How Policymakers Can Use Community Engagement to Address Complex Problems

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In August 2018, tourists arrived in Florida expected to see sugar-white sand and blue water beaches, but found a massive "red tide" crisis instead. Agricultural, environmental, and residential factors had combined to transform algal blooms, usually a seasonal inconvenience, into a statewide crisis. "Red tide" is caused by a storm or other ocean conditions that suddenly increase the number of algae and other ocean organisms, turning coastal water brown or red. The red tide of 2018 was driven to historically toxic levels by fertilizer runoff, leaky septic tanks, loosened water quality regulations, above-average rainfall, and warm coastal waters. This resulted in fish kills, skin rashes, stinking beaches, and respiratory issues that upended the lives and livelihoods of hundreds of thousands of community members and visitors. Governor Rick Scott issued a state of emergency as the red tide began stretching across several counties.

Because no single factor was to blame for the prolonged 2018 red tide event, efforts to avoid future red tides of that scale must account for all of the factors that contribute to the complexity of the problem. Although the risk of similar red tide disasters increases with climate change, the catastrophe in 2018 was instigated by local human behaviors — including failures to maintain household septic tanks, frequent fertilizer applications, and failures to adhere to water quality regulations. The number of human behaviors that contributed to the disaster make predicting future red tide crises and pinpointing appropriate solutions a complex endeavor — and one that needs to address specific community realities. In this case and many others like it, the engagement of community members themselves community is essential — both to grasp multiple, interrelated causes of crises and to develop realistic interventions that can simultaneously address the multiple causes.

The impacts of the 2018 red tide lasted for months, as did public restlessness. Pressure forced state-level decision makers to address the effects — and they did so with near-sighted subsidies to fund local mitigation projects, municipal manpower for beach cleanups, and tourism-related marketing. While these actions alleviated symptoms, they did not cope with the behaviors that had driven the red tide to such disastrous levels in the first place. Instead, the state government should have, first, addressed immediate community needs and then focused on a broader effort to involve local people in efforts to identify true causes and encourage better sewage upkeep, fertilizer use, and water management practices.

Community Engagement to Avoid and Address Complex Problems

When state-level decision makers are faced with complex local problems, there is always a temptation to implement short-term measures that quickly address symptoms but fail to create long-term solutions. While these quick "fixes" may temporarily alleviate public anxieties, the deep-rooted causes remain undiagnosed, and worse, unaddressed. Top-down efforts to address local problems often lead to ill-fitting, one-size-fits-all solutions. To develop an understanding of the true nature of complex challenges in particular contexts, policymakers should meaningfully engage community members and allow them to contribute to realistic interventions.

As a first step, grassroots information must be collected from the community where the problem is rooted. With this knowledge, decision makers can develop strategies to be discussed and decided upon with the community members who will be most directly affected. This approach saves resources and enables decision makers to test bottom-up solutions to determine whether they will be effective in achieving long-term goals.

Examples of Participatory Modeling

State and local decision makers should consider the participatory modeling approach to problem solving used by the coastal town of Placencia, Belize. In that place, decision makers used surveys, interviews, focus groups, and water quality instruments to collect information about the community's wastewater systems. The information they collected was then used to develop a model to simulate the operations of wastewater innovations that could be used to protect coastal resources from contamination. Decision makers then used this tool to simulate marketing, economic, and technical options, and ended up significantly increasing the number of wastewater systems adopted in Placencia. Because they took a flexible approach and sought community input, leaders were able to identify a mismatch between community expectations and the actual maintenance costs for new systems. They developed an educational campaign to urge community members to spend more on maintenance, in order to avoid future costs and failures.

This kind of community-based, participatory process can be fashioned to fit various issues and places. Data and methods for collection may include information from state-level databases, community surveys, economic trends shared by utilities or industry partners, and real-time information logged from sensors and other instruments. Other successful applications of this type of community-engagement have included studies of water management infrastructure, decision making about public housing, and spending on health care and educational reforms.

Leveraging Community Engagement to Solve Community Problems

A participatory modeling approach to community challenges can strike an important balance between qualitative depth and quantitative rigor. When done right, participatory modeling integrates information from local communities into simulations of alternative solutions. These simulations help decision makers and community stakeholders understand how everyone's behaviors are likely to affect proposed solutions. Participatory modeling does not completely replace real-time spending to meet crises, but it can leverage that spending to promote long-term, sustainable solutions. This approach requires resources be allocated for the collection of grassroots knowledge and feedback as policy solutions are modeled and implemented.

In cases like the 2018 red tide crisis, the Florida Department of Environmental Protection should identify areas where a complex network of local and state interests depend on shared environmental resources. These areas would benefit most from a participatory modeling approach to working out a long-term solution to a recurrent environmental and economic crisis.

Read more in Christine Prouty, Shima Mohebbi, and Qiong Zhang, "Socio-technical Strategies and Behavior Change to Increase the Adoption and Sustainability of Wastewater Resource Recovery Systems," *Water Research* **137, (2018): 107-119.**