MAPPING RESILIENCE

A Blueprint for Thriving in the Face of Climate Disasters

Asian Pacific Environmental Network | 2019

EXECUTIVE SUMMARY

OVERVIEW

FROM INTENSE STORMS THAT HAVE CAUSED MUDSLIDES AND FLOODING TO RECORD-BREAKING WILDFIRES AND HEAT WAVES, THE PAST SEVERAL YEARS HAVE DEMONSTRATED THE DESTRUCTIVE IMPACTS OF CLIMATE CHANGE IN REGIONS ACROSS CALIFORNIA. IN THE MOST DEVASTATING CASES, THESE DISASTERS HAVE RESULTED IN DEADLY CONSEQUENCES FOR THOSE LIVING ON THE FRONTLINES OF CLIMATE IMPACTS. We have also seen communities forced to evacuate, displaced from their homes, or left without access to critical resources. Climate change, as a threat multiplier, exacerbates existing inequalities in health, housing, land use, transportation, and economic opportunities. This means those who are most impacted are consistently communities with the least resources to respond.

Although there is mounting evidence of the unequal effects of the climate crisis, researchers and advocates agree that there are relatively few robust, well-disseminated frameworks to account for, measure, and display the multiple and interacting factors contributing to differences in climate vulnerability across populations and places. CalEnviroScreen, one of the most widely applied screening tools in California environmental policy, is an exemplary model of an indicator set, assessment framework, and visualization tool to communicate complex information for planning and decision making to address the cumulative impacts from poverty and pollution. Complementing CalEnviroScreen with information derived from a climate vulnerability assessment framework offers enormous promise to help local and state agencies make broader climate policy decisions based on comprehensive data.

In light of these research needs, this report provides a review of existing frameworks related to community vulnerability to climate impacts and identifies strengths and gaps in the field.

KEY FINDINGS

1. CLIMATE DISASTERS HAVE UNEQUAL IMPACTS.

The past several years of disasters underline the way that the climate crisis disproportionately impacts the state's most vulnerable communities. These include (but are not limited to): transit-dependent populations such as the elderly, young children, and disabled; outdoor and informal workers; low-income communities; rural communities; indigenous people; undocumented immigrants; and incarcerated populations. For example, many agricultural workers are day laborers who cannot afford to miss work, and therefore are more likely to agree to work in dangerous conditions. During the aftermath of the Thomas Fire in 2017, amidst falling ash and extremely poor air quality, farmworkers in Oxnard continued working in the fields without protective masks, experiencing symptoms like burning eyes and nosebleeds.

2. REGIONAL CHARACTERISTICS DETERMINE CLIMATE RISK.

Climate change impacts on communities vary across the state based on biophysical setting, climate, and jurisdictional factors. For example, threats from sea level rise are specific to coastal communities, including those along the Pacific Ocean like Los Angeles and along the San Francisco Bay. There are also unique population characteristics in rural areas as compared to urban areas. For example, densely populated areas tend to have a much larger number of highly vulnerable populations, but in less-populated rural areas, a larger percentage of the population is characterized by high social vulnerability.

3. EXISTING FRAMEWORKS VARY IN SCOPE AND QUALITY.

Some frameworks are specific to distinct climate impacts, while others are more comprehensive and depict interacting social, health, and environmental factors across multiple climate impacts. We provide a brief overview and assessment of more than 40 climate vulnerability frameworks across sectors and scope. Comparison of the range of the frameworks included in this review reveals key distinctions in breadth and accessibility.

According to existing literature, there are relatively few approaches that combine multiple factors into a single framework to address the intersectional nature of climate vulnerability. Based on this analysis, four statewide frameworks stand out in regard to comprehensively integrating multiple exposures, population sensitivity, and adaptive capacity. These frameworks are selected based on breadth (those that incorporate the greatest number of indicators across exposures and vulnerability factors) as well as accessibility of data (those with high-quality visualization platforms). They are:

- Public Health Alliance of Southern California's **California Healthy Places Index** (HPI);
- California Building Resilience Against Climate Effects **Climate Change and Health Vulnerability Indicators** (CalBRACE CCHVIz);
- California Energy Commission's (CEC) **Social Vulnerability to Climate Change**; and
- **Climate Change Vulnerability Screening Index** (English et al.).

Although three of these frameworks were developed by California agencies to inform planning and action around the state, they do not appear to be in broad use at this time.

Two additional frameworks stand out in depicting vulnerability to specific climate impacts, similarly selected based on statewide data availability and accessibility of data. These are:

- Four Twenty Seven's **California Heat Assessment Tool** (CHAT); and
- Climate Central's **Surging Seas Risk Zone Map**

4. FURTHER RESEARCH IS NEEDED TO ADDRESS REMAINING DATA GAPS AND CAPTURE OVERLOOKED FACTORS.

Limits in data collection imply that many relevant factors and trends underlying community vulnerability are either overlooked or reflect inaccuracies. For example, there is a wealth of data and knowledge about population sensitivity, but fewer indicators representing adaptive capacity (e.g., transportation access, public facilities, government infrastructure). Other data gaps include certain climate impacts (e.g., worsening air quality, environmental justice implications, drought vulnerability), health outcomes (e.g., infectious diseases, mental health), and socioeconomic factors (e.g., informal workers, immigration status, homelessness). Efforts to address gaps are currently being undertaken across a variety of agencies, including the Strategic Growth Council's Climate Change Research Program. Efforts to strengthen data accuracy should continue to be pursued.

5. A COMPREHENSIVE STATEWIDE INDICATOR SET, ASSESSMENT FRAMEWORK, AND PLATFORM CONNECTING SOCIAL VULNERABILITIES WITH CLIMATE IMPACTS HAS NOT YET BEEN FULLY REALIZED.

The field currently lacks shared framework(s) for understanding the unique climate risks and social vulnerabilities faced by low-income and disadvantaged communities. Moreover, there is a lack of consistency across the multitude of frameworks that aim to account for, measure, and display the multiple and interacting factors contributing to climate vulnerability. Researchers and advocates continue to recommend the development of a robust, well-disseminated climate vulnerability framework mirroring the development and application of CalEnviroScreen. Therefore, there is growing consensus around the need for an interactive mapping tool that incorporates projected climate change impacts, environmental health risks, socioeconomic data, and adaptive capacity.

KEY RECOMMENDATIONS

BASED ON THESE FINDINGS, WE OFFER KEY RECOMMENDATIONS REGARDING FUTURE NEEDS AND OPPORTUNITIES TO ADVANCE THE DEVELOPMENT AND APPLICATION OF CLIMATE VULNERABILITY FRAMEWORKS.

1. CLIMATE VULNERABILITY SHOULD BE ASSESSED AND DEPICTED BASED ON REGIONAL CHARACTERISTICS AND SPECIFIC CLIMATE THREATS.

Regional variations caution against making statewide measurements and comparisons and instead warrant a regional and climate impact-specific lens in the state's approach to understanding and addressing climate vulnerability. A regional lens also supports the application of the data since much of land use planning, as well as infrastructure development, occurs through regional or local policymaking.

2. RESEARCHERS DO NOT NEED TO DEVELOP NEW CLIMATE VULNERABILITY INDICATOR SETS.

There is a rich volume of existing frameworks to identify geographic areas and populations most impacted by climate change threats with significant redundancy of indicators used across frameworks. Moreover, there are enough underlying data, established indicators, and published methodologies that assert relevant factors contributing to vulnerability. Therefore, there is not an imminent need to create a wholly new set of indicators to conceptualize and assess climate vulnerability in California.

3. CALIFORNIA POLICYMAKERS REQUIRE A CENTRALIZED AND WELL-DISSEMINATED SET OF CLIMATE VULNERABILITY INDICATORS AND AN ACCOMPANYING VISUALIZATION PLATFORM.

Although we identify several comprehensive frameworks, there is no single set of indicators that exhaustively captures the most significant interacting factors that contribute to climate vulnerability. The density of frameworks available to inform adaptation planning is overwhelming, which results in a difficulty to discern

which set of indicators or framework is most appropriate for the given application. This may create gaps in the way the abundance of available data is effectively informing policy action. Moreover, the availability of so much data is leading to paralysis of action. Accordingly, local, regional, and state policymakers developing new policies and implementing adaptation programs would benefit immensely from a streamlined compilation of the most significant indicators into a single interface. This platform would include indicators for exposure (e.g., temperature, wildfire threat, flood risk), population sensitivity (e.g., linguistic isolation, unemployment), and adaptive capacity (e.g., vehicle access). In order to support ease of use, this interface would also automatically populate relevant indicators based on the selected climate impact. The selection of indicators should be informed by a complementary policy framework that identifies priority issues, programs, policies, and funding opportunities.

4. PUBLIC OFFICIALS SHOULD GROUND-TRUTH AND COMPLEMENT VULNERABILITY MAPS WITH COMMUNITY EXPERTISE.

Vulnerability mapping is helpful to target vulnerable areas or communities, but data limitations should caution public officials against relying on any single such framework to identify and capture all factors and trends contributing to community vulnerability. Therefore, government officials should integrate the information derived from quantitative indicators and mapping with experiential knowledge and stories from community residents through ground-truthing processes. This will ensure that the public processes involving the development and application of climate vulnerability mapping are inclusive and participatory to generate well-informed decisions.

THE *MAPPING RESILIENCE* REPORT

THERE IS A NEED TO BETTER CHARACTERIZE AND PROMOTE THE NOTION OF COMMUNITY RESIL-IENCE AS PART OF BROADER ADAPTATION STRATEGIES TOWARD A VISION THAT IS DEEPLY ROOTED IN CLIMATE JUSTICE AND EQUITY. Various sectors are already implementing climate adaptation programs, but these efforts are often siloed and focus on protecting natural resources or built infrastructure. Developed by the Asian Pacific Environmental Network (APEN), the *Mapping Resilience* report aims to raise the public visibility of the needs of frontline communities within statewide climate adaptation and resilience efforts. The full report contains the following sections:

1. Background on communities disproportionately impacted by climate change-related disasters in California and lessons learned from examples across the U.S.;

2. Key existing indicators, data, tools, and analytical frameworks for understanding the intersection of climate impacts, health and well-being outcomes, socioeconomic vulnerability, and adaptive capacity factors;

3. Major data limitations and knowledge gaps;

4. Lessons learned from development and use of indicators in related fields (e.g., public health, environmental justice, and land use); and

5. Anticipated uses of indicators to advance key fields and policies, as well as opportunities for working with other nonprofits, academic institutions, and public agencies to advance the development and effective use of useful indicators.

FULL REPORT AVAILABLE AT APEN4EJ.ORG/MAP