Building and Measuring Community Resilience: Actions for Communities and the Gulf Research Program

The frequency and severity of disasters over the last few decades have presented unprecedented challenges for communities across the United States. In 2005, Hurricane Katrina exposed the complexity and breadth of a deadly combination of existing community stressors, aging infrastructure, and a powerful natural hazard, bringing the phrase "community resilience" into the lexicon of disaster management. In 2010, the Deepwater Horizon oil spill and explosion occurred in the same region, renewing questions about resilience in the states and communities of the Gulf of Mexico. In November 2013, the National Academy of Sciences received $500 million in settlement funds from the Deepwater Horizon criminal cases to "... improve understanding of the region's interconnecting human, environmental, and energy systems and foster ... benefit[s] [for] Gulf communities, ecosystems, and the nation" over a 30-year time period, and created the Gulf Research Program (GRP) to carry out this mission. This report responds to a 2016 request from the GRP to present "effective options for measuring resilience at the community level."

EVALUATION OF EXISTING RESILIENCE MEASUREMENT EFFORTS

Resilience-related research, programs, and other efforts have explored resilience across a range of scales (from the individual through global levels) and topics (from infrastructure to ecosystems to human health). To better understand the current state of resilience measurement science and practice, the committee examined a sample of 33 resilience measurement efforts. The large number and variety of measures underscores the fact that no single measurement tool fits the resilience measurement needs of all communities. A defining characteristic across most of the tools is that resilience includes multiple dimensions, which are broadly encompassed by six assets (or "capitals") across a community: natural, built, financial, human, social, and political. Few of the measurement efforts consider all six of these capitals, and few have been applied more than once in the same community or in more than one community, making application of a consistent set of tools difficult.

HOW COMMUNITIES MEASURE RESILIENCE

The committee conducted meetings and site visits in eight communities with demonstrated disaster or resilience experience: New Orleans and Baton Rouge, Louisiana; Gulfport and Waveland, Mississippi; New York, New York; Minot, North Dakota; and Rapid City and Pine Ridge Reservation, South Dakota.
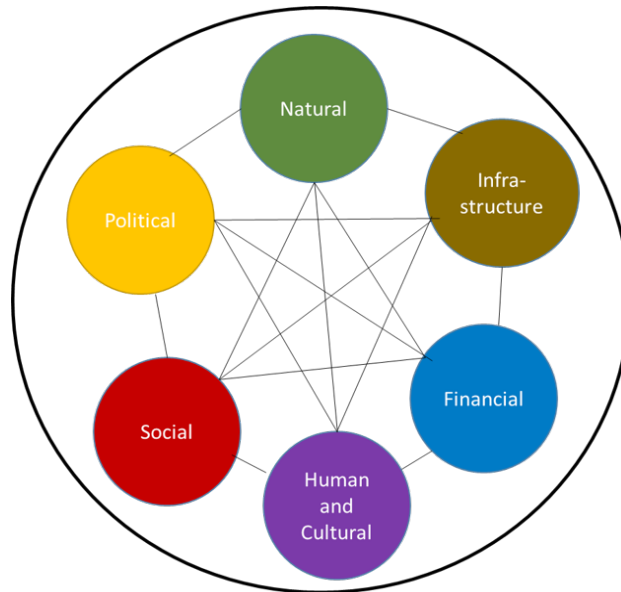
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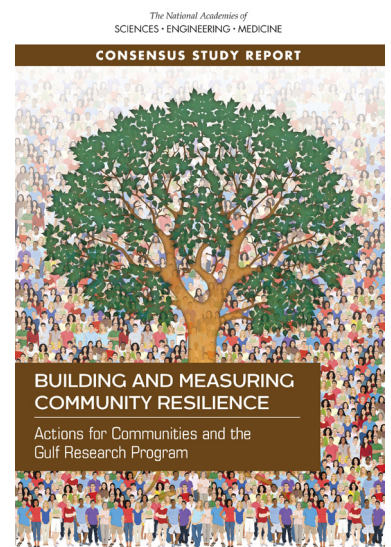
Figure 2-1 The multi-dimensional nature and inter-connectedness of community resilience capitals are the foundation for measurement efforts from local to global scales.

With participants from local government, the private sector, the nonprofit sector, research centers, and academic institutions, four common themes emerged:

- Despite the range of readily available resilience measurement frameworks and tools, these communities are not explicitly measuring resilience, in part because no single tool fits all communities, leaving local decision makers unsure of which, if any, of the tools to use.

- Every community collects data and tracks a variety of community indicators relevant to resilience, but data collected for disparate purposes are often incompatible, which presents challenges in using common measures across sectors.

- All of the communities acknowledged that resilience encompasses much more than disaster management, and they supported resilience approaches across multiple dimensions or capitals to capture the fullness of community resilience issues.

- Communities stressed that community engagement and buy-in across diverse stakeholders and sectors are critical to community resilience to help stakeholders coalesce around goals, priorities, leadership, and other desired outcomes.

TABLE 3-1 Recent Disasters in the Communities with Whom the Committee Met

Community	Recent Disasters
Baton Rouge, LA	Hurricane Katrina (2005); Hurricane Gustav (2008); Louisiana flood (2016)
Gulfport, MS	Hurricane Katrina (2005); Deepwater Horizon oil spill (2010)
Minot, ND	Train derailment (2002), flood (2011)
New Orleans, LA	Hurricane Katrina (2005); Hurricane Gustav (2008); Deepwater Horizon oil spill (2010); tornado (2017)
New York, NY	September 11 World Trade Center attacks (2001); Hurricane Sandy (2012)
Pine Ridge Reservation, SD	High winds (2015); tornado (2016); tornado and hail (2017)
Rapid City, SD	Black Hills flood (1972); Winter Storm Atlas (2013); ice storm (2014)
Waveland, MS	Hurricane Katrina (2005); Deepwater Horizon oil spill (2010)

RECOMMENDATIONS FOR COMMUNITIES

Based on a review of the resilience measurement literature and research, as well as the feedback from communities, the committee identified the following key actions for building and measuring community resilience: (1) building community engagement and buy-in to develop resilience goals and priorities; (2) accounting for the multiple dimensions of a community—natural, built, social, financial, human, and political—to identify resilience needs and challenges and develop resilience goals; (3) linking community resilience measurement to decision making; and (4) creating incentives for measuring resilience through actions that provide multiple benefits. From these actions, the committee offers communities four recommendations for tracking and measuring community resilience efforts:

Recommendation 1: Communities should use community participation and engagement at the outset of their resilience building and measurement efforts. The process of participation helps communities develop resilience goals and priorities and generate community buy-in for those goals. Setting goals and priorities is necessary before any measurement activities can take place, as they provide the basis against which a community can track its progress and gauge its success.

Recommendation 2: Communities should design and measure resilience around multiple dimensions of a community. Community dimensions are captured by the six capitals (i.e., natural, built, social, financial, human, and political), which provide a structure for setting community resilience goals and a reference for measuring progress toward those goals.

Recommendation 3: Communities should ensure that the data collected, integrated, or synthesized for community resilience are relatable and usable for decision making. The data collected should be used to make decisions about public sector budgets and public-private financing, to gauge the efficacy or progress of resilience goals, or to inform policy formulation and implementation.

Recommendation 4: Communities should incentivize the measurement of resilience. Community resilience investments can include milestones and yield multiple benefits that are trackable along and across the relevant community capitals. Measurement needs to include a range of downstream or cascading impacts of investment choices in order to capture the broadest range of multiple benefits.

RECOMMENDATIONS FOR THE GULF RESEARCH PROGRAM

The committee's task was to provide recommendations on "key issues for future programs to consider in measuring the resilience of a community," which it interpreted as referring to future programs that the GRP would administer. With a $500 million endowment, a remaining 25-year time line, and a mandate focused on the Gulf region, the GRP has the resources, time, and mission to effect positive change over the next quarter century in the resilience of the communities impacted by Deepwater Horizon.

Recommendation 5: The Gulf Research Program should develop a major, coordinated initiative around building or enhancing community resilience in communities across the Gulf region. The basic structure of a GRP community resilience initiative should include multiple communities, capture and document community resilience strategies and measurements, foster interactions across and among GRP resilient communities through a resilience learning collaborative, and implement longitudinal research that includes systematic analysis and integration of data from various sources.

Recommendation 6: For each community in the Gulf Research Program community resilience initiative, the GRP should develop and employ a community resilience framework that includes: (1) community engagement to engender buy-in around resilience priorities, goals, and leadership; (2) resilience across multiple community capitals; (3) measures and ways to track progress that are useful to decision makers; and (4) investments in resilience that result in multiple benefits. In implementing a community resilience framework, the GRP should engage diverse stakeholders to build community buy-in and recruit local leaders and champions for resilience efforts; include as many of the community capitals as possible to capture how communities conceive their resilience priorities, approaches, investments, and assessments; be deliberate in bringing researchers and decision makers together in the community resilience process; and guide short-term investments that will yield positive long-term benefits across multiple capitals.

Recommendation 7: The Gulf Research Program should create, finance, and maintain a resilience learning collaborative for diverse stakeholders to exchange information about lessons learned, approaches, challenges, and successes in their respective and collective work to advance community resilience in the Gulf region. The collaborative participants should include government (local, state, federal levels), industry, academia, nonprofits, and other organizations working on resilience issues in the states of the Gulf of Mexico. In implementing the resilience learning collaborative, the GRP should organize opportunities for information exchanges among the communities that participate in its community resilience initiative, and confer with other recipients of settlement funds from the Deepwater Horizon explosion and oil spill and/or organizations active in community resilience about collaborative efforts on common program elements.

Recommendation 8: The Gulf Research Program should implement longitudinal research associated with its community resilience program. Long-term, periodic, comprehensive resilience assessment research is needed that can address the dynamic state of communities and their changes in risk and resilience over time; link information or data from disparate programs with each other and to community resilience priorities; and ultimately link research, data, and information with decision making. While the communities would initially be located across the Gulf states, the effort would include experts and researchers from outside of the Gulf region. To implement longitudinal research, the GRP should identify, collect, and maintain data that can be used to effectively monitor the changes in regional and community resilience and assess why these changes are occurring; and proceed with investing, developing, and designing a longitudinal research program to collect, analyze, and integrate data from different sources that have relevance to community capitals, investments, priorities, and measures.

OPPORTUNITY FOR ADVANCING COMMUNITY RESILIENCE

The Gulf region is a landscape ripe for advancing community resilience. Its mix of issues related to economy, ecology, and a diverse and vibrant culture combined with its exposure to the effects of social inequity and vulnerability, low health outcomes of its residents, an extractive economy, and natural hazards, underscores the urgency of action. The GRP has a rare opportunity to alter the resilience trajectory of Gulf region communities through a community resilience framework, community engagement, a learning collaborative, and longitudinal, transdisciplinary studies that inform decision making.

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