



Introduction

Claudia's¹ graying teeth and limp hair meant she came from the farmlands. Periods of intense drought made food scarce and nutrition limited. Those farmlands, I had heard, bred some of the most radical protestors. Claudia was a perfect example. A righteous attitude complemented her stubborn nature. Taking no for an answer was never an option. She told me that she had not married because it would hold her back; macho Brazilian men and their ideas about a woman's place were not worth her time or energy. She had instead given her life to the church in a way I did not understand. Not a nun, exactly, but a dedicated worker in the path of justice. Her church actively supported the downtrodden, the marginalized, the many people pushed off their lands by stronger corporate interests. As one whose lands had been exploited, Claudia was indignant and, despite almost no education, brilliant.

Claudia was one of the first people I met who protested the construction of large hydroelectric dams in Brazil. Our first encounter was at a roundtable held by local professors to discuss several dams with the community. I had not been to the interior of Brazil before and was fascinated by its inhabitants, not because of their customs or style of dress but because of their understanding of the land and their community. For the most part, they had never entered a formal

¹ Claudia is a pseudonym used to protect the actual individual.

school but had instead grown up learning the land. They knew how to make nourishment rise from lackluster soil and to catch the largest fish so that the smaller ones would be left for next season. They intimately understood the ebb and flow of the river from which they drew enough water to plant crops year after year. And they knew what the proposed dams would do to their river, their land, and their livelihoods.

Claudia spoke eloquently and passionately at this first meeting. I watched the professors learn from her, and she from them. Despite her experience with protest, she did not fully understand reports the state had generated to argue that her land and people should be displaced. Meanwhile the professors had little knowledge of the crops produced in the area, where community members lived, or exactly how the proposed dams would shift the local economy. As they explained the report's findings, she countered with what she knew to be the truth. The professors took notes. Her input was added to their critique of the inaccurate environmental impact assessment they held in their hands. The community did not have a copy. It had not, in fact, been offered one by the state. The researchers seemed to be the brokers of information, offering state studies to the community and working with this group to generate a new study. They would, in turn, offer the new impact assessment to the local environmental agency, suggesting that the dam not be built.

Although I had seen the anti-dam movement occupy construction sites and effectively slow the progress of dam building, I knew that behind-the-scenes collaboration was a tactic critical to the movement. Activists invested great amounts of time and resources in working with the researchers to learn about the environmental impact assessment (EIA) format, make a new report showing all the missed information, and then share their perspectives at a public hearing. The hearing where this private deconstructing and reconstructing of the environmental impact assessment would become public was the only pathway for citizens to participate in the policy-making process. In addition, since the EIA was the main justification for the dam, it was an important terrain of contestation.

At the hearing, arguments would be laid out by the local community, the government agency, and the representatives of the corporation that was funding the project. But the community would not have formal decision-making power. And ultimately, this community, which might be displaced by one of multiple dams being planned in the area, would most likely be flooded. Its participation in the process would make no difference, despite the organizing, educating,

and collaborating. This case is not singular in nature. It represents a dilemma that spans the globe—movements engaging in long, drawn-out processes of changing research in order to shape policy, but facing the possibility of complete inefficacy. Democratizing science in this way is a growing movement tactic that is necessary because research findings have become the basis of policy making and the corporate justification for new products and practices. But this tactic is often co-opted through superficial participatory mechanisms and overpowered by large transnational corporations. Therefore, movements face a dilemma: how to democratize science without getting sidelined.

The Outcome of Dual Processes

Distrust of science and technology has arisen at the same time that public consumption of them has skyrocketed. Here I refer to “science” as the institutions that fund research, experts who conduct experiments and generate findings, and technologies whose impact may filter down to the public. In the United States, this resulted in protest after World War II when conflict-based technological advances came into question (Egan 2007). Contestation of science has also developed in industrializing nations as certain forms and institutions of science have become globalized (Fairhead and Leach 2003). This protest is in part due to the way science is generated. Much research and many resultant technologies, such as methods of energy generation, nanotechnology, large-scale farming, genomics, and chemicals, have been developed with little input from the lay populations whose lives they affect (Heller 2002; Macnaghten, Kearnes, and Wynne 2005). The “iron triangle” of government, corporations, and research has locked citizens out of political decision making about these products (Egan 2007). This situation has been exacerbated by the “scientization” of politics, where experts play a critical role in policy making and laypeople are marginalized.

Many movements protest science and related technologies with a particular focus on the lack of democracy involved in their development. These movements aim to democratize science, both the institutions that insulate it and the actual production of new technical information. Democratizing science movements (DSMs) contest expert knowledge and critique research findings as biased and politically driven. They aim to legitimate lay knowledge in science processes, government policies, and public discourse. They also intend to change the value structure underlying science, drawing attention

to the biased nature of research trajectories and ignored impacts of new technologies. These actions have unintended consequences for movements, such as shaping the success of activists, research trajectories, and political functioning. Despite the growing exchange between science and movements, there is little understanding of how activists can effectively democratize science, and even less assessment of the social structures that make them fail.

This book examines social contestation of large hydroelectric dams in Brazil and another seemingly dissimilar case, movement formation around environmental causes of breast cancer, in order to examine how movements democratize science. Research on social movements, ethnoscience versus citizen science, the role of science in policy, and debates over corporate/government relations has generally been hindered by the divide between developed and developing worlds, ignoring commonalities between them. Democratizing science movements are sprouting everywhere. They demonstrate the interplay between “global science” and civil society (Fairhead and Leach 2003), as well as the similarities across DSMs around the world. A transnational, transtopical approach articulates the importance of contextual factors while highlighting the global nature of these struggles.

I trace the rise of democratizing science movements, explore why they are emerging and how they function, and examine under what conditions they are able to make change. I focus on these two cases, as well as examples of many others, to examine the before, during, and after of DSMs, including what they do when democratizing science fails. I argue that DSMs have emerged in response to government dependence on research and corporate control of it. The process of scientization has shaped the very functioning of movements, instigating movement participation in research projects and government institutions. Yet engaging in scientific production does not have clear outcomes. It may advance movement agendas or actually be a source of activist co-optation. Theorists of participatory research and of deliberative democracy argue that truly participatory measures are vastly difficult to create, and few institutions have actually been successful at it (Heller 2001a, 2001b; P. Evans 2002; Ryfe 2005). This is of particular concern in a “knowledge society” (Böhme and Stehr 1986) where science is essential to democracy but is not in itself democratic. This research asks if there is a way to alter entrenched epistemic philosophies and superficial governmental mechanisms through which social movements participate in research.

I also argue that these movements are only sporadically able to create such institutions, and that more often than not, participation is circumscribed. Several interlocking factors shape the success of these movements, including the scientific frameworks, methods, tools, and norms at play, the participatory parameters of government institutions, and the overwhelming power of transnational corporations that are mandated both to fund and to conduct science. In addition, movement tactics and approaches codetermine outcomes. DSMs have multiple goals and tactics, some of which are more effective than others. For instance, a DSM can more readily gain information about science and distribute it to constituents than challenge the policies of a federal government that are based on limited research funds. By detailing the successes and failures of these two movements, this research offers several resources to readers.

First, this framework offers an explanation of how the growing saliency of science and technology and resultant public disenfranchisement from them become a terrain of contestation. A social movement is a network of individuals with shared beliefs and agendas who work together to protest a set of institutions, practices, or social norms over a period of time. It arises when a group, generally defined by a certain identity, seeks to improve its welfare through changing policy, its public image, or its ability to achieve certain goals (Della Porta and Diani 2006). As science and technical information have become critical to improving health, welfare, and policy, movements have begun to use it in grievance formation. However, as activists gain knowledge of science, they often find that new research must be developed to support their hypotheses and goals. As a result, they engage in scientific production.

In order to understand why science and technical information have become fundamental to many movement struggles, we must look at how lay citizens are disconnected from research trajectories, how expert knowledge is inculcated in political institutions, and how corporate interests have developed power over it. Movements attempt to insert a new set of interests into research that represents marginalized groups. In other words, by focusing on DSMs, we can begin to see how movements intervene in processes where “science converts knowledge into power” and we can also examine “how power converts interests and power into science” (Harding 1998a, 51).

Like many movements that are not concerned with science, democratizing science movements attempt to address the privatization of conflict that limits the capacity of citizens to make change

(Schattschneider 1960). More specifically, they attempt to include the knowledge claims of nonexperts in order to overcome limitations of who is involved in a debate, or what Schattschneider calls “scope.” Scope shapes movement outcomes. Schattschneider claims that privatization limits the scope of conflict; this process is similar to scientization. For DSMs, the idea of scope raises questions about the definition of an activist, especially how expert or nonexpert identities cross in untraditional ways. These issues are important in debates related to science or technology.

This leads to the second contribution of this text—a better understanding of how lay disagreements with official scientific codifications get introduced, publicized, and mediated. DSMs use multiple methods and have several different outcomes. Movements “reframe” research and scientific objectivity and then work to change science itself. Through the first tactic, activists work to change public opinion and understanding. Engaging in science is then used to alter research topics, advance findings, and change related policies. In both movement methods, activists work with scientists to gain access to information and credibility.

Finally, through these cases we can see how the intent of democratizing science shapes movements themselves. Social movement theories such as political process (McAdam 1982), framing (Gamson and Meyer 1996; Steinberg 1998; Benford and Snow 2000), and resource mobilization (McCarthy and Zald 1973) intersect with theories regarding the role of science in policy (Bimber and Guston 1995; Jasanoff 1990) to help elucidate how scientization engenders certain kinds of DSM tactics. On the other hand, the very process of engaging with scientists shapes movement outcomes. For example, the politicization of local knowledge encouraged by lay/expert collaborations can become a root of organizing and movement development. Also, focusing on science means marginalization of other tactics.

Using scientific contestation as a tactic may also influence to what extent a movement can achieve its agenda. In some instances, it may instead serve as a form of movement co-optation or lead to movement failure. I aim to differentiate when a movement will be co-opted and when it will be able to achieve its goals through democratizing science. Outcomes are partially determined by what type of deliberation and participation takes place. Because a great deal of research is government funded and because the science that informs policy is housed in political institutions, understanding the outcomes of social movements involves examining both participatory research and the structure of political institutions.

TABLE I.1 TYPOLOGY OF PARTICIPATION

Lay/expert form	Direction of knowledge transfer	Methods of knowledge-sharing	Main activities
1. Researcher educator	Top→ bottom	Expert language sharing	Researchers serve as educators of movement representatives or laypeople
2. Researcher activist	Top→ bottom	Construction of a new discourse outside collaborative space; instrumental legitimacy offered to support communicative claims	Researchers serve as movement leaders or political representatives
3. Citizen/science alliance	Bottom→ top	Discussion and deconstruction of official knowledge; countering of expert and lay claims	Construct new research about the impacts of dams or causes of breast cancer
4. Collaborative forum	Bidirectional	New, official codifications of knowledge	Laypeople and experts construct official documentation of dam projects or breast cancer research

In order to articulate different kinds of participation that span these multiple DSM approaches, I present a four-part typology that includes researcher educator, researcher activist, citizen/science alliance, and collaborative forum (Table I.1). These types are much broader than most participatory theories because they account for lay/activist engagement outside the realm of formal institutions and inside the space of movement organizing. They are surprisingly consistent across the two empirical cases at hand. These forums have the capacity to be new institutions of deliberative democracy that improve democratic decision making by involving citizens more thoroughly in many spheres, such as government and the economy (Warren 1996). Some of them are more effective than others, and all of them create different outcomes. This typology may be a resource for other researchers who investigate similar movement activities.

Theoretical Departures for This Book

This book provides several theoretical contributions. First, it articulates the direct interrelationship among social movements, science,

and government institutions (Morello-Frosch et al. 2005). On the basis of the work of social movement theorists, it might appear that government institutions have been more porous to movements than scientific institutions have been. This appearance is driven by the smaller amount of attention devoted to movement/science interactions. More recent scholarship has drawn attention to their interrelationships and the influence that movements have had on science (Steven Epstein 1996; Egan 2007; Corburn 2005; Hess 2007; Moore 2008). I aim to add to these recent studies and create a mesolevel theory for them.

Second, I intend to clarify the forms of participatory research or political institutions that work best for movements across national context. In order to do so, I connect literatures regarding community-based participatory research (CBPR), participatory action research (PAR), feminist epistemology, and deliberative democracy. There has been a long-standing divide between these bodies of literature that can be overcome only by a cross-national comparison that brings these diverse theories together. Past research has avoided this bridging because such cross-national comparisons generally face serious methodological difficulties. Theoretically, however, they inform one another in important ways. Feminist epistemological theory is a linchpin of making a connection between CBPR and PAR; it shows that the knowledge possessed within oppositional consciousness crosses all kinds of boundaries, including race, nationality, gender, and subject of contestation (Harding 1998b). Combining theory on participatory research with research on deliberative democracy is essential because of the scientization of government institutions. Political dependence on science means that movements attempt to develop new or use existing government institutions to engage in research and policy making. In a knowledge society, we should not make a distinction between participatory science and participatory government. Science and government are too intimately interwoven for that. This book advances these bodies of literature by acknowledging the social context from which participatory projects emerge. Theorists interested in deliberative political institutions or research processes often forget to account for the social forces, like movements, that are pushing forward the creation of democracy.

The gap between the CBPR and deliberative democracy literatures is driven by the underlying assumption that laypeople, as so named by the first group, and citizens, as the second group of scholars refers to them, are subjects of participation or deliberation rather than actors who create it. The question has more often been how lay

citizens function within these structures than how they instigate and shape them. This is where social movement theorists are helpful. They address the question of what movements can do. But they generally do not deal with questions about participation studied by the first two groups. In addition, few of these previously mentioned theorists address the actual process of scientific development or science as an institution.

Why Look at These Two Cases?

I use two case studies to fill out the details of the DSM framework: the environmental breast cancer movement (EBCM) in the United States and the anti-dam movement (ADM) in Brazil. The EBCM is a subset of the larger breast cancer movement that focuses specifically on potential environmental causes of the illness. It arose in three areas in the United States—the San Francisco Bay Area, Massachusetts, and Long Island, New York—that have some of the highest rates of breast cancer in the world. Unlike the broader breast cancer movement that focuses on raising funds to find a cure, the EBCM directs attention to prevention and causation. The anti-dam movement in Brazil is the only national-level movement of its kind. It protests undemocratic government practices that result in displacement and little compensation for poor, rural people. The movement has changed the conception of dams from sustainable to problematic and has simultaneously altered related national and international policy.

From a distance, these movements look entirely different, but they have a similar focus on democratizing knowledge. Although they are in very different countries, contest different topics, and are composed of very different populations, both movements find it necessary to contest expert knowledge and construct new research to advance movement goals. Their very differences highlight the similar importance of this movement method across contexts. I began studying the EBCM in order to understand how a small movement of women could create a completely new and controversial paradigm of illness causation, be successful enough to have their hypothesis tested with federal research funding, and gain enough attention to be reported on by national news sources (Kolata 2002). This question was the topic of my master's thesis at Brown University, for which I conducted research from 1999 to 2001 (McCormick 2001). I traveled to the three main locations where the movement had formed. I also spent the summer of 2001 working at the only research organization dedicated solely to studying women's environmental health,

with a particular focus on breast cancer, Silent Spring Institute in Massachusetts. For more than seven years, I conducted interviews with social movement activists in local and national breast cancer organizations, government officials, and scientists who had collaborated with the movement. I also spent time with movement activists observing their activities and attending events across the country.

After studying the EBCM for some time, I began to come to conclusions about why a movement predominantly composed of highly educated, white, privileged women would challenge and manipulate, even engage in, science to achieve their agenda. They had access to political resources that funded the studies they wanted. They were generally not very radical, which meant that government funders were not threatened. Their education facilitated their understanding of scientific complexities used in studies. The movement worked in a societal context where expert knowledge had become so dominant that the only way to contest illness causation was to engage in science. In other words, they had advantages that gave them access to science, and they lived in a context that necessitated its use. This type of phenomenon, I assumed, would be isolated to a Western, democratized setting where movement actors had similar characteristics.

But as I finished my research, I began to wonder whether this assumption was accurate. In order to test it, I decided to compare the EBCM to a movement that was as different as possible on most counts—political context, activist identity, and subject being contested. I wanted to examine how different movement organizations could develop a similar focus on contesting and shaping knowledge and using it to make discursive and material change.

As I began my research, I realized that similar movements exist in places where science is much less institutionalized and normalized in everyday culture, where there is little participatory democracy, and where movement groups are almost completely marginalized. Researchers have reported on them in India, Africa, Eastern Europe, and Latin America. The variety of topics that these movements contest is vast, although many of them are environmentally related, like the topic of the EBCM. I selected the anti-dam movement in Brazil for comparison. It was different from the EBCM in almost every way but the one I was interested in understanding—contestation of science and democratization of knowledge. By focusing on this similarity, I hoped to understand why this focus persisted across contexts. I spent four years traveling to Brazil (2002–2006), spending two to four months every year crossing the length and breadth of the country. I began in the south, where the movement originally arose, inter-

viewing activists, researchers, and government officials. Each group connected me with the next and led me to another region linked to activist networks. Eventually, I was able to meet anti-dam activists and their expert counterparts in all five regions of the country. Most of the findings in this book relate to that period of time, although they have been updated through 2007.

Like the EBCM, the anti-dam movement had allied with scientists to contest the expert knowledge used to justify dam planning. These lay/expert collaborations were taking place all over the country, creating an entirely new discourse about dam building and even stopping the construction of dams (Zhou, Laschekski, and Barros Pereira 2005; Rothman and Oliver 1999). With the assistance of these laypeople, experts wrote books about how dams were highly problematic and unnecessary (Bermann 2002). As my interviewees described in depth, even government officials had begun to adopt this new discourse. While largely unconscious of the movement itself, the public had begun to believe that there were other, more effective options for generating energy (Goldenberg 2002). And in contrast to the case of the EBCM, the people most affected by dams were largely rural workers who lived in a country where science received only peripheral attention (Araujo 1990).

The ADM had long been characterized as a poor people's movement shaped by environmental conflict. The grassroots, protest-based nature of activism makes this apparent. Less obvious, however, is the role that science could possibly play in such struggles where livelihoods and ancestral histories are at stake, and where human rights are being violated. Most research on the role of science in movements has not addressed such a movement, yet conflicts are often mediated by the state through the arena of science, which is meant to be the arbiter of disputes. Violent conflict may continue between the state or corporations and activists at the same time the terms of development are negotiated through science.

Despite their vast differences, several factors drive the similarity of these two movements and many other democratizing science movements. The first is the expert basis of public perception and policy making. In these two cases, the expert control of the "war on cancer" (Sporn 1996) and the building of what Jawaharlal Nehru called temples of progress make the ADM and the EBCM more likely bedfellows than they might appear. For example, breast cancer activists point to unregulated chemicals in our environment that may affect human health (Breast Cancer Fund 2007). Whether or not each chemical is licensed supposedly depends on scientific measurement of

its toxicity, although in practice most chemicals are not tested (Vogel 2004). Energy policy is also allegedly based on expert impact assessments (Fearnside 2006), with little consideration for the environmental, health, and social issues raised by displaced people.

The strength of political and economic interests that shape these bodies of expert knowledge and use it for their own purposes is an additional similarity between these two cases, as well as many others. Consequently, the EBCM and the ADM are driven to introduce new participatory structures to counter the influence of industry. In both countries, citizens are provided limited space to participate in the construction of environmental regulation. Industry has much greater influence on such policy than citizens (DeSombre 2000). Despite the existence of policies to regulate industry, these private interests have continually challenged passage and implementation of environmental regulation. Industry is in fact the main body that produces research necessary for a chemical or a dam to be approved by governmental agencies (Barrow and Conrad 2006). Independent institutes or consultants also do similar research, but often the researchers in those institutes are funded by industry (Yach and Bialous 2001).

Third, because of the vast array of internal movement differences, such as identity of movement actor and length of movement activity, I saw the similarity of focus on an environmental concern as helpful. The most common type of movements attempting to democratize knowledge is that addressing environmental concerns (Pickvance 1997). Both movements had combined environmental concerns with a social justice framework, although the resulting grievances were very different. Environmental movements have traditionally encompassed a large body of well-educated people, including scientists, who could use their expert assessments to counter other claims (Gottlieb 2005). This was necessary because of the increasing regularity with which environmental policy was based on science, research, and expert knowledge. As the environmental movement has grown and diversified to include many groups who are not led by experts, many local communities have come to argue that this bias toward expert knowledge removes them from a role in policy making and understanding of environmental degradation (Fischer 2000). Other fields fall prey to similar biases. Study of two movements that deal with environmental concerns and related expertise can aid assessment of other types of expertise in the future, be they legal, political, or of some other kind.

Finally, and most important, expert knowledge was central to both movements—their formation, tactics, and goals. Although movement

actors had different educational backgrounds and each country invests different levels of resources in science, successes of both the ADM and the EBCM hinged on access to technical information and the ability of social movement activists to reformulate it. The following sections begin to describe the backgrounds of these cases and the major issues that they contest.

Breast Cancer: From Pink to Green

The influence of environmental groups in the United States has transformed public consciousness, turning trees into huggable symbols of life and toxics into a reflection of corporate control. Likewise, the breast cancer movement in the United States brought women's breasts onto the public agenda by literally placing them in the public eye (Casamayou 2001). Graphically depicted on billboards and magazine ads, the breast has become a symbol of motherhood, sexuality, and youthful vigor. Maybe at one time the idea of connecting these two concepts was an oddity, but the environmental breast cancer movement does this simply and strongly by arguing that women's bodies and breasts reflect the toxics in the environment as chemicals build up in breast tissues and result in cancer.

The environmental breast cancer movement has created a new public awareness of environmental causes of breast cancer, instigated massive government-funded research studies to examine environmental variables, and advanced a new conception of environmental health (McCormick, Brown, and Zavestoski 2003). The EBCM works toward four goals: (1) to broaden public awareness of potential environmental causes of breast cancer; (2) to increase research into environmental causes of breast cancer; (3) to create policy that could prevent environmental causes of breast cancer; and (4) to increase activist participation in research. It is focused on three main locales that have significantly higher incidences of breast cancer than the rest of the United States (Aschengrau et al. 1996, Robbins, Brescianni, and Kelsey 1997).

This activism began in Long Island and then spread to Massachusetts and finally to the San Francisco Bay Area (Klawiter 2000). Within each location, a number of organizations work locally and nationally. Some lean toward collaborating with groups nearby, while others form coalitions across the country. In Massachusetts, the three most important organizations are the Women's Community Cancer Project, the Alliance for a Healthy Tomorrow, and the Massachusetts Breast Cancer Coalition, the last of which founded Silent

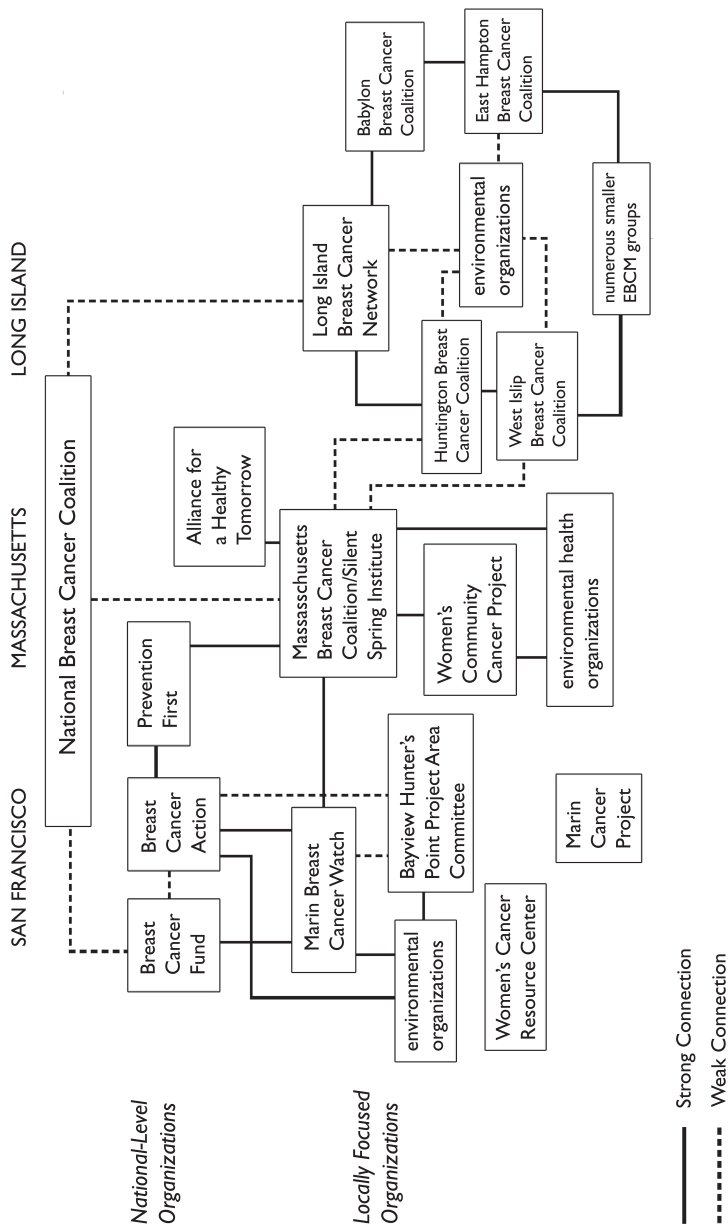


Figure I.1 EBCM Movement Organizational Chart

Spring Institute, which is devoted to studying environmental causes of breast cancer. On Long Island, a number of small service-based organizations have also engaged in science, such as Huntington Breast Cancer Coalition (whose name recently changed to Prevention Is the Cure), One in Nine, Babylon Breast Cancer Coalition, Breast Cancer Help, and West Islip Breast Cancer Coalition. These groups organized under one umbrella, the Long Island Breast Cancer Network, in order to collaborate with scientists on the Long Island Breast Cancer Study Project, the first major environmental breast cancer research project. In California, Breast Cancer Action, the Breast Cancer Fund, the Marin Breast Cancer Watch, and the Bayview Hunters Point Community Advocates are the main organizations that work both nationally and locally. Although local culture variations make the locales in which activism has occurred somewhat different (Klawiter 2001), the collectivity of knowledge and the overall movement ideology offer sufficient similarities to justify viewing this as a coherent national movement. These organizations also often engage in nationwide campaigns that unite their efforts. Figure I.1 visually depicts the level on which these organizations generally work, as well as their connections to one another.

Although the EBCM has focused mainly on three locales with high rates of breast cancer, it has also responded more generally to a world of cancer research that is predominantly focused on treatment, detection, and cure. This trajectory of research is a part of the larger “war on cancer” that Richard Nixon began in 1972 (Sporn 1996). This call was initiated by public concern about rising rates of cancers, of which breast cancer is one of the most common. Today in the United States, a woman is diagnosed with breast cancer every three minutes, and another woman will die of breast cancer every eleven minutes (N. Evans 2006). There were 178,480 new cases of invasive breast cancer and 62,030 cases of in situ breast cancer diagnosed in 2007, and 40,460 women died (American Cancer Society 2007).

Large Hydroelectric Dams: From Local to Global

Anti-dam groups began in the south of Brazil in the 1970s and grew into larger movements and organizations in the 1980s (Khagram 2004). The south faced construction first during the military dictatorship, when arbitrarily displaced small landowners were generally not powerful enough to contest construction. However, the opening

of political opportunities as the Brazilian government transitioned to democracy between 1979 and 1983 stimulated movement activity (Rothman 1993). As more dams were built and resisted by local communities, these groups eventually began to exchange information and coalesce.

The anti-dam movement in Brazil has three main goals: (1) to alter public understanding of dams and their alternatives, (2) to increase democratic participation in the planning of energy generation, indemnification, and resettlement, and (3) to introduce a new energy model. The movement must use several tactics, including organizing, demonstrating legitimacy of its claims, generally through research projects, and protesting and demonstrating publicly. Strong grassroots groups and nongovernmental organizations (NGOs) work on multiple political and social fronts to achieve this mission.

National, regional, and local organizations work in conjunction with one another. Although local protest had formed in response to the construction of Itaipu in the south (Bruneau 1986), the first formal anti-dam organization was the Regional Commission of People Affected by Dams (Comissão Regional de Atingidos por Barragens, CRAB). It developed into what is now called the Movimento dos Atingidos por Barragens, or the Movement of Dam-Affected People (MAB). Additional important grassroots anti-dam organizations include the Movement for Development of the Trans-Amazon and Xingu River (Movimento Pelo Desenvolvimento da Transamazonica e Xingu, MDTX), based on the northern region, and Forum Carajas, based in the northeast but functioning across the country.

While MAB's organizational strategy has followed in the footsteps of the Workers' Party and the Movement of Landless People by creating small subunits in local areas where dams are being built (Wright and Welford 2003), MAB and these other organizations also work with small, independent organizations, such as the Association of People Affected by Dam Projects in Gatos and Sucos (AMOGAS) in the interior of the northeastern region of the country, and groups of fishermen, indigenous people, and *quilombos* (isolated communities formed by escaped slaves). Finally, a series of international NGOs work across the country. They include the International Rivers Network (IRN), the Energy Working Group (Grupo de Trabalho de Energia, GT Energia), Living Rivers (Vidágua), SOS Matatlântica, and Greenpeace. Figure I.2 shows an organizational picture of the movement presented here for the purposes of understanding networks and relationships found in this research. Weak ties represent infrequent communication and collaboration and lack of real membership over-

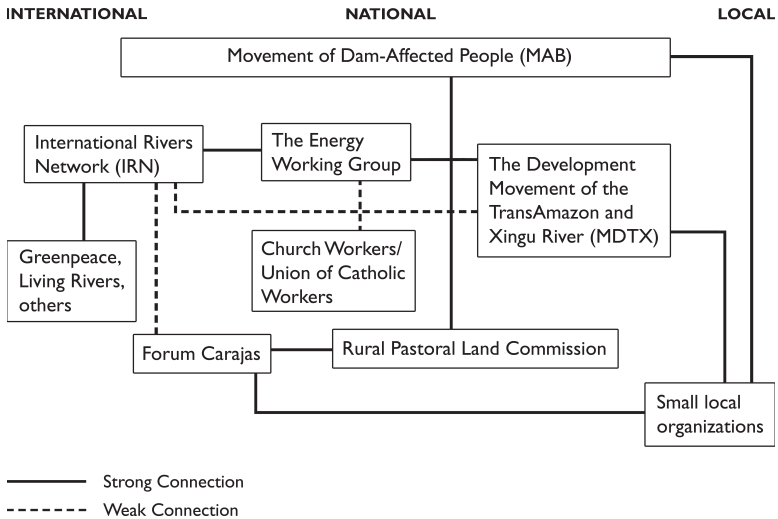


Figure I.2 Organizational Chart of the Anti-Dam Movement

laps, whereas strong ties signify sharing of substantial numbers of members, collaboration on projects, and regular interaction between group leaders.

The anti-dam movement has responded to the huge impact of hydroelectric dams in Brazil. Brazil has the third-largest installed hydroelectric capacity in the world. It has the greatest potential of any nation; larger than some entire continents (Santos, Andrade, and Wright 1990). Today, Brazil has more than six hundred dams (Brown and McCully 1997). Large dams are internationally defined as being higher than fifteen meters (LaRovere and Mendes 2000). They take ten to twenty years to construct and are costly, as is exemplified by the Itaipu Dam shared by Brazil and Paraguay, which was built in eighteen years and cost nearly \$18.3 billion (Luxner 1991). Small dams are constructed much more frequently than large dams and have a related set of problems (Zhouiri 2003).

Although a few large dams such as Tucuruí and Balbina were built in the north in the 1970s and 1980s, most dams in Brazil are in the southern and southeastern regions, where rolling hills are dotted by small farms. A long legacy of energy-intensive mining in the southeast was responsible for the earlier construction of dams, but many new ones are driven by the massive influx of industry. The majority of hydrological resources in the south are already used, and because of the construction of Sobradinho and Itaparica, the northeast

has only a minimal amount of remaining river resources (Agencia Nacional de Aguas [ANA] 2003). Therefore, the three other regions have been the site of the newest construction. The first inroads of building began a few years ago in the center and west and are beginning to gain strong social and environmental attention.

The northern region, more than any other in Brazil, has the most potential and is characterized by the greatest risk. The presence of the Amazonian forest in the north is causing growing contention. Government documents estimate between twelve and sixty dams under consideration for construction. These plans were once part of the *Avança Brasil* project meant to initiate multiple megadevelopment projects in the area (Laurance et al. 2001) and are now considered necessary for national development. Resolution of the pending energy crisis was a part of President Luiz Inacio Lula da Silva's platform in 2002, and the construction of dams in the Amazon has recently been emphasized as a way to meet energy demand. The Amazonian region holds more hydrological potential than most countries in the world (McCully 2001). Yet because it is also the home to what many have called the lungs of the earth (Gore 2006), referring to the oxygen-producing capacity of the forest, it is consequently shielded by the international norm of environmental protection.

Vast Differences, Important Similarities

Because the EBCM and the ADM are vastly different in their internal functioning and contextual circumstance, concepts that are applicable to both are likely to be relevant to cases in many other places. The subjects of contestation are vastly different and have shaped the identity of movement actors. Because breast cancer largely affects women, women constitute the majority of the EBCM. Since dams largely displace poor, rural people, they make up the largest number of anti-dam activists. The structure and role of the state and each country's place in the global world system are also very different from one another.

Although they diverge on many counts, the ADM and the EBCM are somewhat similar in tactical approach. Like many if not most contemporary social movements, they both challenge the state, target the role of industry, engage in public protest, and organize or educate the public. These similarities may be caused by a long history of active social movements in both Brazil and the United States (Jaquette 1994; Treece 2000; Langer and Muñoz 2003). In Brazil this is signified by the critical role that social movements played in

initiating democracy and the important role they continue to play in making democracy work (Cardoso 1992). In both Brazil and the United States, there are many social movement organizations that address a breadth of topics and provided lineage for the two movements studied here.

In the United States, a powerful feminist movement preceded the women's health movement (Altman 1996), which was followed by the general breast cancer movement, the environmental movement, and finally the environmental breast cancer movement. In Brazil, a strong movement of landless people and workers, then an indigenous people's movement, and an environmental movement have gained strength. The church has also traditionally facilitated movement advances as well (Eckstein 1989). All these movements assisted in the formation of the anti-dam movement.

Both the EBCM and the ADM make similar attempts to bring local perspectives into the debates leveraged against the state or industry and for the public. These movements use a particular similar mechanism—lay/expert collaboration—to change policies, make industry more accountable, create new frameworks of contestation, and educate community members about the topics they contest. They both aim to create participatory processes by challenging the shortcomings of representative democracy and offering citizens more participation in the governing process. Although the specific type of knowledge they contest varies, both movements attempt to increase valuation of lay knowledge and to penetrate insulated arenas of decision making. Studying the tactics through which these movements democratize knowledge reveals similarities in mechanisms of contention (Giugni, McAdam, and Tilly 1999).

Plan of This Book

The following chapters explore how democratizing science movements become successful or are co-opted. In the first chapter, I examine previous research on movements that engage in science and the gaps that research has left. In response, I describe an overall theoretical framework of DSMs that includes reasons why democratizing science movements emerge, and how the very contexts that engender their development limit their success. The following two chapters introduce the two case studies in depth. Chapter 2 tells the story of the founding of the environmental breast cancer movement, the role that scientists played in that process, and the scientific basis upon which it formed its framework, while Chapter 3 relates those details

TABLE 1.2 MOVEMENT SIMILARITIES AND DIFFERENCES

	EBCM	Anti-dam movement	Common frame
Main Purposes	<ul style="list-style-type: none"> ~Educate the public about environmental causes of breast cancer ~Promote research of these causes ~Push for participation of women with breast cancer in this research ~Prevent these causes/precautionary principle 	<ul style="list-style-type: none"> ~Educate/organize the public to fight dam construction ~Propose an alternative model of energy production ~Push for democratic decision making ~Push for resettlement where necessary 	~To create participatory processes that result in the reduction of industrial impacts on the environment and people
Connections Made	~Health and the environment	~Environment and social exploitation	~Must consider marginalized populations (e.g., women or poor, displaced people) in the construction of environmental policy
Role of Knowledge	<ul style="list-style-type: none"> ~Women have embodied knowledge of environmental exposures ~Scientific research marginalizes this knowledge 	<ul style="list-style-type: none"> ~Local people know most about their environment ~Their traditional knowledge is destroyed by dams/development 	~Value of embodied lay knowledge is critical
Forms of lay/expert collaborations	<ul style="list-style-type: none"> ~Participatory research institution formed (local and national levels) ~Research projects funded by the state 	<ul style="list-style-type: none"> ~Participatory research institution formed (local, national and international levels) ~Research projects funded by the state and foundations 	~New research and institutions founded around participatory processes
Perspective on Industry	~Not properly regulated; therefore, it causes public health problems	~Is exploiting people and the environment	<ul style="list-style-type: none"> ~Must slow or change the methods of industry ~Need to democratize industrial production decision making to allow for more public accountability

for the anti-dam movement. Both chapters show how collaborating with scientists not only serves the purpose of changing science or policy but also contributes to movement development and sustenance. It is critical to initial movement formation, the politicization of local community consciousness, and the formation of a community around new grievances that lead to sustained movement activism.

Chapter 4 looks behind the science and movements in order to reveal how government institutions and corporate interests overlap in research trajectories that raise movement concerns and instigate challenges. The paradigmatic approach and intersecting interests of government and industry often instigate movement creation of new scientific frameworks. The EBCM developed a new environmental connection that politicized the illness and argued for new types of research and regulation. In the ADM, a developmental emphasis that prioritizes economic gain has guided dam development and planning. The movement proposes a sustainable paradigm that makes planning accountable to local communities and reduces environmental impacts. These movements create such critiques by learning complicated science and translating it to their constituents.

Chapter 5 examines the lay/expert collaborations that are often the root of both learning to reframe science for the public and changing scientific trajectories. The two movements represented in this research have developed multiple collaborations that change scientific tools, methods, and topics in order to address activist concerns. By examining how these collaborations have functioned and connecting them to theories of participatory research, I assess how these projects can take place most effectively for both scientists and activists. These collaborations also often result in another unrecognized way in which collaborating with scientists advances movements: movement reframing of issues. This issue is also discussed in Chapter 5.

These collaborations face major challenges in the realms of science and politics. Scientists are often reluctant to engage and have their credibility challenged. Others critique participatory research as lacking objectivity. In the process of participating, activists often face the possibility of being co-opted by superficial participatory mechanisms that allow their involvement but do not give them decision-making power. Chapter 6 presents cases of movement co-optation. In the northern region of Minas Gerais, Brazil, local communities engaged in the public hearing process to protest the possible construction of a number of industry-funded dams to little avail. The cases at hand demonstrate how powerful interests shape mechanisms

of participation and consequently necessitate movement challenge. Theories of deliberative democracy articulate best why these participatory mechanisms are inadequate and how they can be advanced.

Chapter 7 looks at the most recent developments in each movement and raises questions about what these new, long-term struggles and projects mean for their future success. By looking at the twenty-year battle over Belo Monte and the new National Institute of Environmental Health Sciences Breast Cancer and the Environment Research Centers, I begin to explore what these movements need in order to succeed and what their achievements might look like in the future. In the final chapter, I come to some conclusions about why democratizing science movements have created new tactics to accommodate the importance of research in a “knowledge society,” and how they might be more effective. This requires a nuancing of different types of achievements that these movements can make. Ultimately, I conclude that the partnership between scientific experts and the affected public holds great potential for democratic practice and social norms in many countries. Democracy is most deepened when barriers to disenfranchised populations are overcome and their perspectives are incorporated into political discourse. However, private and public interests more powerful than movements have found ways to sidestep change. Only through recognizing how superficial answers are given to concrete demands, and the role of science in that process, can democracy be deepened.