MIT Science Impact Collaborative

(September, 2014)

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The MIT Science Impact Collaborative is a long-term action-research center based in the MIT Department of Urban Studies and Planning. Graduate students and faculty work on issues ranging from the management of risks associated with climate change in New England, to the siting of renewable energy facilities in Chile, to global management of mercury risks, to strategies for engaging civil society in water management and other sustainable development conflicts in Malaysia. Over the past 15 years, the Collaborative has published books and articles dealing with the theory and practice of collaborative adaptive management (CAM), participatory action research (PAR), joint fact finding (JFF), the use of face-to-face multiparty games or role play simulations (RPS) as public learning tools and the consensus building approach (CBA) to resolving science-intensive policy disputes.

Here are very brief descriptions of six on-going projects. MIT students are encouraged to join the research staff.

Energy Facility Siting and Public Engagement in Chile
(http://scienceimpact.mit.edu/projects/chile-hydropower/)

The new President of Chile is committed to public engagement in national and regional energy policy-making. The previous administration's support of large-scale hydroelectric facilities in Southern Chile has been reversed. The Science Impact Collaborative, in conjunction with the Consensus Building Institute and a range of university partners in Chile and New England, is working with the new administration to (1) characterize the ways in which other countries link electricity generation and energy facility siting to regional economic development, water resource management and land use planning; (2) describe how stakeholder consultation processes might work to generate regional energy policies; and (3) explore ways of ensuring that international standards of Free, Prior Informed Consent (FPIC) are guaranteed to the Mapuche people.

The Future of Hydropower in Chile

The Malaysia Sustainable Cities Program
(malaysiacities.mit.edu)

Malaysia has an explicit goal of transforming itself from a developing to a developed country. Even in the face of substantial ethnic, racial and religious differences, the population has made enormous strides in this direction through a national planning effort that has promoted sustainable city development and a shift from agrarian to high-tech investment. In conjunction with our partners at Universiti of Teknologi of Malaysia (UTM) and Iskandar Regional Development Agency, the Collaborative and the MIT Community Innovators Laboratory (CoLab) have begun to document the ways in which this Muslim democracy has used its oil and gas revenues to promote universal education (through college), investments in large scale integrated infrastructure systems and entrepreneurship (especially for women). Ten visiting scholars from developing countries spend half a year at UTM and half a year at MIT to transform their research findings into on-line teaching materials that can be used throughout the developing world to share what Malaysia has learned about sustainable city development.

The New England Climate Adaptation Project
(necap.mit.edu)

In conjunction with the National Estuary Research Reserve System (NERRS) of the National Oceanographic and Atmospheric Administration (NOAA), the Science Impact Collaborative has spent three years documenting the ways in which municipal efforts to manage climate risks in four New England states can be supported through the use of collaboratively produced risk assessments, stakeholder assessments, and widespread public engagement in tailored role-play simulations. We hope, next, to be working with the Massachusetts Department of Public Health to assist clusters of local public health departments in their efforts to analyze the public health risks associated with climate change and engage the public in adaptation planning efforts.

Better Safe than Sorry: Helping Coastal Communities Anticipate and Manage Climate Change Risks
Summary Climate Change Risk Assessments: Barnstable, Cranston, Dover, Wells
Role Play Simulations and Teaching Notes: Coastal Flooding in Shoreham, Flooding in Milton, Flooding and Climate Change Risks in Northam, Coastal Flooding and Climate Related Risks in Launton
Case Studies: Coming Soon

The Water Diplomacy Workshop
(http://waterdiplomacy.org)

In conjunction with the Tufts Water Diplomacy Program and the Public Disputes Program at Harvard Law School, the Science Impact Collaborative is preparing case studies for the on-line AquaPedia (an interactive set of documented efforts to resolve water conflicts around the world). The Collaborative also presents the week-long train-the-trainer workshop for senior water professionals in areas of transboundary water conflict around the world (including the Middles East, South Asia, and Nile River Basin). We hope to focus on the Mekong River Basin in 2014-2015. We are seeking to build curricula in transboundary water management for universities in South Asia.

Water Diplomacy: A Negotiated Approach to Managing Complex Water Networks
Water Diplomacy: Creating Value and Building Trust in Transboundary Water Negotiations

A New Regime for Managing the Arctic Fisheries?
(http://scienceimpact.mit.edu/projects/arctic-devising-seminar/)

Retreating Arctic sea ice appears likely to trigger a new round of energy and mineral exploitation in the Arctic. Current global regimes for managing transshipment, exploration and fisheries may not be adequate. The interests of Indigenous Peoples appear not be taken into account by the Arctic nations. Environmental and other stakeholders are also concerned that development will outstrip efforts to manage environmental and social impacts. The Science Impact Collaborative, in conjunction with the Public Disputes Program at the Program on Negotiation at Harvard Law School, is convening a Devising Seminar to assist the relevant governmental and non-governmental stakeholders in their efforts to decide whether a new regime is needed to help manage the Arctic Fisheries.

New Approaches to Siting Off-shore Wind Energy Facilities
(http://scienceimpact.mit.edu/projects/offshore-wind/)

Wind energy potential off the Atlantic coast of the United States is substantial. However, efforts to build off-shore wind farms have, for several decades, been caught up in regulatory, political and legal disputes from Maine to Florida. The "costs of contentious" are making it difficult to exploit this form of renewable energy. We are exploring alternative regulatory regimes and strategies for collaborative decision-making that may reduce the cost of contentiousness.

The Cost of Contentiousness: A Status Report on Offshore Wind in the Eastern United States

On-going Doctoral Research

Todd Schenk,
Planners and decision-makers are increasingly aware of the risks climate change poses to their infrastructure, and of what might be done technically to mitigate them. However, progress on actually integrating that knowledge into decision-making has been slow. A substantial barrier appears to be the *governance* challenges associated with answering key questions around *who, what, when* and *how* climate risks will be institutionalized into current systems of planning and decision-making. These challenges are compounded by the uncertainty and dynamic nature of climate data, which has not traditionally been incorporated into decision-making and is therefore unfamiliar to those involved in infrastructure planning. Todd works with infrastructure managers and other stakeholders to explore how they can effectively collaborate to address these governance challenges and build climate-ready infrastructure. He engages these actors via workshops that feature role-play simulation exercises. Participants are introduced to different models of collaboration and decision support tools - including scenarios - and invited to explore their efficacy, opportunities for their use, and barriers to implementation. Todd has run workshops in Rotterdam and Singapore, and is now working with stakeholders in Boston.

Bruno Verdini,
Resource management decisions about open, evolving, and interconnected water, energy, and environmental networks are complex. When multiple stakeholders from different countries with competing interests and values are involved, the challenges are compounded. Bruno's research focuses on the leadership, negotiation, and communication strategies that can alter the prospects to find agreement. Through interviews with the chief negotiators that have recently resolved long-standing water and energy disputes between the United States and Mexico, he explores practical solutions that are thriving on joint fact-finding and adaptation. By examining the tensions between creating and claiming value in transboundary resource management negotiations, as they pertain to water usage, distribution and conservation (i.e. investment on supply and storage, development of irrigation infrastructure, restoration of riparian and estuarine ecology, etc.), as well as to ocean-based energy exploration and production (i.e. joint extraction and revenue-sharing of deepwater minerals, oil spill prevention and response, protection of marine and coastal resources, etc.), Bruno aims to highlight the ways in which stakeholders are effectively re-interpreting their circumstances, allocating benefits instead of costs, and re-defining their shared future.

Danya Rumore
Climate change presents considerable risks for coastal communities. Preparing for and managing these risks will require ongoing collective risk management, a task that is complicated by irreducible uncertainty about climate change impacts, limited financial and technical resources, and differing opinions about what, if anything,

should be done to prepare. Danya Rumore's research explores whether science-based role-play simulations can, when run with key stakeholders and the public at large, increase local readiness to undertake collective risk management and prepare for climate change. Her research draws on quantitative and qualitative data collected through engaging over 500 people in four coastal New England communities in climate change role-play simulation workshops. Her findings will enhance our understanding of whether and how role-play simulations and other serious games can be used to educate and engage stakeholders around climate change adaptation and other science-intensive environmental issues. Her work will also shed light on the challenges communities in the U.S. face in preparing for climate change, what is needed to increase local readiness to adapt, and how participatory action research can build local capacity to address challenging environmental planning concerns such as climate change adaptation.

Leah Stokes

Decarbonizing the electricity system requires sustained policies over several decades. However, the past ten years have seen renewable energy policies become increasingly politicized. Across US states, several groups have sought to repeal renewable portfolio standard (RPS) policies and impose large, monthly charges on distributed generation solar installations. Given that technologies require stable policies to drive investment and reduce costs through learning, these developments are particularly concerning. Transforming the electricity system to address climate change is a politically contested process. Drawing on comparative case studies, econometrics and public opinion methods from political science, Leah Stokes' work seeks to understand the politics of transitioning the grid to renewable energy technologies. Leah's research attempts to explain why some renewable energy policies have successfully expanded over time, for example in California. She also seeks to understand the conditions that lead to policy retrenchment, as has occurred in Arizona and Ohio. The specific policy design and implementation structures how costs are distributed to the public, including how salient these costs are. If policies create a new market for renewable energy technology, they will build an industry that will defend against retrenchment. Concentrated costs imposed on organized interest groups during implementation may similarly catalyze them into action during later rounds of policymaking. Together, these dynamics arising from benefits and costs being imposed on the public and interests groups in varying ways highlight that policy implementation decisions can trigger different feedback mechanisms.

Kelly Heber

Over a hundred million Southeast Asians depend directly on coral reefs for their sustenance and economic needs, with significant proportions of the population completely dependent on reefs for all aspects of their livelihoods. The second half of the 20th century was a period of great destruction for global reefs, due to the rise in popularity of destructive fishing methods such as cyanide poison and dynamite. In the face of these disturbances, governments and multilateral donors are increasingly supporting community based natural resource management regimes

that place trust in local communities to manage resources they depend on. This type of regime is termed Adaptive Co-management. In the face of uncertainty and global change, how can communities adaptively and collaboratively manage their reef resources in a way that ensures sustainable and resilient ecosystems and livelihoods?
Kelly is creating a statistical model that will predict reef health as a function of seven socioeconomic indicators of adaptively co-managed systems, with long form, qualitative interview data supplementing and explaining the findings of her model. Independent variables include attributes of the community-based reef management institution, while the dependent variable is ecosystem health. Her fieldwork takes place across five Indonesian and three Malaysian villages. The independent variable is assessed via a mixed methods approach, with over 400 stakeholders surveyed, and 200 stakeholders undergoing long form interviews. The dependent variable is data from a representative set ecological surveys conducted over the same 8 Southeast Asian reef field sites, measuring the of percentage hard cover reef building corals. Thus, her work is at the nexus of ecosystem science and environmental policy.

Nah-yoon Shin
In the post-Fukushima era, the extended operation of nuclear power plants has gained public attention and become increasingly contentious. Decisions about whether nuclear facilities can operate safely beyond initial design lifetime entail science-intensive public discussion about a wide range of issues including the reliability of a plant system, adequacy of evacuation plans, risks from storing high-level nuclear waste on site, and long-term environmental and economic impact in the vicinity. The involvement of local activists and antinuclear groups, however, is often under a tight control of central nuclear regulatory agencies that have seldom rejected relicensing applications. Nah-yoon's research explores ways in which local opponents attempt to overcome these institutional constraints. Her work is built upon a cross-national comparative analysis of three cases involving enduring public opposition against the extended operation of nuclear power plants. Tracing political processes by which plants were shut down, Nah-yoon's research illuminates the importance of proactive roles that State governments play in facilitating stakeholders' discussion of risk, cost and benefits associated with the extended operation of nuclear facilities, and in putting this discussion in the context of state-level energy policies. Her findings also reveal challenges state legislators face in designing and implementing a novel decision making process that undertakes precautionary actions within the limited regulatory authority. Her work will expand our understanding of new oppositional tactics that are based on extensive public deliberation and the subtle effects they bring to the closure of aging nuclear plants.