 of this guide (Climate Vulnerability Assessment Tools) identifies areas of overlap with local general plan requirements. For example, a number of the indicators presented in Section 2 (Table 1, p 8) can help to identify communities that are both vulnerable to climate impacts (consistent with SB 379 requirements, Government Code Section 65302(g)), as well as identifying Environmental Justice communities (as required by SB 1000, Government Code Section 65302(h)). Because local jurisdictions are faced with implementing multiple, often overlapping planning requirements, this resource guide identifies areas where existing resources and tools can be used to meet multiple requirements. Section 2 is merely meant to be a useful tool for public agencies and the public to use at their discretion.

CLIMATE VULNERABILITY ASSESSMENT TOOLS

Understanding the components of vulnerability, as described in the above definition, is a useful first step, however making this definition actionable (i.e. identifying and assessing vulnerable communities) requires a diverse suite of indicators that address the complex relationship between the factors defined above. The following descriptions are provided to help practitioners identify publicly accessible tools that can be used to assess vulnerable communities.

As outlined in the definition above, an individual or community may be vulnerable with respect to multiple factors at once, the cumulative effects of which may contribute to heightened vulnerability[6]. To fully understand the level of vulnerability a community may experience, it is important to first consider climate risk, which includes assessing both the degree of exposure and sensitivity to climate impacts, as well as an individual or community's level of adaptive capacity. It is recommended that climate risk be assessed by using the State's climate projections data tool, Cal-Adapt, or other locally developed climate projections. Adaptive capacity can be assessed by considering the above-mentioned physical, social, and economic factors by using a number of different tools and indices (a number of publicly accessible tools are discussed below).

6 Ibid

EVALUATING CLIMATE RISK

While not an exhaustive list, the following tools and data can be used to analyze climate risk:

CAL-ADAPT

California has invested significant resources in developing climate change information for the entire state at a resolution that is useful for planning at both a statewide and regional scale. These data are called downscaled climate data. Downscaling is an analytical tool that starts with data from global climate models and then makes adjustments using statistical techniques and/or numerical models to provide projections of climate impacts at a finer scale. California has developed a set of downscaled climate data for the State using the Localized Constructed Analogs, or LOCA, statistical downscaling technique. All data are available through Cal-Adapt, an online tool that displays climate impacts in a spatial format. The platform also includes a web Application Programming Interface (API) to allow users to build their own applications. Accessible data includes annual averages, extreme heat, sea level rise, snowpack, wildfire, cooling degree days and heating degree days, downscaled climate projections, and more.

URBAN HEAT ISLAND INDEX FOR CALIFORNIA (UHII)

The Urban Heat Island Index, developed by the California Environmental Protection Agency, quantifies the extent and severity of urban heat islands for individual cities, including urban heat island interactive maps that show the urban heat island effect for each census tract in and around most urban areas throughout the state. This can also help identify and prioritize areas across the state for adaptation efforts such as urban greening and cool roofs and pavements.

INDICATORS OF CLIMATE CHANGE IN CALIFORNIA

The 2018 Indicators of Climate Change in California report, prepared by the Office of Environmental Health Hazard Assessment (OEHHA), presents 36 indicators that are grouped into four categories: Human-influenced (anthropogenic) drivers of climate change, such as greenhouse gas emissions; Changes in the state's climate; Impacts of climate change on physical systems, such as oceans, lakes and snowpack; Impacts of climate change on biological systems – humans, vegetation and wildlife. The indicators can serve as a tool for communicating technical data in relatively simple terms and help portray the interrelationships among climate and other physical and biological elements of the environment. Many of the indicators reveal evidence of the already discernible impacts of climate change, highlighting the urgency for the state, local government and others to undertake mitigation and adaptation strategies.

EVALUATING ADAPTIVE CAPACITY

While not an exhaustive list, the following tools can be used to begin analyzing adaptive capacity:

CALENVIROSCREEN (CES)

CalEnviroScreen 3.0 is a screening tool that identifies communities most affected by and vulnerable to the effects of many sources of pollution and population-based disparities. It aggregates state-wide environmental, health, and socioeconomic information to produce scores for every census tract in the state. A census tract with a high score is considered more disadvantaged than a community with a low score as a result of pollution burden and population characteristics. When overlaid with climate impact and exposure data, CalEnviroScreen can provide insight into built and environmental exposure factors that contribute to vulnerability.

CLIMATE CHANGE & HEALTH VULNERABILITY INDICATORS FOR CALIFORNIA (CCHVI)

The CalBRACE Project developed climate change and health indicator narratives and data to provide local health departments and partners with tools to better understand the people and places in their jurisdictions that are more susceptible to adverse health impacts associated with climate change, specifically extreme heat, wildfire, sea level rise, drought, and poor air quality. The assessment data can be used to screen and prioritize where to focus deeper analysis and plan for public health actions to increase resilience.

HEALTHY PLACES INDEX (HPI)

The California Healthy Places Index (HPI) is an interactive online data and GIS mapping tool that allows users to easily visualize the social and economic conditions that shape health in each neighborhood in California. HPI is validated with life expectancy and provides census tract rankings across the state. As of 2017, the Healthy Places Index platform also includes climate change indicators. This tool provides graphic overlays of climate risks, vulnerabilities and indicators of adaptive capacity, along with the healthy places index score, and other key decision support layers. HPI moves data into action by providing policy briefs outlining best practices to address risks associated with climate indicators.

REGIONAL OPPORTUNITY INDEX (ROI)

Another mapping tool to identify census tracts lacking in opportunities and needing investment is the Regional Opportunity Index (ROI) from the UC Davis Center for Regional Change. The goal of the ROI is to help target resources and policies toward people and places with the greatest need. The tool incorporates both a “people” component and a “place” component, integrating economic, infrastructure, environmental, and social indicators into a comprehensive assessment of the factors driving opportunity.

TOOL INDICATOR COMPARISON TABLE

The following table summarizes the indicators included in each of these assessment tools discussed above, organized by four categories, or factors, of vulnerability (highlighted cells identify which indicators are included in a given tool)[7]. While there are areas of overlap, each tool was designed to inform different decision-making processes and research questions, and as such, any single tool alone will not provide a comprehensive assessment of climate vulnerability. When considering use of the tools in Table 1, the following should be noted:

- While indicators may be included in multiple tools, each may use different data sources and timescales; when using multiple tools in an assessment process, users should review the metadata associated with each indicator to identify potential inconsistencies between tools.
- Table 1 does not reflect all requirements of SB 1000 (Government Code Section 65302(h)) or SB 379 (Government Code 65302(g)), therefore review of the respective sections of OPR's General Plan Guidelines is important to establish consistency with the underlying statutes.

7. These "factors" are taken from Planning and Investing for a Resilient California: A Guidebook for State Agencies developed by the Technical Advisory Group for Executive Order B-30-15. http://www.opr.ca.gov/planning/icarp/resilient-ca.html

SB 1000 CROSSWALK

The table below also provides a crosswalk between the indicators that are required components of an Environmental Justice Element of a general plan, per Senate Bill 1000 (2016, Leyva). While the other indicators are not required, some may be useful health-related indicators planners may want to consider.

Table 1: Comparison table: indicators currently available through statewide vulnerability assessment tools, organized by system factors

FACTOR	INDICATOR	CES (weighted index + map)	CCHVI (not an index)	HPI (weighted index + map)	ROI (weighted index)	SB 1000
Existing inequities, institutionalized racism, or exclusion: People facing disadvantage or discrimination often have lower socioeconomic status, which result in fewer resources for preparing, coping and recovering from climate impacts.	Educational attainment	■	■	■	■	
	Employment	■		■	■	
	Housing burdened low income households	■		■	■	■
	Income			■	■	
	Linguistic isolation	■	■		■	
	Poverty	■	■	■		
	Race and Ethnicity		■		■	
	Two parent household			■		
	U.S. Citizenship				■	
	Violent Crime Rate		■			
	Voting			■	■	
Physical states or conditions that increase vulnerability: Older adults, young children, pregnant women, and people with chronic health conditions or mental illness are more susceptible to harm from effects of climate change.	Asthma emergency department visits	■				
	Children		■			
	Cardiovascular disease					
	Elderly		■			

Table 1: Continued

FACTOR	INDICATOR	CES (weighted index + map)	CCHVI (not an index)	HPI (weighted index + map)	ROI (weighted index)	SB 1000
Poor environmental conditions, access to services, or living conditions: Populations at higher risk under a changing climate include those who are uninsured or underinsured or lack access to health care or child care, lack access to transportation, live in areas with poor air quality, live on upper floors of tall buildings, live in areas with lots of impervious surfaces and little tree cover, and lack life-supporting resources such as adequate housing, ways to cool living space, are food insecure or lack adequate medications, or are tenants or renters. Populations at higher risk also include those living in "land islands" that have limited access to resources and services due to conditions of geographic isolation.	Alcohol outlets			■		
	Air conditioning			■		
	Active commuting			■		■
	Diesel PM	■		■		■
	Groundwater threats	■				
	Housing habitability			■		■
	Hazardous waste facilities and generators	■				
	Healthcare availability				■	
	Housing crowding			■		■
	Impaired water bodies	■				
	Impervious surfaces		■			
	Ozone concentrations	■	■	■		■
	PM 2.5 concentrations	■	■	■	■	■
	Park Access			■		
	Solid waste sites/facilities	■				
	Public transit access		■			
	Toxic cleanup sites	■				
	Toxic releases from facilities	■				■
	Traffic density	■				
	Tree canopy		■	■		
	Retail Density			■		
	Supermarket Access			■	■	■
	Use of high-hazard, high-volatility pesticides	■				■
	Water Contaminants	■		■		■
Lack of investment and opportunities: The disinvestment and resource deprivation historically experienced by communities facing inequities or isolation leads to degraded living conditions and lack of power over decisions that affect their lives	Homeownership					■
	Health Insurance		■			
	Vehicle Ownership/ Access					

ADDITIONAL INDICATORS FOR CONSIDERATION

In addition to the assessment tools presented above, there are a larger number of other indicators developed by a wide range of research and guidance documents that could also be considered when analyzing and defining vulnerable communities in an adaptation context. The below list of indicators are not intended to be exhaustive, but provide examples of additional indicators that could complement existing tools and resources. Because these indicators are not incorporated into any of the tools presented in the section above, inclusion in an assessment process would require additional data collection and analysis on a case-by-case basis.

Table 2: Summary of additional vulnerability indicators for consideration

DEMOGRAPHICS	Sexual Orientation
	Homelessness
	Occupation**†
	Persons with criminal records
	Access and functional needs populations**
	H.S. Graduation Rates/College Degrees*
	Earning potential vs. job base provided*
	Population stability*
	Tribal community demographic data*
	GDP per capita †
	Gender †
	Immigrants †
HOUSING SECURITY	Homeowners or renters insurance
	Renter population**
	Average property value †
	Homes in flood plains
	Flammable roof, vegetation within 10 meters of home***
	Homes with flood-proofing
	Number, location and population of prisons
	Domestic violence shelters
	Shelters for LGBTQ youth and adults
	Value, quality, and density of residential construction**
	Short-term rental market*
MOBILITY	Evacuation routes
	"Land island" communities*
HEALTH SERVICES	Individuals with health insurance coverages
	Persons with substance abuse
	Mental health services
	Number of hospitals per capita †
	Substance abuse services
	Back up grid energy plans for hospitals*
	Domestic violence hotline
	Doctors or nurses per capita
	Emergency response partnerships with pharmacies/clinics for medication reliant individuals*
	Distance to critical service providers (isolation factor) *
	Increasing food costs††
ENVIRONMENTAL HAZARDS	Adequate/effective sewage/waste management systems
	Combined exacerbating effects of poor air quality (ozone and PM 2.5) and extreme heat*
	Smoke from wildfires (controlled and not controlled)*

Table 2: Continued

EMERGENCY SERVICES	Household knowledge level of disaster resources
	Households with disaster kits
	Household distance to nearest fire station
	Availability of hazmat certification programs
	Hazmat certified individuals
	Potential loss of key infrastructure**
	Disaster plans in place at schools, businesses, churches, etc.
BUSINESS/JOBS	Minority owned businesses
	Businesses with flood proofing\
	Businesses with insurance
	Union jobs
	High density/value commercial and industrial development**
	Amount of Full Time jobs available versus Part Time jobs year round*
	Recreation-based economies susceptible to climate impacts *
PUBLIC/PRIVATE UTILITIES	Telecommunications - availability and access (phone, cable, broadband, etc)
	Households with water/electricity shut offs in last 12 months
	Household that have never been connected to the electricity grid*
	Households reliant on well-water
	Reliance on wood based heat*
	Households & businesses with independent power generation/storage capacity*
SOCIAL SERVICES	Social services-availability
	Services for undocumented persons
	Access to childcare*
GOVERNANCE	Inclusive governance
	Policy or ordinance requiring air conditioners in all single- or multi-family homes*
	Model ordinances addressing urban heat island (cool roofs, cool pavement, etc.)*
	Policy Landscape
COMMUNITY	Neighborhood cohesion
	Financial literacy
	Civic participation †
FISCAL HEALTH	Completion of financial risk assessment*
	Potential loss of employment following a disaster**
	Access to credit ††
CULTURE	Cultural/religious ties to land/water Priority on local purchasing & economic development*

SOURCE KEY (SEE REFERENCES FOR FULL CITATIONS)

The basis for this table of indicators can be attributed to the NAACP's Equity in Building Resilience in Adaptation Planning

Additional indicators came from the following:

* Proposed by Technical Advisory Council member or State Agency partner

** Cutter, Boruff, and Shirley, 2003.

*** Cooley, Moore, and Allen, 2012.

† United Nations Development Programme, 2017.

††Bennett, et al., 2016.

PROCESS GUIDES

Identifying quantifiable measures to assess and identify vulnerable communities is a critical component of any vulnerability assessment, however the process of prioritizing which indicators to include is equally important. Each of the toolkits and checklists presented below guides users through a series of questions that can help inform an assessment process. While these resources were not designed with the specific goal of informing climate vulnerability assessment processes they may be helpful resources depending on the type adaptation effort the assessment is intending to inform.

EXECUTIVE ORDER B-30-15 EQUITY CHECKLIST

The Equity Checklist was created by the Equity and Vulnerable Communities subcommittee of the Technical Advisory Group, facilitated by the Climate Change and Health Equity Program of the California Department of Public Health and is intended to assist State agencies implement Executive Order B-301-5.[8] The checklist it is intended to assist agencies to ensure that plans and investments identify and protect the State's most vulnerable populations. This checklist can be used alongside any decision-making process to improve equitable outcomes.

GOVERNMENT ALLIANCE ON RACE (GARE) RACIAL EQUITY TOOLKIT

The Government Alliance on Race and Equity (GARE) is a national network of government working to achieve racial equity and advance opportunities for all. The Racial Equity Toolkit is designed to integrate explicit consideration of racial equity in decisions, including policies, practices, programs, and budgets. Use of a racial equity tool can help to develop strategies and actions that reduce racial inequities and improve success for all groups.

BAY LOCALIZE COMMUNITY RESILIENCE TOOLKIT

The Bay Localize Community Resilience Toolkit guides groups in leading workshops to plan for resilience in their communities while decreasing reliance on fossil fuels. It is designed for community groups that would like to get involved in making a difference in their neighborhood, city, or county. The Toolkit offers Bay Area-specific resources, but it may also be used to support development of actions across many communities in California.

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9. Executive Order B-30-15 directed State agencies to integrate climate change into all planning and investment, including accounting for current and future climate conditions in infrastructure investment. EO B-30-15 also mandates that because "climate change will disproportionately affect the state's most vulnerable people", all "State agencies' planning and investments shall…protect the state's most vulnerable populations". This was the first mandate in the United States requiring all state agencies to plan for climate change and to protect vulnerable people while doing so.

REFERENCES

Advancing Climate Justice in California: Guiding Principles and Recommendations for Policy and Funding Decisions. Prepared by the Climate Justice Working Group. August 2017. http://www.healthyworldforall.org/en/express-img/17081516-3570-img1.pdf

California Governor's Office of Planning and Research. 2017. Executive Order B-30-15 Resiliency Guidebook: Vulnerable Populations. http://www.opr.ca.gov/planning/icarp/resilient-ca.html

California Governor's Office of Planning and Research. 2017. Executive Order B-30-15 Resiliency Guidebook: Equity Checklist. http://www.opr.ca.gov/docs/20180312-Equity_Checklist.pdf

Bennett, N.J., Blythe, J., Tyler, S. et al. 2016. Communities and Change in the Anthropocene: Understanding Social-Ecological Vulnerability and Planning Adaptations to Multiple Interacting Exposures. Regional Environmental Change. 16: 907. https://doi.org/10.1007/s10113-015-0839-5

Cooley, H., E. Moore, M. Heberger, and L. Allen (Pacific Institute). 2012. Social Vulnerability to Climate Change in California. California Energy Commission. Publication Number: CEC-500-2012-013 http://www.energy.ca.gov/2012publications/CEC-500-2012-013/CEC-500-2012-013.pdf

Cutter, S. L., B. J. Boruff, and W. L. Shirley. 2003. Social Vulnerability to Environmental Hazards. Social Science Quarterly 84 (2): 242–261. http://danida.vnu.edu.vn/cpis/files/Papers_on_CC/Vulnerability/Social%20Vulnerability%20to%20Environmental%20Hazards.pdf

IPCC, 2014: Summary for policymakers. In: Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Field, C.B., V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastrandrea, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea, and L.L.White (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA. http://www.ipcc.ch/report/ar5/wg2/

IPCC, 2014. In: Climate Change 2014: Impacts, Adaptation, and Vulnerability. Annexes: Glossary. https://www.ipcc.ch/pdf/assessment-report/ar5/wg2/WGIIAR5-AnnexII_FINAL.pdf

National Association for the Advancement of Colored People's Equity in Building Resilience in Adaptation Planning http://action.naacp.org/page/-/Climate/Equity_in_Resilience_Building_Climate_Adaptation_Indicators_FINAL.pdf

United Nations Development Programme. Social Vulnerability Assessment Tools for Climate Change and DRR Programming - A Guide to Practitioners, September 2017. http://www.adaptation-undp.org/sites/default/files/resources/social_vulnerability05102017_0.pdf