ABSTRACT  This paper develops a framework for understanding social movements that address issues related to science, technology and expert knowledge. ‘Democratizing science movements’ contest, reframe, and engage in the production of official scientific research in order to achieve their goals. They contest the seeming objectivity and neutrality of science and seek to legitimate lay perspectives. In order to empirically explore why such movements arise and how they work, I discuss two cases: the anti-dam movement in Brazil and the environmental breast cancer movement in the USA. While there are obvious internal and contextual differences between these two movements, they both exemplify similar characteristics of democratizing science movements. In this sense, these cases are representative of a broader, transnational phenomenon. Qualitative data in the form of interviews, ethnographic observations and document collection were used to study these cases.

Keywords  Brazil, breast cancer, environment, science, social movements

Democratizing Science Movements:
A New Framework for Mobilization and Contestation

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As expert knowledge has begun to predominate in policy-making and be influenced by corporate entities, social movements around the world have begun to contest and control scientific knowledge (Shiva, 1989; Parajuli, 1991; Rosenberg, 2000). These movements exist in Asia and Africa, and in South and North America, and address a diverse set of issues, ranging from AIDS (Epstein, 1995) to pollution regulation (Hsiao & Liu, 2002). Populated by non-experts, they attempt to reclaim citizens’ power by making lay knowledge legitimate in science, policy and public debate.

These movements have arisen largely in response to what Jurgen Habermas (1970) called ‘scientization’ – the control of governmental decision-making by technical experts and bureaucracy, where citizens have little influence. This process empowers those who possess expert knowledge, while often marginalizing lay people. Scientization has also had broader social impacts through the technical codification of traditionally non-scientific elements such as culture, bodies, and livelihoods. Ever since Habermas conceptualized scientization, many other theorists have been...
concerned with processes akin to it. Among many other topics, these scholars have addressed the construction of biased expert knowledge (Haraway, 1988; Harding, 1998), and its consequent insulation in governmental institutional structures (Jasanoff, 1990; Bimber & Guston, 1995), and corporate influences on it. The issue of corporate influences has grown in importance with recent controversies over corporate censorship of scientific production, such as the results of pharmaceutical studies (Krimskey, 2003). These private economic actors also play an influential role in major governmental decision-making about such matters as whether or not to sign on to the Kyoto Protocol, which is meant to be based on pure science (McCright & Dunlap, 2003). Industry also produces its own research, which is then used as the basis of lobbying strategies. Such industry science, with its influence over governmental decision-making, is often used to support the consumption of new products, consequently increasing profits.

Activists attempt to counter such studies, open governmental institutions, and reclaim power by generating new research or reframing scientifically codified objects, bodies, and livelihoods. This paper seeks to extend past social movement theories to conceptualize a new framework for understanding social movements that contest scientization: movements that I shall call ‘democratizing science movements’. Democratizing science is the process through which lay understandings are taken into account when scientific knowledge production is used to make political decisions. This framework provides theoretical grounding for investigating why movements use science as a basis for their organizing, and identifying the tactics for doing so. This framework both draws from and adds to previous social movement theories of political opportunism, resource mobilization, framing, discursive change, and participatory institutions.

However science and technology have been important for social movements for some time. However, social movement scholars have done little to articulate how shifts in epistemic authority instigated by social movements occur, and what these modifications mean for state or corporate power. These questions are important since science has become an explicit means for corporate interests to exert influence over state decision-making. By developing new frameworks that reveal influences and values usually obfuscated by the institutionalization and neutral veneer of science, movements draw attention to issues of justice and equality.

In order to make science a more democratic forum for development, debate and policy-making, democratizing science movements contest science, critiquing it as biased and politically driven. In many cases, movement activists form alliances with sympathetic experts who then conduct new studies to influence political and scientific discourse. In other cases, they use scientific processes, methods, language, and objects to inform public protest, education, and discourse. Through such contestation and democratization of expert knowledge, normative constraints on what is considered legitimate in science and technology have shifted to make science more accountable to affected populations.
In order to theorize and empirically explore how democratizing science movements function in multiple contexts, this paper examines two social movements: the anti-dam movement (ADM) in Brazil and the environmental breast cancer movement (EBCM) in the USA. By examining movement initiation, framing, and tactics, I draw attention to the processes of contesting existing research, generating new research to counter it, and re-framing the debate through technical language. A reciprocal process occurs between science and social movements in which each shapes the other. In the cases at hand, the movements utilize science to gain additional legitimacy and success. In these ways, democratizing science movements inform multiple theories of social movement framing, resource mobilization, and political opportunity. Working with scientists and experts has also served an important role in movement initiation, development and processes of framing.

Due to the extensive scientization of society, democratizing science movements can address a broad range of topics. For example, they have focused on uncertainties about the health impacts of nanotechnology, the inadequacies of urban planning schemes, and reduction of point-source pollution. These movements can also have a broad range of goals: social justice, normative change, improved democratic practice, altering public perception, and many others. Democratizing science activism manifests itself in a number of ways: contesting expert knowledge, re-framing science, making political claims, mobilizing scientific resources, and democratizing knowledge production. One of the primary methods of democratizing science movements is to democratize knowledge production through lay/expert collaborations – partnerships between researchers and activists for critiquing existing science or constructing new knowledge. These goals do not mean that local knowledge or lay perspectives are sufficient to create effective research outcomes or policy-making. Instead, they can actually adopt and adapt science to fit their strategies.

There are several potential downsides for movements that focus on science. For example, while collaborations aim to develop democratic participation, governments also can co-opt community perspectives, in order to legitimate their own decisions. Community representatives may offer knowledge or insight, and while government officials may hear their opinions, they are not mandated to incorporate them. Activists can both value and be distrustful of science (Yearley, 1992), thereby dividing movement initiatives between criticizing or engaging in scientific developments. In addition, when activists use science as a mechanism for social change, it may take much more time than if political or public pressure were the focus. Scientific studies can become mired in prolonged debate. Therefore, democratizing science movements may be caught in scientific pursuits while missing opportunities to make radical demands based on other grounds. Despite these possible drawbacks, this movement focus on science persists.

These two cases demonstrate the central role of science across contexts and subjects of contestation. From a distance, the EBCM and the ADM look entirely different, but they both have a similar focus on contesting, controlling,
and re-framing expert knowledge. The ADM in Brazil is the only movement of its kind at a national level. It protests the undemocratic government practices that deny corporate accountability and result in the displacement of poor, rural people, with little compensation. The movement has changed the conception of dams from sustainable energy sources to national and international ecological problems (Khagram, 2004). Contesting official codifications of dams to include their social and environmental impacts has been critical to this process. The EBCM is a subset of the larger breast cancer movement that focuses specifically on potential environmental causes of the illness (McCormick et al., 2003). Unlike the broader breast cancer movement that focuses on raising funds to find a cure, the EBCM directs attention to the need to better regulate polluters in order to prevent breast cancer. EBCM activists partner with experts in order to develop this innovative framing of the illness and develop new evidence that supports their argument.

Although in different countries, contesting different topics, and composed of very different populations, both the ADM and EBCM find it necessary to contest expert knowledge and construct new research to advance movement goals. The differences between these movements highlight the importance and applicability of this movement framework. Despite the entrenched economic interests against which they struggle, both the ADM and the EBCM use lay knowledge to develop new expert, political, and public discourses about breast cancer and dams. Participants in these movements also assert their rights as citizens of democratic countries to improve participation in policy-making. These movements are only two of the many in which science has been central for contestation and mobilization.

Data and Methods

Semi-structured interviews were conducted in Brazil \(n = 78\) and in the USA \(n = 50\) with representatives of social movement organizations, government agencies, corporations, and international financial bodies. Interviews were also conducted with relevant experts in each country. To locate social movement participants to interview, I used a purposive sample of organizational representatives, followed by a snowball sample. Interviewees included movement leaders, such as directors of organizations, as well as grassroots level activists. The government representative and researchers I interviewed included those directly involved with or related to movement concerns. Ethnographic observations of social movement activities, and meetings between social movement participants, experts, and other government representatives offered a basis for interpreting interview data. A variety of written materials from government and non-government sources were also collected for purposes of reconstructing past events, including the development of movement philosophies and activities.

I transcribed the interviews, took extensive notes on documents, and constructed a database of field notes and ethnographic observations. QSR NVivo (a qualitative software program) was used to analyze the data by first establishing codes and themes related to specific research questions, then constructing new codes while analyzing the data.
Movement Background

Movement Formation, Membership, and Goals

Although the ADM and the EBCM began at different times and in different national contexts, they were both initiated by the release of scientific studies or by experts alerting local communities to new information. These community groups then appropriated these scientific findings, either by developing public critiques or generating new research in terms of social justice frames. These frames critically read the research findings to legitimate the interests of large corporations.

Community or local opposition to the construction of large dams in Brazil began in the 1970s, and developed into larger, more organized movements in the 1980s. The democratization of the Brazilian government between 1979 and 1983 created opportunity for political movement activity (Rothman, 1993). As more dams were built and resisted by local communities, opposition groups eventually began to exchange information and coalesce. Alliances between professors at a local college, progressive elements in the Catholic Church, and rural unions helped form a small, grassroots organization in the interior of the southern state of Rio Grande do Sul, called the Regional Commission of People Affected by Dams (Comissão Regional de Atingidos por Barragens [CRAB]).

As with many later cases, alliances with researchers were critical during the initial phases of activism. Researchers offered information previously inaccessible to the public that stimulated community organizing. While governmental agencies often offered minimal or incorrect information about dams, professors served the role of providing accurate information to potentially affected local groups. This often instigated movement activism. One of the first examples of the impacts of discovering, contesting and re-framing state-generated knowledge was in the state of Rio Grande do Sul when CRAB changed Eletrosul’s (the southern electrical agency’s) policy in a landmark accord struck in 1987. By leveraging their perspective on who would be displaced against the planners’ perspective, local people were able to alter dam plans. Through agreement between CRAB and the state, displaced people also achieved a settlement with movement representatives appointed to monitor their allotments.

Although they began at the local level and continued to function at the grassroots level, organizing campaigns are now often run by the Movement of Dam-Affected People (Movimento dos Atingidos por Barragens [MAB]), the national anti-dam organization. Since the 1990s MAB has networked with many other groups to become the only national ADM in the world (Rothman & Oliver, 1999). MAB’s mission is to fight the construction of large hydroelectric dams, protect the rights of river-dwellers, including indigenous people and quilombos, raise consciousness about social and environmental impacts of large dams, and promote the construction of alternative forms of energy generation. Other important grassroots anti-dam organizations include the Movement for Development of the TransAmazon and Xingu River (Movimento Pelo
Desenvolvimento da Transamazônica e Xingu [MDTX]) based in the northern region, and Forum Carajas in the north-east, which focuses on regulating industrial development.

Each of these groups has taken a different approach to contesting the environmental impact assessments (EIAs) used to assess dam projects. Most frequently, activists work with experts to generate new research and learn technical aspects of dam planning. Non-governmental organizations (NGOs) offer necessary support to grassroots activists, and often provide technical critiques in lieu of expert advice. The International Rivers Network (IRN) has provided a great deal of financial and technical support for the movement, and even has an office based in São Paulo. IRN is a member of a larger group of Brazilian and international NGOs that focus on energy issues called the Energy Working Group (Grupo de Trabalha de Energia [GT Energia]). Other members of the Group include Living Rivers (Vidágua), an organization that addresses water preservation in countries across Latin America; SOS Matatlântica, an organization focused primarily on forest preservation; Greenpeace; and 14 other organizations.

Broadly, the ADM has three main goals: (1) to alter public understanding of dams and their alternatives; (2) to increase democratic participation in energy policy; and (3) to change policy (both for energy generation and resettlements). The movement uses several tactics: (1) organizing; (2) demonstrating legitimacy of its claims, generally through research projects; and (3) conducting public protests and demonstrations. Underlying the agenda of the ADM is a focus on sustainability, environmental values, and the importance of local knowledge. These activities are used to pressure political representatives and to interfere with dam construction. Lay/expert collaborations play an important role in making governmental institutions and the corporations that fund dam construction more accountable to affected people and creating new discourses about impact.

Science has even greater importance for the EBCM. The EBCM works to broaden public awareness, create policy, and increase research and activist participation in such research on environmental causes of breast cancer. It is focused on three main locales, Long Island in New York, the San Francisco Bay Area, and Massachusetts. These three areas have significantly higher incidences of breast cancer than the rest of the USA (Aschengrau et al., 1996; Robbins et al., 1997). This activist movement began in Long Island, then spread to Massachusetts, and finally the San Francisco Bay Area. The movement was generated by the publication of data suggesting that rates exceeded normal levels in these areas or by lay-mapping of breast cancer cases in local communities.

The EBCM began in the early 1990s, when women in western Long Island began noticing an upsurge in breast cancer in their local areas. Women with breast cancer, as well as women who had never had the disease, began to map breast cancer cases in their community. After the initial groups formed, they joined with a number of local groups in Long Island, including the Huntington, West Islip, and Southampton Breast Cancer Coalitions, and groups in other states such as the Marin Breast Cancer Watch and Bayview.
Hunters Point in California, and the Massachusetts Breast Cancer Coalition and the Women’s Community Cancer Project in Massachusetts. A number of national organizations such as the Breast Cancer Fund and Breast Cancer Action also took part. The National Breast Cancer Coalition (NBCC) is the largest breast cancer organization in the USA, but most of these organizations had a distant relationship with it. A variety of environmental groups also connected with EBCM activists in each area.

Like the ADM, the initial formation of the EBCM was facilitated by support from scientists at a local university. Activists sought scientific evidence to support their hypothesis of an unusually high incidence of breast cancer on Long Island. In 1993, they marshaled backing from other well-known scientists and held a conference on the issue, in which the Centers for Disease Control, Environmental Protection Agency, and National Cancer Institute had a major part. This alliance encouraged several Congressional representatives from the area to introduce legislation that set up and funded the Long Island Breast Cancer Study Project. The legislation passed and provided US$32 million in federal funding. Activists in the Bay Area and Massachusetts achieved similar success.

Following these initial successes, these groups have used public demonstrations, community education, lobbying and lay/expert collaborations to achieve their goals. Groups in all three locations occasionally have marched, walked, and held public rallies. Fundraising events have also been common. These are more generally used to raise awareness and recruit new activists. Much more common, however, are education workshops held in homes and community centers. The EBCM’s most central tactic is the lay/expert collaboration. Most other tactics emerge from or are supported by it. In addition to the development of lay/expert collaborations, the movement’s successes include a significant amount of public awareness, the large amount of supportive research, and a continuing dialogue with the scientific community.

**Developing Scientific Claims**

Both movements have developed critiques of relevant scientific research. Researchers and experts who were intimately familiar with the technical language, details, and debates provided a fundamental resource to the activists. Collaborations with them spanned both countries and lasted for the duration of the movements.

MAB has long worked with researchers at IPPUR, an urban studies institute at the University of Rio de Janeiro. As the movement became more formalized, activists from the far south who formed MAB approached IPPUR. Members of the two groups together generated new research, and the researchers also advised movement leaders on policy and technical considerations. MAB/IPPUR affected governmental policy at national and state levels and laid the groundwork for many other groups. Defeating Belo Monte Dam, which would have been the largest in Latin America, was accomplished through a collaboration between the MDXT and researchers at the University of São Paulo. Like these other groups, Forum Carajas
engages in public debates by targeting the logic of megadevelopment with particular focus on technical considerations and outcomes.

Two collaborations developed in the state of Minas Gerais. A research team at a small, local university – the University of Viçosa – gained university funding to work with communities in the town of Ponte Nova and surrounding areas. By critiquing EIAs, developing new studies, and engaging in public displays that countered claims made by corporate-funded EIAs, the group stopped several dams (Rothman & Oliver, 1999). It is currently attempting to prevent further dam construction. In the same state, researchers at the University of Belo Horizonte, together with community members from Irapé in the north of the state, which would be affected by the dams, reanalyzed the relevant EIAs. Finally, local groups affected by Tucurui Dam and researchers at the Geolgi Museum and the University of Pará formulated the newest project. They are attempting to gain resettlement packages for communities downstream from the dam that have not been compensated in the 20 years since its completion.

There also were two projects that transcended national boundaries and engaged with transnational institutions. First, the World Bank initiated the World Commission on Dams (WCD) in 1998 to examine global impacts of large dams. The WCD conducted a case study of Tucurui Dam in the Amazon that involved activists, researchers, and government officials. Its form was participatory and democratic, designed to represent multiple sectors of civil society and government. Activists gained several resources from their collaboration with the WCD, including legitimacy, access to global norms of environmental preservation and local participation, and access to governmental institutions. The collaboration of activists and researchers in scientific development re-framed both the disastrous flooding caused by Tucurui, so that a new resettlement was initiated, and raised the salience of discourse regarding lay participation in dam building.

Second, Brazilian researchers worked with a group of NGOs called the Brazilian Forum of Non-governmental Organizations and Social Movements (FBOMS). The Energy Working Group developed from this larger organization. Founded in 1991, with one of its main goals being to protest of Belo Monte Dam in the Amazon, it comprised organizations from all over the country, representing a diversity of specific areas of interest, including Amazonian degradation, nuclear energy, degradation caused by electro-intensive industries, forestry, river resources, and other general natural resource issues. In this coalition, highly educated and technical groups intersected with grassroots organizations that possessed indigenous knowledge of localities and potential impacts on them. The combination of these knowledges and backgrounds was important for this group’s legitimacy in the eyes of a broad base of local constituents and government agencies.

The EBCM also engaged in scientific debates and initiated new research projects locally and nationally. The Long Island Breast Cancer Study Project, Silent Spring Institute, research between the University of California, San Francisco and activists in the Bay Area, and the new National Institute of Environmental Health Sciences (NIEHS) Breast
Cancer and Environment Centers are the most institutionalized of these endeavors. The Long Island Breast Cancer Study Project was initiated in 1993 as stipulated by a Congressional bill. It was the first item of legislation in the USA to specify the topic and method of Congressionally directed research. It helped establish massive breast cancer funding for years to come through the Congressionally Directed Medical Research Program as a part of the Department of Defense. Soon after in 1994, Massachusetts Breast Cancer Coalition founded Silent Spring Institute, in which a Public Advisory Committee made up of activists helps advise research processes. Only a few years later, activists in California began their own research projects. The most active of these groups is Marin Breast Cancer Watch. Its members have worked in conjunction with scientists on a number of projects, and are now listed among the co-PIs on the NIEHS Centers for Breast Cancer and the Environment.

Since the early 1990s when EBCM activists first gained political and public attention, lay involvement in science increasingly has been utilized to address potential environmental causes of illness. The EBCM has since instigated some of the largest public involvement research projects of any social movement in the USA, and possibly in the world. For example, the Long Island Breast Cancer Study Project (LIBCSP) cost US$32 million and the Breast Cancer and Environment Centers US$150 million. The initial tactic that the EBCM utilized to democratize cancer research was ‘lay mapping’: plotting individual cases of breast cancer on local maps to identify geographic clusters. Like other methods that they used later, lay mapping was an attempt to codify observations made by local women. These women knew that their interpretation of illness patterns and intuitive ideas about causation would have little credibility without such scientific authority.

Engaging in scientific research with well-established scientists has given the EBCM a great deal of legitimacy, often to such an extent that its projects are funded by state or federal agencies. These projects have also led to greater attention from the media. In addition, through such engagement, activists have learned the technical and scientific background to breast cancer science. They translate this information into a more legible, ‘lay’ language, and re-frame scientific debates and findings in the process.

Contesting Scientization and Advancing Movement Development

Contesting scientization through collaborations with researchers was central to the initiation, development, and outcomes of the movements (see Figure 1). Politicizing consciousness is often a first step in social movement formation. It involves creating a more political view about everyday occurrences that can be developed into a movement framework for articulating grievances. Social movement theory shows that the construction of movement identity and movement consolidation is based largely around the
The politicization of an issue, turning what was once considered a personal trouble into a public issue (Gamson, 1992). In this case, the most important aspect of politicizing consciousness is connecting local knowledge with protest. This process is similar to ‘the sociological imagination’, described by C. Wright Mills (1959: 6) as a way to ‘grasp history and biography and the relations between the two within society’. More recent work by sociologists studying controversies about links between health and environmental exposures has conceptualized this process as evolution through a ‘dominant epidemiological paradigm’ (Brown et al., 2001). They claim that science fundamentally shapes the process through which personal problems become publicly conceived.

Lay/expert collaborations consolidate and politicize local perspectives on research. By providing a means through which information can be transferred in both directions, lay/expert collaborations are critical for politicizing consciousness. For example, even in cases where local populations know about a proposed dam and contest it, they do not necessarily connect their own embodied experience or local knowledge to their protest. The personal trouble is powerfully transformed into a public problem when that connection is made. Collaborating with experts provides a space in which lay perspectives are legitimized and therefore used as a counter to official expert discourse. This furthers the initial political framing of dam building by deepening the critique of expert knowledge that underlies policy. When community members assemble together in a lay/expert collaboration to analyze and contest an EIA, the collectivization of their knowledge helps to construct local solidarity rather than leading to the community disintegration that usually results from displacement.

The WCD was one case in which local communities coalesced around their knowledge of impacts and need for indemnity. As one WCD researcher remarked:
At the moment we [researchers] appeared and the WCD issued the study, they [local groups] were very excited because their movement was kind of disaggregated. Eletronorte could manage to weaken the movement so that it would no longer be a problem for them. When we appeared the movement re-aggregated. Most people started to look for their rights and see what was going on. I think they had kind of a renewal of the movement. They liked that. When we were with them, they started conversations again with Eletronorte, [about] some compensations. I think the movement is now much better than it was, especially because they gained more visibility.

In the case of the WCD study and other collaborations, this solidarity and politicization helped mobilize a broader movement. In this sense, understanding the role of science and being able to contest particular knowledge claims is fundamental to assessing how democratizing science movements form and mobilize.

Contesting Science, Changing Discourse

Contestation and control of science shaped movement outcomes. By engaging in these processes, the EBCM and ADM were able to change scientific knowledge and have an effect on official discourse. The movement’s targets, whether government, science, or industry, often coopt movement discourse into their public campaigns. Discursive changes were preliminary to implementing new policies and practices. For example, a high-level official in environmental licensing claimed that ‘[p]ublic hearings provide a very limited basis of what you can do because they are so short term, 4 or 5 hours, and the public doesn’t have very much information’. He also explained that since the hearings are conducted after the dam is planned, local people have very little opportunity to inform the process. This official was from the state where anti-dam activism had persisted longer than elsewhere, and he had come to realize that it was necessary to meet movement demands for increased participation. After the interview was conducted, a governmental process began to change the hearing procedure by, planning to among other things, holding the hearing before the licensing stages begin.

Similar to movement calls for increased accountability, the WCD used a participatory philosophy, claiming that its ‘… framework for decision-making is based on five core values – equity, sustainability, efficiency, participatory decision-making and accountability’ (Berkamp et al., 2000: 3). For the most part, dam-affected people subscribe to these values. For example, in a letter of protest to Alcoa, an aluminium-manufacturing company attempting to build a dam in central Brazil, MAB states that the company ‘… has failed to respond adequately to repeated efforts by the affected populations and other civil society organizations …’, or in other words, to be accountable to the interests of local people, one of the core ideas of the WCD.

The following quote from the NIEHS Request for Proposals (RFP) for Breast Cancer Centers to Study Environmental Factors is amazingly similar in its adoption of the EBCM’s discourse about participation:
Partnerships among scientists, breast cancer advocates, community members, and health care providers will be required. The active participation of the community and national breast cancer advocacy groups and other community or faith based organization will be expected throughout the Center, especially in activities which translate research findings into useful information for the public. Evidence of such participation in activities of the Center and especially those that are involved with translating research findings to the public will be required and reviewed as part of the application package.

As with the WCD in Brazil, the NIEHS RFP demanded the participation of affected communities. This RFP was responsive to demands from the EBCM for further research on environmental causes of breast cancer with advocate involvement. After the Centers were funded, the EBCM’s initial success in changing discourse became part of research.

The movements were able to tailor the official language of government, industry and research to suit their own agendas. In the case of breast cancer research, scientific norms were used to shape conceptions of causation and assume control over preventative methods. In Brazil, corporations and government bodies shaped the development paradigm. Only by contesting such scientific norms and reshaping the dominant paradigms could both movements change governmental decision-making to respond to their interests.

*Generating New Research, Opening Political Spaces*

The movements also had distinct impacts on the construction of science and official codifications. The EBCM was able to generate a whole new set of studies focusing on environmental causation. This is striking, considering the general marginalization of environmental health science in governmental institutions, and specifically of research on environmental causes of breast cancer. Lay involvement resulted in changes in the types of science being done. As one researcher recounted:

There get to be dogmas in research of what an acceptable area of research is. So one thing I find very helpful about having a diverse group of advocates is that it can sometimes help to ... loosen up whatever the current dogma is and get people sort of un-entrenched; get people out of whatever dogma trench they're in.

The EBCM ultimately garnered well over US$180 million in research funding to study environmental causes of breast cancer. The movement was also able to institutionalize lay involvement in scientific research.

The ADM had important influence on state-generated reports such as EIAs. Activists participated in numerous critiques of industry-developed EIAs, and encouraged new EIAs to take account of social and environmental impacts of dams. By working together, researchers and activists thus developed important new reports and assessments. Such collaborations in Minas Gerais and in other locales submitted their studies to gov-
ernmental agencies. For example, the authors of an EIA resulting from such a collaboration criticized the lack of transparency in the methods used in an earlier EIA, and faulted that document for lacking ‘… innumerable pieces of missing information (maps of Irape [the area], for example) and insufficient data’, as well as including incorrect information, such as the area that would be inundated and other impacts that would be incurred by the dam. They claimed that the data they had generated for the new EIA was much more accurate.

For democratizing science movements, engaging in or creating participatory state structures and generating new knowledge are inseparable processes. These movements were forced to generate new data because EIAs had either ignored local community concerns or misreported outcomes. More important was the process of shifting power from the hands of experts to those of lay people. Official scientific assessments of risks and environmental impacts utilize networks of power in order to produce and justify actions that influence human bodies, livelihoods, and land. By successfully taking part in such assessments, the ADM and EBCM were able to reframe and consequently reclaim some of the authority of science for the communal ends their members valued.

Conclusions

My analysis of the two movements demonstrates the critical role of contesting official scientific research for initiating and sustaining movement activism, developing new frames, and leveraging political demands. Despite differences in political context, economic and social status of movement members, and different topics of contestation, both the breast cancer movement and the ADM forged lay–expert collaborations to contest official scientific assessments. Contesting scientization had similar ramifications for research results, government policies, movement credibility, discursive change, and forms of participatory activity. These tactics are an important means for politicizing communities and sustaining movement activism. Activists gained credibility by critically engaging with official research. Since in both cases policy was based on the assessments generated through research, activists were able to influence policy.

Contesting official knowledge was important for movement functioning, but activists also realized that policy was influenced by other factors, such as having sympathetic political and economic allies. Without such allies, even a large amount of information supporting movement perspectives would be likely to have little impact on the power that major economic interests exert over government decisions.

Activists in both movements also understood that engaging in collaborations takes time and energy, which might otherwise be devoted to public protest or public education. Consequently, they sometimes prioritized traditional movement tactics such as protests, lobbying and sit-ins. Nevertheless, critiques of official scientific research were important bases and buttresses for such movement activities.
Other democratizing science movements are likely to have characteristics besides those discussed in this paper’s social movement framework. Possible cases range from movements that engage in hotly contested and internationally controversial issues, such as global climate change, ecological disasters, and major epidemics, to regional disputes about local disease clusters, development initiatives, and pollution control. Social movements in such cases confront other fields of scientific research, as well as other governmental decision-makers and economic interests. This framework put forward here should be applicable to such cases, by providing a starting point for contesting and evaluating the political, social, and economic factors that shape struggles over knowledge.

The democratizing science movement framework also has several important theoretical implications. First, it supplements resource mobilization theory by conceptualizing scientific research as a material and discursive resource. Second, it elucidates how policy-making oriented around scientific knowledge can play an important role for instigating movement activism. Third, it explicates how expert knowledge can provide language and legitimacy for framing movement activities. In addition to contributing to social movement theory, the democratizing science movement framework draws attention to an important global phenomenon: conflicts over science, the spaces in which those conflicts occur, and the tactics through which they are implemented.

References


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