

PROTECTING CALIFORNIA'S VULNERABLE POPULATION FROM THE EFFECTS OF CLIMATE CHANGE

SARA S. MOORE

NATE GOTTFRIED, JOY BONAGURO, AND JOHN MINOT, EDITORS

Despite efforts to reduce current greenhouse gas emissions, past emissions will inevitably change our climate. Climate change has a disproportionate impact on communities that are geographically exposed and socioeconomically disadvantaged. This paper examines how California is planning to adapt to climate change and makes recommendations about how state planning can best consider vulnerable communities' needs. It recommends: (a) a localized rather than centralized assessment and planning approach; (b) improved feedback loops linking policymakers and vulnerable populations; and (c) direct assistance to vulnerable communities to increase their adaptive capacity.

INTRODUCTION

Despite efforts to reduce current greenhouse gas emissions, past emissions will inevitably change our climate. Climate change puts some communities more at risk than others, and extreme climate events in communities with inadequate capacity to adapt have deadly consequences, as seen with Hurricane Katrina in 2005.

Thus far, most government agencies working on climate change issues have been trying to reduce greenhouse gas emissions (mitigation planning), rather than preparing for the impacts of climate change (adaptation planning). The professional community of adaptation planners acknowledges the disproportionate impacts of climate change on some communities, but government plans differ in the degree to which they address the needs of vulnerable communities—communities with geographic exposure to climate change impacts combined with a lack of adaptive capacity.

This paper examines the climate change adaptation planning process in California and makes recommendations about how the State plan can best consider vulnerable communities' needs. The paper is based on a literature review of adaptation and equity issues, as well as 26 interviews with professionals engaged in climate change policy, environmental justice, and disaster preparedness.[1]

INEQUITY IN ADAPTATION PLANNING

When studying how to best help vulnerable communities, the question of equity arises because a solution necessarily involves redistribution of resources. Inequitable distribution of

resources increases vulnerability and this vulnerability will have social and economic consequences as climate change advances. Therefore, the State has a compelling interest in ensuring adaptation assistance for vulnerable populations, particularly the poor.

In the planning process, the state must assess the cost of adaptation and how this cost can be equitably distributed. Climate change experts have proposed various ways to fairly distribute climate change costs, but have focused almost exclusively on the cost of greenhouse gas (GHG) emissions reductions. Beyond GHG emission costs, there is an emerging literature that identifies additional costs in terms of *loss of life, geographic places, and species*. [2,3]

There are also economic and political costs to not sufficiently addressing the adaptation needs of vulnerable populations. These include compensation and other assistance sought by those displaced by climate change, as well as lawsuits challenging the disparate impacts of state policies. One such lawsuit is currently being prepared by environmental justice advocates, challenging potential negative impacts from California's new low-carbon fuel standard.

However, the need for local evaluation complicates the making of policies that fairly distribute climate change costs. There is inherent difficulty in assessing future costs from climate change or from insufficient adaptation planning. Most adaptation decisions will be made at a microeconomic level by households or private firms. There is a great deal of uncertainty about how climate change impacts will unfold. What we consider an adequate adaptation plan today could become inadequate with new information. Also, there are no accepted

metrics for assessing the effectiveness of adaptation policy. Nevertheless, one recent economic study of climate change adaptation finds shortcomings in private sector adaptation planning, indicating that the government has an important role to play.[3]

The following pervasive issues reduce California's ability to adapt to climate change:

- Relatively high level of income inequality, which has historically outpaced that of the U.S. as a whole.[4]
- Lack of political will to assess adaptive capacity and address shortcomings, as well as institutional constraints such as legislator term limits, which discourage the long-term thinking needed for adaptation planning.
- Limited financial resources at the state level.
- Economic dependency on natural resources that stand to be damaged by climate change, such as water-intensive agribusiness like beef, rice, and cotton.
- Barriers to social cohesiveness needed for local planning and action, such as demographic heterogeneity, disparities between rich and poor, dispersed population, large enclaves of non-English speakers, and lack of facilities in rural areas for public gatherings.
- Lack of adaptive infrastructure, such as water transportation and treatment facilities, means of direct financial assistance for victims of climate crisis events, and public transportation for urban populations needing to go to cooling centers.[5]

IDENTIFYING THE VULNERABLE

Before the State can plan for assisting vulnerable populations, it must have a clear definition of the vulnerable. It is difficult to assess vulnerability to climate change, especially since vulnerability is a dynamic characteristic with many interacting factors. A community's vulnerability to climate change is mainly determined by its geographic risks and adaptive capacity. This includes the community's ability to anticipate, cope with, resist, and recover from climate impacts.[6,7] Individuals not living in vulnerable communities can still be individually vulnerable to climate change if they lack the necessary capacity to cope with the local climate risk. For example, a coastal community with many poor households that is exposed to storm surges is particularly vulnerable, as is a member of a

poor household in an otherwise well-off coastal community that is exposed to storm surges.

Climate impacts on livelihood systems disproportionately affect the poor.[8] For example, climate change will cause economic shifts such as the substitution away from water-intensive crops, increased prices leading to falling demand and job loss, and the loss of entire sectors, such as recreational skiing after the snow pack disappears. These shifts will push some households into a state of vulnerability.

Any assessment of vulnerable populations must be an iterative process, taking into account climate changes, economic changes, population movement, and other factors affecting adaptive capacity. For example, California may see an influx of climate refugees as rising sea levels make the Pacific Islands less habitable and as drought drives populations north from Mexico and Central America. Such migrations will exacerbate state vulnerabilities by stressing the adaptive systems of urban centers, where new immigrants tend to settle. In addition, increasing food and water scarcity in rural areas will accelerate the existing trend of rural-urban migration.[9]

Factors increasing an individual's lack of adaptive capacity include chronic medical conditions, low socioeconomic status, old age, and living in isolated or segregated areas (especially in urban heat islands, where people may not have transportation to cooling centers).[6,10] Other factors creating vulnerability are dependence on jobs susceptible to climate change impacts, particularly agricultural jobs and subsistence fishing and farming.[11]

The California Climate Action Team (CAT) study on sea-level rise [12] identifies the need for further research on vulnerable subpopulations, "including children, elderly, homeless, physically disabled, and people with limited mobility (e.g., incarcerated residents and healthcare facility patients)."[13] One researcher who compiled information on vulnerable communities for the CAT report clarified the research team's choice of the above categories for further study:

We named those subpopulations [...] using common sense and anecdotal knowledge of events like [Hurricane] Katrina. [...] One first step of such research would be to look at the literature on vulnerabilities to see what groups have been documented as having unique vulnerabilities. [...] From my view the burden of proof should be on finding that the group is not vulnerable, so that we don't assume safety when actually there is just a lack of research.[15]

The CAT report on environmental health affirms that vulnerable communities will see significant health and economic consequences of climate change, and "without proactive policies..., climate change will likely reinforce and amplify current as well as future socioeconomic disparities in

Table 1: Policy Approaches by Benefit to Vulnerable Populations

When the policy action is to...	These approaches produce...	
	...limited benefits	...more benefits
Manage risk	Compensate for losses	Prevent or reduce risk through monitoring and early warning systems ^a (a, b)
Define vulnerable populations, create adaptation plans	State agencies are responsible (exclusively or primarily)	A state-local interagency collaboration, supported by state funds, is responsible (a, b)
Invest in adaptation measures	Focus on technology, investments, capital projects	Focus on livelihood diversification, land reforms, public education (c, a)
Insure against shocks	Insure behaviors that may be maladaptive, e.g., coverage for crops that will not be supported by the land after predicted climate changes	Insure risks that are geographically widespread and cannot be easily eliminated or reduced, e.g., drought insurance based on reduced regional rainfall (a)
Prioritize outcomes	Focus on reducing harm to vulnerable populations (exclusively or primarily)	Focus on reducing harm to vulnerable populations <i>and</i> address the conditions contributing to vulnerability (a)
Measure fairness	Measure outcome fairness, focusing on net loss after climate change impacts (b)	Measure procedural fairness, focusing on institutional factors that limit adaptive capacity and contribute to vulnerability (b)
Reduce climate impact	Focus on business sectors, e.g., agribusiness	Focus on both business and livelihood sectors, e.g., agribusiness and outdoor labor (b)
Evaluate climate impact	Assess long-term impacts	Assess immediate or near-term impacts that increase long-term vulnerability (b)

the impacts of climate change and the abilities of different groups to adapt to it.”[6]

POLICY CHOICES FAVORABLE TO THE VULNERABLE

Addressing the inequitable distribution of adaptive capacity requires climate adaptation policy that takes equity concerns explicitly into account. The following table portrays a number of common actions within climate adaptation policy, and identifies ways to make these actions more beneficial to vulnerable populations. These options are not mutually exclusive, have different levels of benefits and feasibility, and all carry trade-offs. While each of the options listed can benefit vulnerable populations, options in the right column are designed more explicitly to avoid harm, reduce risks and vulnerability, and support individual and community rights and well-being. The principles in this table should be used to assess

California’s current adaptation policy and to plan for the design of future policy.

Expert Advice on Creating Policy Favorable to the Vulnerable

Having found only a limited literature on addressing equity and vulnerability in climate change adaptation planning, the author interviewed public and private-sector experts on climate change and state planning, as well as grassroots advocates for vulnerable communities.[14] The interviews were structured around seven main issues: overarching adaptation concerns; the unit of analysis for adaptation planning; comparable international cases; public education ideals; public participation ideals; and the lessons learned from California’s existing environmental justice input process (where relevant).

Most interviewees cited sea-level rise as the most important climate impact for vulnerable communities. Other fre-

quently cited impacts included the increased cost of goods and services, heat waves, reduced water quality, and health impacts. Additionally, many interviewees had concerns about the execution of climate adaptation strategies in vulnerable communities, and shortcomings in existing practices and policies, including:

- Lack of access in vulnerable communities to emergency services; emergency workers being less responsive to calls from “bad” neighborhoods.
- Lack of baseline measures, such as the lack of state monitoring of ground water levels.
- Lack of participation by vulnerable communities in planning.
- Lack of knowledge of previously tried adaptation measures (what worked and what did not).
- The state economy’s continued reliance on water-intensive agribusiness, and the impact its downturn could have on the poor.
- Problems associated with identifying “sacrifice zones:” areas that should be abandoned, which are often the sites of low-income housing, while more valuable land and capital (e.g., airports) are saved.
- Lack of sub-county-level analysis of vulnerable populations; inadequacy of existing data for identifying scaled-down “hot spots” of vulnerability.
- Difficulty of scaling down climate change models to inform local planning.

What’s Next? Recommendations for California

At this stage of adaptation planning, questions outnumber answers. Where should California go next?

1. **Conduct additional research.** The most pressing research need is more fine-tuned vulnerability assessments. A research design to more accurately define the profile of a vulnerable population might include the following steps:
 - Establish baseline data for health and other indicators related to climate change impacts in ge-

ographically vulnerable areas. Analyze these data along demographic lines to begin identifying populations with starting-point vulnerability.

- Create panel data sets to follow households in communities with starting-point vulnerability. These households should meet a minimum threshold of starting-point vulnerability, including geographic factors and adaptive capacity.
- Create a participatory research design to incorporate local knowledge into the process.
- Create evaluation tools to assess community risks. Evaluation tools should be developed alongside adaptation priorities to improve policy feedback loops.

2. **Harmonize adaptation strategies with those of neighboring states and countries.** A good plan can be undermined by pressures from across state and national borders.

3. **Integrate California’s plan with the national adaptation plan as it emerges (via the U.S. Environmental Protection Agency).**

4. **Participate in international discussions of climate adaptation.** As a state with a substantial immigrant population, it is likely that many climate refugees will migrate to California. International trade can also be used as a climate adaptation measure, for example, by importing water-intensive products from other, less drought-prone parts of the world.

CONCLUSION

An adaptation plan that emphasizes the need for assessing local vulnerabilities is a good start for California, although a fully equitable approach will mean committing state resources to ensure that local assessments actually take place. Unfortunately, such assessments are costly, and California’s adaptation planners currently operate without funding.

Climate adaptation planning can and should take into account the needs of vulnerable communities. Equity issues in adaptation planning have only recently received sustained academic, as State planners have chiefly been engaged in mitigation work. The emerging literature on adaptation planning in addition to input from experts identifies the need for improved feedback loops linking policymakers and vulnerable populations, as well as direct assistance to increase local adaptive capacities. Such policy options can help the State make better adaptation decisions.

Sara S. Moore has worked for 12 years in human rights and the environment with a focus on grassroots organizing in the Russian Federation. She is a dual Master of Public Policy and Master of Arts in International and Area Studies graduate student at the Goldman School of Public Policy, at the University of California, Berkeley.

ENDNOTES

- [1] On November 14, 2008, Governor Arnold Schwarzenegger issued an executive order directing the California Resources Agency and associated agencies to develop a state adaptation plan for climate change impacts. A draft of the California Climate Change Adaptation Strategy (CAS) was produced for public comment in summer 2009. During the drafting process, the author was enlisted by the CAS working groups to develop an analysis of climate adaptation policy implications for vulnerable communities.
- [2] Barnett, J. Climate Change, Insecurity, and Injustice. In *W.N. Adger, J. Paavola, S. Huq, M.J. Mace (Eds.), Fairness in Adaptation to Climate Change* (Cambridge: MIT Press, 2006):115-129.
- [3] Agrawala, S. & S. Fankhauser (Eds.). Economic Aspects of Adaptation to Climate Change: Costs, Benefits and Policy Instruments. *Office of the Secretary-General of the Organization for Economic Co-operation and Development* (OECD), (2008).
- [4] Royer, H.N. Cyclical and demographic influences on the distribution of income in California. *Economic Review - Federal Reserve Bank of San Francisco*, (2000). Accessed on April 29, 2009, http://findarticles.com/p/articles/mi_qa5401/is_200001/ai_n21459514/pg_3/.
- [5] Paavola, J. Justice in Adaptation to Climate Change in Tanzania. In *W.N. Adger, J. Paavola, S. Huq, M.J. Mace (Eds.), Fairness in Adaptation to Climate Change* (Cambridge: MIT Press, 2006): 201-222.
- [6] Shonkoff, S.B., R. Morello-Frosch, M. Pastor, J. Sadd. Environmental health and equity impacts from climate change and mitigation policies in California: a review of the literature. *California Environmental Protection Agency Air Resources Board*, (2009 March).
- [7] Blaikie, P., T. Cannon, I. Davis, & B. Wisner. *At Risk: Natural Hazards, People's Vulnerability, and Disasters*. London: Routledge, (1994).
- [8] Huq, S. & M. R. Khan. Equity in National Adaptation Programs of Action (NAPAs): The Case of Bangladesh. In *W.N. Adger, J. Paavola, S. Huq, M.J. Mace (Eds.), Fairness in Adaptation to Climate Change* (Cambridge: MIT Press, 2006): 182-200.
- [9] Brown, O. (2008). Migration and Climate Change. *Geneva: International Organization for Migration*.
- [10] The 2009 CAT report by the *California Climate Change Center* "A Multi-County Analysis Identifying the Vulnerable Populations for Mortality Associated with High Ambient Temperature in California" presents similar findings, stating that programs for the prevention of mortality associated with ambient temperature should target persons with cardiovascular disease, the elderly, infants, and those racially/ethnically identified as Black, among others. However, the study also emphasizes the need to study subgroups in specific locations, since risk factors vary.
- [11] For example, the Laotian community in Richmond, California, relies on subsistence fishing in the San Francisco Bay.
- [12] The CAT study analyzes the overlay of climate impact areas with poor households and communities of color at the county level.
- [13] Heberger, M., H. Cooley, P. Herrera, P. Gleick, E. Moore (2009, March). The impacts of sea-level rise on the California coast. *California Climate Change Center*.
- [14] Interviewees included Climate Adaptation Strategy Working Group members, other state employees working on climate policy, consultants and academics advising the state on climate policy, campaigners from water advocacy groups and other NGOs working on water issues in California, a consultant on water issues to a State Assembly member, climate change specialists from the Red Cross, and other individuals with key perspectives, including a former California Public Utilities Commission (CPUC) chairperson and a representative of a private water wholesaler.
- [15] E. Moore. (May 4, 2009.) E-mail message to author.