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# Contested credibility economies of nuclear power in India*

**Monamie Bhadra Haines**
Sociology, Nanyang Technological University, Singapore

## Abstract

STS scholars studying anti-nuclear activism in the context of nations in the Global North have observed the critical role of science to mediate relations of domination and resistance. Through a historical examination of anti-nuclear activism in India, this article investigates the instrumentalization of science as a liberal democratic rationality. In doing so, the article shows how elite Indian activists – many of whom are scientists, engineers, journalists and academic professionals – will never be seen as scientifically knowledgeable in nuclear matters, because of their non-state educational pedigrees. If activists cannot hold the state accountable through science, they have attempted to anticipate what other kinds of arguments and modes of contention may gain traction. As such, they have deployed more 'guerilla' tactics grounded in bureaucratic rationalities in the hopes of installing themselves as alternate sources of expertise in India's nuclear landscape.

## Keywords

anti-nuclear, civic epistemologies, credibility, democracy, India

## Introduction

In January 2013, renowned activist Sandeep Pandey was sitting under a green tarp in Jantar Mantar, a lane historically used for protests in New Delhi, India. Barefoot, cross-legged in a lotus position, and wearing the recognizable white kurta pajama worn by

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**Corresponding author:**
Monamie Bhadra, Sociology, School of Social Sciences, Nanyang Technological University, 14 Nanyang Avenue, 637332, Singapore.
Email: monamie.haines@ntu.edu.sg

activists, Pandey was undertaking a one-man fast to oppose India's pursuit of nuclear power. People passing by stalls airing a variety of grievances – the trampled rights of *adivasi* and Dalits, the impunity of rapists, reneged pension policies, or the social and environmental degradation stemming from GMOs – would stop at Pandey's and sit with him a while before moving on. When asked about what he hoped to accomplish with his fasting, he said that he and other anti-activists aspired to propagate the kind of populist fervor against government corruption that began two years earlier in Jantar Mantar by another hunger-striker, Anna Hazare, whose opposition propelled the creation of the Aam Aadmi Party and the passage of the Lokpal Act that promised to curb government corruption. Indeed, anti-nuclear activists have deployed numerous strategies, from staging public protests to interrogating state nuclear science and lodging court cases to pierce the carapace of the state (Bhadra, 2013). Following Prime Minister Manmohan Singh's unprecedented signing of the US-India nuclear deal in 2008, current Prime Minister Narendra Modi has continued Singh's nuclear policy by signing a series of bilateral agreements with Russia, Japan and Australia, among other nations, to import nuclear reactors and fuels in the pursuit of energy, economic security and geopolitical status. How might one reconcile an intensification of Indian anti-nuclear activism over the past decade with an apparent inability to gain traction with the overall nuclear project of the Indian state?

Anti-nuclear activism has spawned a cottage industry of scholarship across the social sciences, and indeed was one foundational intellectual concern for Western scholarship in science and technology studies (STS) (c.f. Feenberg, 1992; Winner, 1986; Wynne, 1982). The academic and activist scholarship on Western anti-nuclear movements shows that protests have been fundamentally concerned with democracy-building, producing new citizens and forging publicly accountable institutions to regulate and curtail nuclear development (Meyer, 2014; Rüdig, 1990). Anti-nuclear activism was made possible through activists' building technoscientific counter-expertise, rendering scientific knowledge a pre-eminent force in structuring state-society relationships into that of risk society (Beck et al., 1994; Moore, 2008; Nelkin and Pollak, 1981; Wynne, 2002) – albeit in culturally specific ways (Jasanoff, 2005a). An overview of Western anti-nuclear activism in terms of the role of science is thus pertinent to contextualizing anti-nuclear politics in India. Vis-à-vis the discourses and spectacles activists mobilized and the responses of nuclear establishments, one might see uncanny resemblances between Western anti-nuclear movements in the 1970s and '80s and contemporary anti-nuclear activism in India. For Western anti-nuclear activists, opposition was never solely grounded in the risks of technology, but encompassed broader alternative social imaginaries (Kaltefleiter and Pfaltzgraff, 1985; Nelkin and Pollak, 1981; Touraine et al., 1983; Welsh, 2000), particularly the strengthening of technocracy at the expense of democracy (Habermas, 1970, 1984; Winner, 1977, 1986) As in India, rural communities in Europe feared the erosion of traditional values and the centralization of governance, and felt resentment at bearing the burden of urban electrification. French provinces, for example, saw themselves as objects of internal colonization and exploitation (Nelkin and Pollak, 1981; Touraine et al., 1983). Farming and fishing communities in Britain worried about the effects of radiation on agriculture, livestock and fish (Welsh, 2000; Wynne, 1982). Germans worried about the collusion of science, secrecy and a centralizing state, and

used nuclear energy to launch a larger critique of modernity and capitalism (Flam, 1994; Nelkin and Pollak, 1981). One can observe the same kinds of discourses moving through the Indian nuclear landscape (Bhadra, 2013).

Still, differences remain between Western and Indian anti-nuclear activism, particularly in how scientific and technical knowledge is being produced and mobilized (or not) by the anti-nuclear movements, which points to deeper political, cultural and constitutional differences in relationships between science and democratic politics. Ezrahi (1990, 2012) argues that Western liberal democracies have always been preoccupied with separating science from politics, to preserve the 'necessary political fiction' that scientific knowledge and rationales could serve a neutral and apolitical *terra firma* of state decision-making. Such discursive separations played a key performative and substantive role in how the anti-nuclear movements reached closure in Western nations. As states opened limited avenues for public participation, they also dictated the terms of participation, where only those with scientific and technical expertise could enter the corridors of power to engage in technically-circumscribed deliberation (Dryzek et al., 2003; Flam, 1994; Nelkin and Pollak, 1981; Wynne, 1982). Anti-nuclear activists thus draw on the knowledge of scientists and engineers to develop formidable levels of technical counter-expertise to forge a language in common with the state. Scholars have noted how anti-nuclear activists have come to believe in the power of mobilizing 'tribes of experts' to gain political legitimacy by possessing scientific credentials (Bobrow and Dryzek, 1987; Mehta, 2005). In short, the history of Western anti-nuclear activism could be read as creating and drawing from nationally specific, collectively-shared, liberal democratic 'civic epistemologies' in the nuclear domain (Jasanoff, 2005a; Miller, 2004).

Largely overlooked is an exploration of spaces where scientized, socio-institutional forms of knowledge politics are not well-established, publicly accessible, nor reliably integrated into forms of nuclear politics and governance, such as in India. In other words, the concept of 'civic epistemology' – used to describe the highly institutionalized and patterned forms of knowledge development, contestation and deliberation in Western liberal democracies, through which publics and their representatives make claims to their governments about technological trajectories, and states justify their decisions – does not adequately explain the technopolitics of spaces outside liberal democracies, including the in-between, dappled regimes of democracy and authoritarianism that populate most of the world.

Illustrating the epistemic politics of the Bhopal industrial disaster in India, Jasanoff (2005b) shows how the usual categories of objectivity, criteria for expertise, demonstration practices and grounds for credibility – components of a functioning civic epistemology – reveal only epistemic fragmentation, where all actors attempting to produce knowledge – scientific or embodied – share only mutual distrust. Evaluating the possibilities of building technology assessment capabilities in Eastern and Central Europe, Hennen and Nierling (2014) describe how authoritarian modes of exercising power eclipse more rationalized forms of knowledge politics of policy justification and legitimization between state institutions and publics. Research on environmental politics in the Czech Republic illustrates how citizen groups struggle and fail to be viewed as 'attestive' witnesses (Ezrahi, 1990) who require specific forms of epistemic justification for policy decisions (Stöckelová, 2009). The politics of genetically modified organisms in

Chile also demonstrates how conflicting notions of expertise abound, with little agreement on the kinds of knowledge necessary for political closure (Tironi et al., 2013). Scholars writing on Brazil indicate its state and citizens may not share any civic epistemologies, because public justifications of technological policy are deemed unnecessary (Acero, 2010; Fonseca and Pereira, 2014). Framed as such, scholars find little by way of the knowledge politics of legitimation, but a great deal of raw coercion. Setting aside the observation that liberal democracies are also hybrid regimes with powerful authoritarian components, the cases point to blind-spots in our understandings of the variability of democracy and how legitimacy is secured in contexts where science is not a publicly-available or widely-accessible rationality, where science does not 'pattern as authoritative' (Jasanoff, 2005a). Indeed, Ottinger et al. (2017) write: 'More work remains to be done to understand why science is authoritative in some cultural and political contexts and not in others, extending research … to a broader range of cultures than those of advanced, liberal democracies' (p. 1037).

In this article, I answer this exhortation by decentering the focus on scientific deliberative rationalities to show how vanguard anti-nuclear activists in India have strategized and attempted to deploy different 'credibility economies' (Shapin, 1995) of nuclear knowledge-making with the Indian state and publics over the years, mobilizing different deliberative rationalities. Here, credibility economies between different actors are intended to render political power visible and achieve political legitimacy in terms of how collectively generated knowledges are produced, deployed, contested, consumed and upheld. Adopting a historical approach, I examine the terrain of credibility struggles by tracing how activists have attempted to forge their own credibility economies with the state, piggyback on existing credibility economies, and mobilize extra-institutional forms of political activism to achieve their core political desires: acknowledgment and admission of civilian nuclear expertise and the creation of an independent nuclear regulatory institution.

This article is the product of interviews conducted with elite, urban anti-nuclear activists, archival media analysis of English-language newspapers from the 1970s through the 1990s, and multi-sited event ethnographies of anti-nuclear events.[1] In the following sections, I first briefly discuss how science was never meant to be a political resource for attestive witnessing in postcolonial India. Instead, the state tried to constitute a credibility economy anchored in celebrating the technoscientific authority and military might of the Indian state. Next, I discuss the rise of Indian nuclear activism and attempts by activists to use liberal democratic norms of scientific evidentiary standards and forge a science-based credibility economy with the state how the hegemony of national-level civic epistemologies should be viewed as exclusionary, partial and not totalizing. Finally, I show how activists shifted their epistemic and political norms to mobilize based on procedural rationalities to gain traction with the Indian nuclear establishment.

## Celebrating nuclear power

Upon achieving independence in 1947, the 'necessary political fiction' (Ezrahi, 2012) with which the Indian state sought to bind a fragmented nation was never about depersonalizing power through technique, but about asserting power as a unified,

independent nation, enacting a national identity, and maintaining sovereignty over a heterogeneous land with diverse cultures (Khilnani, 1997; Roy, 2007). Science was not designed to be the grammar of credibility with diverse, multiethnic polities. The ambivalent experience with colonial rule was expressed in postcolonial leaders' importing and hybridizing liberal democratic ideals, such as scientific rationality, citizenship, equality of rights and the state, into the Indian context. Kaviraj (2010: 17) writes that while in Europe such ideas were seen by a majority of people as the fruits of political experimentation that sought to control arbitrary power, in India such notions emerged from the 'irresistible power of colonial rulers'. Thus, in the domain of nuclear power in India, science was a political resource, not for providing an avenue of transparency and accountability in governance, but rather for consolidating power and authority over public affairs in the state's governing apparatus. In Ezrahi's terms, nuclear science was cultivated as spectacle that required the 'celebratory gaze', where subjects would be awed by the symbolic spectacle of the nuclear sublime.

Scholars have written extensively about how Republic Day parades displaying India's military might, visits to ceremonies launching nuclear power plants, the rosy memoirs of nuclear officials, attempts to cultivate the so-called 'scientific temper' through nuclear literacy programs, and weapons tests themselves, are forms through which the Indian state colonized the public imagination of nuclear power as something to be celebrated as the pinnacle of achievement (Abraham, 1998; Kaur, 2009; Roy, 2009). To this, one might add the circulation of images that exemplified Bhabha's nuclear vision, namely schematics of the indigenous three-stage nuclear program, which would cope with its dearth of available uranium by utilizing India's abundant thorium deposits found in monazite sands. Unveiling the plan in 1954 as a program of self-reliance in a uranium-scarce nation, Bhabha and subsequent generations of nuclear scientists have publicly defended the three-step program as the sole means for energy self-reliance. Homi Sethna, Chairman of the Indian Atomic Energy Commission, who presided over the 'peaceful nuclear explosions' under Indira Gandhi in 1974, stated: 'The cornerstone of our nuclear strategy has always been self-reliance. … We opted for an integrated nuclear programme that took into account the availability of local resources and technological and economic capabilities' (quoted in Bidwai, 1978). Images of three-stage program have been, and continue to be, replicated in Department of Atomic Energy (DAE) literature, scientific articles, public outreach programs, and nuclear policy reports. National magazine and news articles on nuclear energy frequently refer to India's indigenous plan. During interviews with elite civilians, even if people knew little about the technical details about the nuclear energy, they knew about thorium, the three-stage program and its relation to self-reliance. Adopting the 'scientific temper', then, meant accepting the discursive power of the state.

Such calculated dissemination of the state's nuclear-democratic imaginary is not only intended to elicit the celebratory gaze in Indian polities but are also performs a social contract between the state and citizens. Pageants, groundbreaking ceremonies, the three-stage reactors, nuclear literacy campaigns and weapons tests not only reveal the alternately benign-paternalistic and military-coercive might of the state, but also reveal vulnerabilities, and hence possibilities of accountability. Yet, such knowing is reserved for selected elite, often middle-class publics. A survey conducted by the Centre for the

Study of Developing Societies showed that a staggering 54% of the Indian electorate had not heard about India's nuclear weapons tests (Abraham, 2009). Polities constituted through nuclear power expect the state to live up to its nationalistic, global arriviste logics when they and the state come to know nuclear power together during nuclear pageantry or missile tests. Similarly, citizens come to know nuclear power when they are constituted as citizens who require improvement through scientific literacy projects so they accept the rationales of the state's nuclear agenda. Although such modes of producing collective knowledge are largely symbolic and not embedded in apolitical epistemic practices, such as vetting scientific or legal evidence, they are nonetheless spaces where the state attempts to instantiate a particular civic epistemology with specific publics, and constitute one another through the process of knowing.

## Imagining a science-based credibility economy with the state

The heady afterglow of Indian Independence was steadily eclipsed by the onset of general disillusionment with technocratic development models among many in India's rural poor and urban intelligentsia, as has been widely documented in Indian academic and activist communities (e.g. Baviskar, 2005; Gadgil and Guha, 1995; Nandy, 1988; Raina, 1997; Shiva, 1997). The late 1970s through 1990s witnessed a set of challenges to nuclear power. An alternative ethics emerging from the vocabulary of environmental and livelihood protection questioned technocratic ethical commitments and the economic policies they generated. In particular, the near constant problems experienced by the American-built Tarapur nuclear power plant, located north of then-Bombay, precipitated critical responses either expressing dismay that India did not build from an indigenous design, or alarm at Tarapur's moniker as the 'most polluted atomic power plant in the world', and the environmental and bodily harm it caused Tarapur's large contingent of unskilled, temporary workers and the inhabitants of the surrounding villages (e.g. Bidwai, 1978; Centre for Science and Environment, 1984).

In 1978, Praful Bidwai, an investigative journalist wrote a feature article, 'Nuclear power in India: A white elephant?' in *Business India*. In doing so, he did for Indian anti-nuclear activism what Rachael Carson's *Silent Spring* did for the American environmental movement – putting forward a new set of social and environmental ethics that called the state and citizens to rethink ideas about democracy, energy, environment and the state's responsibilities to its citizens. Through revealing interviews with mostly anonymous high-level scientists and engineers in the nuclear establishment, Bidwai painted a picture of a power-hungry and secretive organization buying and building expensive and unreliable technologies that proved to be dangerous to nuclear workers and the environment. Reporting on everything from the numerous technical difficulties facing commercial reactors to the nuclear establishment's hierarchical organizational culture that does not reward independent thinking and initiative, from the economics of nuclear power to the DAE checkered commitment to indigenous nuclear development, Bidwai sounded the call to activists of all stripes to oppose India's pursuit of nuclear power.

How could citizens pursue such activism? And on what grounds? The early anti-nuclear activists believed that the only form of knowledge that might get traction with

the state, in terms of seriously undermining the nuclear project and democratizing it, was scientific knowledge – as had been experienced in many Western nations. This assumption on the parts of early anti-nuclear activists of what would constitute a credibility economy with the Indian state is key. Those writing on the Nehruvian nuclear program have noted that, in spite of the rhetoric of self-reliance, Indian nuclear scientists developed close ties with the international epistemic community for nuclear research by attending annual conferences, creating collaborative research projects, exchanging knowledge and most controversially, purchasing foreign nuclear reactors (Abraham, 1998; Anderson, 2010). The same was true of anti-nuclear activists. The first generation of activists were keen observers of international anti-nuclear activism, following developments in nations like Germany, Sweden, the United States, France, the United Kingdom and Soviet Union, and incorporated outside ideas into Indian activism back home. Although the majority of activists hardly had the resources to visit and participate in international conferences, it is notable that the individuals who would become anti-nuclear leaders had extensive academic ties in the West, particularly the United States.

Many of these were urban, upper-caste men, and were physicists, doctors and natural and social scientists in civil society. Dhirendra Sharma, for example, who would later form Committee for a Sane Nuclear Policy (COSNUP), received his PhD in the epistemology of science at University College London. He took positions as a visiting scholar in Columbia University, the University of Wisconsin and other universities, and was active in Pugwash, as well as the anti-nuclear and anti-Vietnam campaigns in the US, during which he formed a significant friendship with Noam Chomsky. He returned to India in 1974 and became the director of Jawaharlal Nehru University's (JNU) Centre for Studies in Science Policy. Gandhian anti-nuclear activist Surendra Gadekar, after completing his PhD at an IIT, was a post-doctoral fellow at Iowa State University, where he went with his wife, physician Sanghamitra Gadekar. Their English-language anti-nuclear publication, *Anumukti* devoted many pages to updating Indian activists about the goings-on abroad, and reprinted news articles in international media, such as from sources like *The Bulletin of Atomic Scientists* and *Wise News Communique*, as well as radiation-related scientific studies and even personal testimonies to the US Congress. MV Ramana, who would later write economic, technical, and political critiques on the nuclear establishment, received his PhD in physics from Boston University, and held postdoctoral positions in University of Toronto and MIT before joining Princeton University. SP Udayakumar, before spearheading mass mobilization against the Koodankulam nuclear reactor, received his doctorate in political science from University of Hawai'i and has since taught extensively in American universities, such as Monmouth University in New Jersey; Udayakumar cites his interest in green politics from his time spent in Europe and the United States, and has since tried to promote green politics in Tamil Nadu (Roy, 2013).

The anti-nuclear stance of these individuals was influenced not only by experiences and networks created abroad, but also through exposure to Western thought on science and technology in society, complementing Gandhian ideas about science, technology and citizenship that already suffused Indian activism. Many of these activists were conversant with the classic works of Lewis Mumford, Ivan Illich and Jacques Ellul, as well as with newer works coming out of the United States. Gadekar, for example, wrote extensive reviews of English-language books coming out the United States and Europe,

such as Jeff Smith's *Unthinking the Unthinkable* (Gadekar, 1990). Another anti-nuclear journalist writing about the protest against the proposed Bhoothathankettu nuclear power plant in Kerala quoted Paul Feyerabend: 'Scientists, of course, assume that there is nothing better than science.' The citizens in a democracy cannot rest content with such a pious faith. Participation of laymen in fundamental decisions that affect the community is required even if it should lower the success rate of the decisions' (Kumar, 1985). Moreover, as almost all nuclear-related knowledge, such as that about the price of heavy water, the cost of uranium, and amount of waste, was classified, many anti-nuclear activists were forced to rely on nuclear information gleaned from public, Western sources, to write critiques of nuclear energy. Dhirendra Sharma (1986) writes: 'two important points had gained currency amongst sections of the Indian intelligentsia: – energy potential of nuclear power was beings seriously doubted; waste disposal and radiational hazards were being considered as major stumbling blocks in the nuclear programme development. These realizations were, however, a fallout from reports published in the West.'

MP Verghese, who organized the aforementioned anti-nuclear campaign in Kerala, prepared technical reports through correspondence with foreign scientists, which were extrapolated to speculate on the possible effects of the proposed Bhoothathankettu plant (Verghese, 2000). Thus, in substantive ways, the desire to form a science-based credibility economy with the state was significantly shaped by activists' intellectual connections with Western academia, intellectual traditions, anti-nuclear movements, as well as by the far more accessible nuclear-related knowledge emerging from the United States and Europe.

More subtly, Nehru's anxieties with and ambivalence towards Western modernity, were reproduced in these activists in their credibility performances. During interviews, the Gadekars were very careful to ensure their statements about nuclear power were dispassionate and objective, even as they held a deep moral conviction to helping the communities living and suffering near nuclear installations. MV Ramana was always critical of blithely vilifying the nuclear establishment in broad strokes and called for nuance in assessments. VT Padmanabhan, too, refrained from tarring the nuclear establishment as a categorically secretive and undemocratic. Even as these scientists held profound emotional conviction to helping people and eradicating the Indian nuclear program, they practiced a self-reflexivity to ensure their political convictions and emotions did not affect their 'scientific objectivity', even if it meant concluding, for example, that in uranium mining colonies, dust was more the culprit of widespread illness than was radiation. Anti-nuclear activists, then, were implicitly engaging with the scientific temper, what it meant for them, and how to practice science in a way that resonated with their humanitarian ethics, thereby forming the foundation of credibility in the knowledge politics they wanted the state and broader publics to adopt as part of a new Indian public rationality around nuclear power.

The issue of developing techno-scientific counter-expertise came to the fore when allegations emerged about Tarapur's horrendous safety record in the United States, where Clifford Beck, a US Atomic Energy Commission official, stated, 'there is likely to be a major nuclear disaster in the world, and the prime candidate is Tarapur' (quoted in Denton, 2016: 120).[2] The Indian nuclear establishment dubbed the charges as false and noted their own impeccable safety record (Kapoor, 1983) and argued that the radiation limits adhered to by the International Atomic Energy Agency and the US were far too

conservative. In this context, trying to air grievances to the state through emotional and moral pleas, unless couched in livelihood concerns, had limited chances of success. In response, several prominent anti-nuclear scientist-activists urged rational criticism rather than emotive conjurings of atomic holocausts and nuclear armageddon. Prominent activist R Ramachandran of Kerala wrote: 'From the point of public perception of such technological issues, what is important is to present a perspective tempered by science rather than by emotionally charged considerations' (Ramachandran, 1992). Indeed, Roy (2009) writes how the apocalyptic imaginaries of anti-nuclear activists were directly responsible for weak popular opposition to nuclear power. For activists, fighting the state meant being armed with the artillery chosen by the state, namely techno-economic and scientific facts about nuclear power.

Yet the state denied activists the ability to harness such kinds of information. Unlike Western nations, where anti-nuclear movements were legitimized, if not initiated, by establishment scientists to disrupt prevalent constellations of scientific knowledge and power (Moore, 2008; Nelkin and Pollak, 1981), in India, these kinds of scientific defection were not seen, with only rare individuals speaking out against the nuclear establishment once they retired. Anti-nuclear scientists had to show themselves to be authoritative, if alternative, purveyors of expertise, equal to the nuclear establishment's technoscientific experts, who were products of Bhabha's organizational philosophy of 'growing science' (Udgaonkar, 1985). Under this principle, men and some women were trained by Bhabha Atomic Research Centre (BARC) and DAE scientists at the Saha Institute of Physics in Calcutta and the Tata Institute of Fundamental Research in Bombay. Bhabha had personally recruited many of these men (Anderson, 2010). They rose through the ranks of the nuclear establishment to become BARC officials and scientists. As such, their expertise and trustworthiness resided in their institutional affiliations, which, in turn, received its credibility from their commitment to India's scientific and economic development under the rubric of self-reliance.

The Indian nuclear establishment brooked no dissent. Scientists who did speak out against the nuclear establishment were quickly fired from their positions (Bidwai, 1978). For example, when Ahmed Ali Khan, director of the health physics division at the Nuclear Fuel Complex, publicly revealed his findings of contaminated drinking water caused by the Complex's zirconium oxide plant sending its effluents through regular storm water drains and into surrounding villages since 1971, he was demoted and then fired, upon which he became a street cloth seller (Radha Krishna, 1989). Captain Budhhi Kota Subharao, retired officer of the Indian Navy, was arrested and jailed by high-ranking BARC and DAE officials on May 30, 1988 for questioning 'the technical feasibility of the (nuclear) submarine propulsion systems, the designs for which were developed by BARC scientists' (Menezes, 1992). Outside the establishment, RVG Menon, who was director of the Agency for Non-Conventional Energy and Rural Technology for the State of Kerala, was removed from his position when he spoke out against nuclear power, actively sought by the Kerala government. Dhirendra Sharma, too, was personally removed from his directorship at Jawaharlal Nehru University by Indira Gandhi.[3] One veteran activist noted: 'There are many competent people. But they will not get into controversies. Even my guru, CNR Rao, director of the IISc [Indian Institute of Science], and has been scientific adviser to the minister for a long time. He made an anti-nuclear

statement, but would not let himself be filmed. They do not want to get into a controversy, and they will suffer. … they fear the nuclear political establishment.'[4] In sum, the kind of establishment scientist-driven anti-nuclear opposition experienced in Western nations were not emerging in India.

Against such boundary policing, activists had much to accomplish simultaneously if they were to be seen as counter-experts and attestive publics justified in asking for access to nuclear policy-related knowledge. For citizens to ask for scientific justifications was also a demand for a new set of ethical principles governing state-society relationships. Elite, urban activists had to convince the wider public that they have the right to demand nuclear-related information in the interest of transparency, and the right to participate in nuclear policy, which had been off-limits. In the process of making such a case, activists were trying to bring about the existence of a new public that had been non-existent at worst, and a minority at best, while implicitly arguing for themselves as the rightful representatives of such a public. Public-making necessarily required acknowledgment and legitimation by the state, and as such could only occur in conjunction with elite activists' demands to the state to have access to nuclear policy relevant knowledge. At the same time, activists were positioning themselves to become new counter-experts, which they understood would occur only if their demands for access to proprietary knowledge was met.

Activists intuited that simply gaining access to information and knowledge transference alone did not bestow them experts; they needed to divine and appropriate the kinds of cultural norms and patterns at play that would bequeath them credibility. An anecdote Surendra Gadekar likes to recount is quite telling of the cultural conferring of expertise. In the early 1990s, Gadekar had the opportunity to meet then Atomic Energy Regulation Board (AERB) Chairman, A Gopalakrishnan. According to Gadekar, the first thing out of Gopalakrishnan's mouth, even before standard greetings, was his introducing himself with his qualifications, such as his first-class-first standing in exams and his long list of credentials. Then, Gopalakrishnan asked Gadekar about his credentials, to which he answered, 'BSc failed', even though he went to gain admittance to one of the most prestigious Indian Institutes of Technology. Gopalakrishnan lived in a world where one's credentials and accolades dictated social standing and reverence. Decades later, Gadekar noted with gallows humor that all the comments attacked him for being a 'nobody' when he refuted point by point all the mistaken assumptions and data included in a piece by Abdul Kalam, the father of the Indian missile, in the *The Hindu.* Gadekar surmises the public mindset aptly: 'Where is Dr Kalam, and where is this fellow?'

The most prominent way in which activists imagined that they could shape public opinion was by demanding and participating in a public debate with the state about the future of nuclear power in India, where they could demonstrate their expertise. Ever since activists began vocally criticizing the nuclear establishment, one of their chief demands, in addition to the construction of an independent regulatory agency and accessibility to nuclear information, was the organization of an actual national debate about nuclear energy that would include views from multiple perspectives. Although some environmentalists thought such a debate would achieve little, as they 'don't agree on even fundamental issues' (Menon, 1985), many activists were initially optimistic about the possibility of democratizing nuclear policy and settling the question of nuclear power once and for all in India. For instance, echoing liberal democratic values, R Rajaraman

(1988) writes: 'I welcome the emergence of this controversy as would anyone with a respect for healthy democratic processes. Such controversies and the resultant discussion strengthen the element of checks and balances in the development of our nuclear policy and if conducted without acrimony, can be invaluable.'

The debate finally came to fruition around the grassroots mobilization against the Kaiga Nuclear Power Plant, slated to be built in a rainforest in Karnataka. The Bangalore-based group Citizens for Alternatives to Nuclear Energy (CANE) demanded that the Chief Minister of Karnataka, Ramakrishna Hegde, organize a bona fide debate with the DAE on nuclear power, broadly and on Kaiga more specifically. CANE activists sought a public debate to be conducted in the form of a hearing of public grievances, to provide an opportunity for the voices of villagers to be heard. On January of 1988, it was announced that such a debate would take place in April, but that was later postponed to December 10-11, 1988 at the Indian Institute of Science, Bangalore (Prasad, 1988). In the meantime, the debate, initially construed as a deliberative platform where the future of nuclear energy in India would be decided, was downgraded to a seminar by Chief Minister Hegde in February 1988, where different individuals would make different presentations, but not actively engage different speakers. Moreover, a couple of weeks before the workshop was to be held, on November 29, 1988, the Minister of State for Science and Technology, KR Narayanan, told the Rajya Sabha that the Karnataka government was cooperating fully with the DAE and there was no intention of abandoning the project (*Sunday*, 1988).

Thus, in the days leading up to the debate, activists were threatening to boycott it, calling it an 'eyewash' (Deccan Herald, 1988) and 'an exercise in futility' 'that … would not serve any purpose' (Prasad, 1988). But activists attended the workshop, anyway, at the behest of the new Chief Minister, S.R. Bommai (Ramachandra, 1988). On the day of the seminar, activists were in a belligerent mood. The seminar, now called, 'National workshop on nuclear power projects with special reference to Kaiga', was a closed-door affair, consisting of twelve nuclear experts and an equal number of environmental activists, including a retired chief justice, academics, journalists, scientists and few villagers. Not everyone who was invited was able to fit inside the room, leading to much outrage.

Newspapers widely covered the debate, providing not only substantive coverage of the content of arguments, but also of the wider meaning of such an unprecedented encounter. By and large, the media portrayed the activists in a sympathetic light, and ridiculed scientists as blindly poo-pooing activists' assertions that (1) nuclear power was too expensive if taking heavy water into account, (2) safer alternatives were available to meet Karnataka's energy challenges, (3) low-level radiation exacerbated human health and the environment through, (4) reactors were sited through shoddy and politically-motivated practices, (5) atomic weapons were inextricably linked to energy, (6) waste disposal and emergency preparedness plans were entirely absent, and, underscoring all of these dimensions (7) the nuclear establishment was secretive and obscurantist. When confronted with the absence of Kaiga-related documents, one newsman quoted a somewhat ludicrous statement from MR Srinivasan, who defended the inaccessibility of DAE reports by saying, 'this country cannot afford to waste money on paper required for photocopying the voluminous reports' (Shankar, 1989). Perhaps Srinivasan employed this argument to co-opt the environmentalism of the activists.

While CANE asserted that it unequivocally 'won' the debate, newspapers, even those sympathizing with the activists, bemoaned that there was 'no meeting of the minds' (Sharma, 1989) in a veritable 'slanging match', which was not the 'healthy public debate on Kaiga in a manner supposedly common in the West' (Parthasarthy, 1990), but only succeeded 'to generate much heat without light' (Parthasarthy, 1990). Kalpana Sharma (1989), then assistant editor of *Indian Express*, surmised that the two camps were deploying their arguments from two very different views of the objects and ends of development. While the nuclear scientists adopted a techno-economic worldview of development, concerned with electrification as a measure of industrialization, which in turn signified national progress, the activists were operating from a Gandhian, people-centric and justice-oriented view of development, within which nuclear power needed to be interrogated. Thus, in many ways, newspapers implicitly viewed the seminar as a reproduction of the frictions between Gandhian and Nehruvian philosophies of development.

The nuclear scientists were largely depicted as arrogant and condescending. Sharma wrote, 'it was evident that most of the nuclear scientists considered the exercise something of a waste of time. Barring one or two, most of their presentations were excessively casual, premised on a view of the audience as a bunch of ignoramuses who had to be taught the very basics of nuclear power. … Instead of giving straight answers on the questions about the inherent risks involved in nuclear power technology, the scientists brushed them off with statements about how more people die in road accidents every day than are killed in nuclear accidents' (Parthasarthy, 1990). Chitra Kannabiran (1989) of *Bulletin of Sciences* writes, 'rash assertions about the lack of harmful effects of radiation were made with little detail about the source of information.' MK Shankar (1989) of *Sunday Daily* argued that 'the most dubious role has been that of the scientists representing the DAE … for their contempt of the public and the informed opinion at the recent national "workshop" in Banaglore'.

Simultaneously, activists' emotional outbursts, jeering and booing were glossed over in most news articles, preferring instead to showcase the validity of activist's questions posed to the nuclear scientists, and emphasizing how well-studied they were or how they out-debated the nuclear scientists using both scientific and common-sense arguments (c.f. Hegde, 1989; Prasad, 1988; Ramachandra, 1988; Shankar, 1989). When, CANE activist Nagesh Hegde yelled at one point, 'What right do you have to rape Karnataka?' and writer, Shivaram Karanth asked in an emotion-choked voice, 'you are wise men and must permit ordinary men to live. Please spare us atomic deaths', these statements were reported in a newspaper circulated in the UK oriented towards the Indian diaspora, *The Indian Post*, but could not be found in domestic Indian newspapers (Prasad, 1988).[5] Moreover, activists were portrayed as doing the best they could without having access to factual information. Almost all newspapers noted how the activists were operating on second-hand information gathered from international sources, and that given this handicap, a debate would be difficult to facilitate. Kannabiran (1989) wrote: 'The non-availability of sufficient information worked against all those outside the DAE. Routine data on operational conditions in nuclear power plant in India … are extremely sparse and hard to find. How can one argue about such complex and multifaceted issues such as the effects of radiation on health without having data that has been generated locally?

Information available is mostly from other countries, and what is applicable to those countries is not necessarily applicable to Indian condition.'

The media, then, were implicitly participating in imagining a new credibility economy by representing the activists not so much as experts on equal footing with the nuclear scientists, but instead as knowledgeable individuals raising logical and rational concerns and deserving to gain access to nuclear policy-relevant knowledge contained within the tight grasp of the state's nuclear scientists. To be portrayed as worthy recipients of nuclear knowledge, by and large, these people could not be shown as overly emotional, uncouth or disrespectful of the state's nuclear experts. In short, if expertise is accepted in India because it is inscribed on personal qualities, merits, achievements and institutional pedigree, then creating an alternative locus of expertise requires inscribing a similar narrative onto challengers. The print media was grooming anti-nuclear activists to become a new fount of trusted expertise, not only because they raised important issues, but because of who raised these concerns. In the previous two years, activists had solidified their grassroots credentials through media campaigns and protests. They were emerging as individuals with deep empathy for the human condition, commitment to eradicating suffering, belief in the power of local forms of democratic governance, and love for the environment and the people who live in it. In particular, scientists who were also activists were seen as individuals with a conscience and as using their technoscientific skills for public betterment.

After the 1998 weapons test, anti-nuclear energy mobilization was replaced by the peace movement. Additionally, the efforts of elite anti-nuclear scientists to generate their own epidemiological studies of nuclear sites and uranium mining colonies, as well as political and economic analyses of the nuclear program, failed to gain much traction with the Indian state, wider publics or villagers who lived in areas slated for nuclear development. As political scientist Achin Vanaik notes, these efforts were received as a 'mild irritant, nothing more'. Anti-nuclear energy mobilization began anew after the US-India nuclear deal of 2008 and the Fukushima nuclear disaster (Bhadra, 2013). Activists began shifting the registers of accountability with the state from lodging claims of scientific expertise to claims anchored in procedural rationalities of accounting.

## Adopting procedural rationalities of nuclear knowledge-making

Bornstein and Sharma (2015), observing Indian activists' increasing use of judicialized activism, have written how in the current political landscape urban activists and the Indian state engage primarily through the discursive politics of 'technomoral' claims-making through India's legal institutions. For Bornstein and Sharma, technomoral politics 'refers to how various social actors translate moral projects into technical, implementable terms as laws or policies, as well as justify technocratic acts – such as development and legislation regarding administrative reform – as moral imperatives' (p. 11). Technomoral politics are couched in the languages of policy, law and reform, thereby bounding off 'the messy vernaculars of politics and morality'. The authors note that the gradual rise of neoliberal governance since the 1970s in India were marked by a burgeoning of 'non-party political formations' that challenged state policy in the areas of

gender, environment and human rights, particularly through judicial means with the advent of public interest litigation after the suspension of civil liberties (known as the Emergency) from 1975 to 1977 under Indira Gandhi. As such, early activism in the 1980s and 1990s helped drastically expand the legal and policy tools available to citizens and NGOs to lodge claims to the state.

Anti-nuclear activism is no exception, and activists have lodged cases in the Supreme Court to contest, for example, the dumping of irradiated butter in India after Chernobyl,[6] the firing of an employee for whistleblowing on nuclear negligence,[7] and more recently the building of a nuclear power plant. In early February of 2013, amidst ongoing anti-corruption and anti-rape movements raging across India, a finding about defective Russian valves used in the Koodankulam Nuclear Power Plant (KNPP) in the southern state of Tamil Nadu ricocheted through the anti-nuclear activist community in India. The anti-nuclear community was decentralized and small, and its members were largely English-speaking and urban-based. Activists had discovered that a subsidiary of the Russian nuclear corporation Rosatom, ZiO-Podolsk, had manufactured valves and possibly other critical parts from substandard steel and sold these compromised components to India. The news first appeared in the socially progressive news magazine *Tehelka*, and made its way to the widely-read, nationally-distributed English-language dailies: The *Times of India* published a short piece within two weeks, and *The Hindu* and *The New Indian Express* featured more substantive articles two months later. Anti-nuclear activists, long trying to raise the public profile of the dangers of nuclear energy, viewed this revelation of Russian nuclear corruption and possible complicity by the Indian state as an unexpected boon. Such news would unequivocally yoke nuclear energy to the surrounding vitriol against government corruption and incompetence, and help win national public support for a cause that has historically been characterized by sporadic, decentralized, local opposition, but never a national movement.

Activists submitted a special leave petition detailing the ZiO-Podolsk scandal to bolster a public interest litigation suit they already filed with the Supreme Court in 2013. The public litigation suit claimed that the Department of Atomic Energy had not followed its own procedural mechanisms to ensure the safety of the KNPP to receive proper environmental clearance, most notably the proviso of having a public hearing (*DiaNuke.org*, 2011) In the special leave petition, activists alleged that defective equipment fashioned from substandard steel posed significant safety and environmental risks – risks further compounded by a captured Atomic Energy Regulatory Board and the noncompliance of the Nuclear Power Corporation of India, Limited (NPCIL) in notifying citizens of disaster management procedures or performing mock evacuation drills. Activists asked the Supreme Court to stay the commissioning of KNPP until an investigation of substandard parts would be undertaken by independent experts.

These findings fell flat in the Supreme Court and were not even referenced in the final judgments offered by the two-judge bench, Chief Justices KS Radhakrishnan and Dipak Misra. The verdict ordered the culturally and organizationally overlapping institutions of nuclear promotion and regulations, the Department of Atomic Energy and the Atomic Energy Regulatory Board, respectively, to follow their established protocols for nuclear development. Without recognizing any civilian sources of nuclear knowledge, the Court accepted the DAE's rationale and justification of nuclear power, as well as their

assurances of safety. Invoking a litany of acronyms symbolizing the state's nuclear expertise, the Court stated: 'AEC, DAE, BARC, AERB, NPCIL, TNPCB the expert bodies, are all unanimous in their opinions that adequate safety and security measures have already taken at KKNPP which are to be given due weight that they deserve.' Moreover, Radhakrishnan argued, nuclear power was absolutely necessary for all Indian lives to flourish. He interpreted the 'right to life' guarantee of Article 21 of the Indian Constitution by stating the public good was fulfilled with the growth of nuclear power: 'Electricity is the heart and soul of modern life, a life meant not for the rich and famous alone but also for the poor and down trodden. … Nuclear power plant is being established not to negate right to life but to protect the right to life guaranteed under Article 21 of the Constitution. The petitioner's contention that the establishment of nuclear power plant at Kudankulam will make an inroad into the right to live guaranteed under Article 21 of the Constitution, is therefore has no basis.' Radhakrishnan further philosophized, 'Nobody on this earth can predict what would happen in future and to a larger extent we have to leave it to the destiny.' On this reading, nuclear energy could not really be controlled by man, even as India was morally obligated to set nuclear expansion in motion.

When activists pursued litigation asking the Supreme Court to uphold existing environmental laws and follow procedures formulated by the DAE, they presumed they had correctly interpreted the prevailing knowledge politics, where legal claims were couched in the language of constitutional rights. They assumed there would be epistemological consonance between the premises of their arguments put forth to the Supreme Court, the Court's interpretations of the law, and the decisions that should rationally flow from their common understanding of public reason. Moreover, activists were certain that uncovering nuclear fraud would expose the rot in India's nuclear institutions and give credence in both the courts of law and public opinion to their demands for transparency and independence in regulatory processes, safety in nuclear reactors, and slowing down the Central Government's nuclear ambitions.

The court decision stunned activists. To their dismay, news of nuclear malfeasance barely caused a ripple in the English-language news media and wider publics. The kinds of enthusiastic and well-attended rallies drawing in citizens of all castes and classes – against government corruption or the Indian police's tacit sanction of rape – were nowhere to be found. During a Facebook conversation with one of the lead activists based in Delhi about the lack of public support, he asked me in utter frustration if he should 'fast unto the death' or 'perform self-immolation' in a public place to force public attention to nuclear matters. I urged him not to pour petrol over his head and light a match. During interviews, activists stated that they did not view the judgment as legitimate, but wearily resigned themselves to the idea that the Supreme Court would never view their expertise as valid, and would always defer to that of the DAE and AERB. If they pursued Supreme Court litigation over nuclear power in the future, it would serve the 'tactical purpose' of creating delays in reactor construction rather than substantive change.

Such technomoral activism has spilled beyond the courts of law into more guerilla-style forms of activism through online platforms. The internet helped India's authoritarian nuclear establishment maintain its self-representation as a democratic institution. During the 1990s, in response to the Comptroller Auditor General that accused the nuclear establishment of cost overruns, absence of safety protocols, and refusal to provide financial

documents, the nuclear establishment began to use the internet to publish its documents, in the name of transparency. Activists tell of how documents were carefully redacted, and available as PDFs, often unconnected to homepages, and often without any assignation of what these documents were for or what they meant. Yet, when asked by activists about specific kinds of information, they would be told either that it was classified because it related to national security, or that it was available online. As such, the internet became part of the sociotechnical assemblage and resource through which the state deployed its mechanisms of democratic transparency. Meanwhile, the internet allowed activists to create a centralized clearinghouse of nuclear-related information and news related to all that was going on in India, especially all the geographically decentralized site-specific anti-nuclear protests that were occurring around the Indian countryside. Eventually, Google translator allows activists to translate documents found in other languages with more ease. Although imperfect translations are an endemic side effect of the program, it still allows activists to catch glimpses of the nuclear state at work.

The availability of random documents and spreadsheets has led some veteran activists to test out new forms of technomoral activism outside the courts. Some anti-nuclear scientists, who used to undertake citizen science activities such as epidemiological surveys, have begun to develop a mode of dissent by adopting a forensic approach to holding the state accountable. Similar to the 'lone gunmen' of the popular show *The X-Files*, a small group of scientist cum activists in Kerala, – VT Padmanabhan, V Pugalzhenthi, and R Ramesh – have devoted themselves to uncovering DAE malfeasance in the name of reactor safety and human health. 'Nothing is that secret in the nuclear establishment', Padmanabhan tells me. 'You can find everything if you know how to find.' These are the digital sleuths who gather and sift through the crumbs of existing published data of DAE operations available on the internet. They are forensic specialists, savvy in how to navigate India's labyrinthine bureaucracy and pull tendrils of data to track down discrepancies. They gather information buried in obscure PDFs online, such as power outages, statements from sub-contractors and DAE officials, hospital bills, and corporate social responsibility project expenses, to create a cohesive bricolage of DAE activities.

For example, Padmanabhan detailed to me how, through unorthodox means, the trio uncovered evidence of nuclear graft in the ZiO Podolsk scandal. From different sites on the internet, activists found statements from sub-contractors who had boasted how they had re-outfitted the turbine of the KNPP. The activists also uncovered another statement from a Department of Energy report that showed how the reactor core was an old model and had more dangerous welded seams, but in a different statement sent by the DAE to the International Atomic Agency, the reactor core was supposedly the state-of-the-art, and did not have seams inside. Using Google translator, the trio came across the news on a Russian website that stated that the subcontractor executive from ZiO Podolsk was sent to jail for embezzlement. Together, the activists wove a narrative of foreign corporate duplicity and the Indian state's complicity.

Among other activities, the activists also track the electricity output of KNPP from a public website that reports electricity flows throughout the region and reports outages. Padmanabhan and Pugalzhenthi both speak of a small shop owner in Chennai who, in his spare time, trolls through the DAE websites and downloads expense reports, such as how much money was spent on hospitals, and gives these reports to Padmanabhan. They

notice that 30% of money was given to an eye care center. This could indicate a significant health-related finding, where eye troubles were caused by a community's close proximity to the reactor, or it could simply be a reflection of a corporate social responsibility endeavor that gives eye care to the poor.

Unlike earlier anti-nuclear activists, these activists do not want to use the information they find to dismantle the nuclear program, because in their view the path dependencies have already become entrenched. The 'crime' of nuclear power has already been committed. Now, the only thing left to do is 'solve' the crime. As such, the Indian lone gunmen are content to provide this information to the nuclear establishment to do with as they see fit. These activists know they cannot tackle nuclear expertise directly – all have produced, to no avail, independent epidemiological studies of nuclear communities. But they have learned to operate within the bureaucratic rationality of the nuclear establishment. They do not see themselves as producing outside knowledge. They are trying to hold the DAE accountable to its own ideals of procedural integrity by teasing out a narrative of nuclear impropriety from available data .

Even though, in this forensic brand of activism, these actors are no longer rejecting the state's nuclear imaginary, but rather working with it to ensure safety and rule-following, it is worth examining how expertise is being constituted. These activists are attempting to fashion themselves to align with the imaginaries the state has of its citizens, as exemplified in the recent anti-corruption movements. The populist anti-corruption movement in the past two years used a politics of simplification and visibility to clearly link material evidence of disrepair to government ineptitude. Roy (2014) writes how the anti-corruption movement covered a wide range of intervention stories, from infrastructural breakdown (potholed roads, absent sewer lines, high electricity bills, empty water taps), to the non-delivery of government services (failure to receive subsidized food rations, passport application delays), to access to the law (delays in registering criminal complaints and case adjudication). Roy states that all intervention stories had in common the following features: (1) 'seeing' problems was extremely simple and only required visual evidence and documentation gathered through sting operations to expose government 'scams', and (2) fixing these problems was fundamentally an easy task if only the state would act 'as per rule'. Interventions by the anti-corruption movement involved filing right-to-information claims and cultivating legal-procedural knowledge in citizens to file police reports the correct way and to understand the fine print in voter registration so those with legal documentation could work. The laws were robust as they were; what was needed was a legally knowledgeable citizenry to implement the laws in place.

Indian anti-nuclear activists are showing signs of embracing the legal-procedural epistemic practices of the anti-corruption movement in how they are attempting to hold the state accountable for its actions. By employing forensic stealth and savvy, they are attempting to create a visual politics that makes clear connections to government misconduct in its ability to guarantee safe reactors and a constant power supply. Yet the evidence they assemble is not as visible as potholes on the road. Not only does one require expertise to know what data droppings to look for online and how to link them together, but 'seeing' and accepting such evidence as a valid critique of nuclear malfeasance requires publics to trust and empathize with the counter-experts, in a way that viewing potholes does not. Moreover, it is difficult to frame 'fixing' the problem of

downed generators, power outages and safety issues as fixable by following pre-written rules. Trying to mitigate unintended consequences by adhering to procedures, no matter how robust, can only go so far.

Similarly, the online foundation upon which this narrative is constructed is proving to be tenuous. The characteristics of the internet that allowed activists to pull disparate lines of reasoning and pieces of evidence together are the very aspects that are contributing to unraveling of their narrative. When the activists wrote their report tracing how the substandard parts came to be, their primary sources were internet links to various national nuclear public groups and private corporations. Yet if one clicks on the links they have provided, one will find that many of them are broken. Although, working links alone do not certify a document as credible, their marked disappearance after the article was published online has made it difficult to ascertain what actually took place. The ease with which institutions can delete or reposition entries works against arguments that depend on stable, linked websites and documents. Still, activist groups such as the lone gunmen are fleet-footed and constantly shifting their tactics and arguments to see what will 'stick' in both courts of opinion and the state. In doing so, activists are engaged in the tricky task of reshaping imaginaries of themselves while aligning these newly-wrought imaginaries with that of the state.

## Illiberal credibility economies of nuclear power?

It remains to be seen whether or not a forensic form of attestive gazing succeeds in performing epistemic jujitsu. Will the nuclear establishment acknowledge the critiques and act accordingly to align its practices with its own procedural logic, or develop new procedures to accommodate these critiques? Will wider publics accept the activist's assembly of new knowledge and transfer allegiance to these nuclear outsiders? Scholarly writings of Indian bureaucracy warn that staking a credibility economy on procedural rationalities is limiting, because of its systematic arbitrariness and production of injustice (Gupta, 2012), even as it is also a site of complex negotiation and contestation about the meanings of development, democracy and lived experience (Corbridge et al., 2005; Nilsen and Roy, 2016). Similarly, in the domain of nuclear power, while bureaucracy and its rationalities of accounting provide spaces for citizens to experience and know the nuclear state – both its capacity for violence and munificence – it also systematically disfavors anti-nuclear stances, showing that ultimately, India's anti-nuclear struggle is explicitly political. Yet, it is unclear what kind of political mobilization might interpellate an anti-nuclear polity. Contemporary scholarship on Indian populist movements is broadly organized around Hindu fundamentalism, anti-corruption and anti-rape, and tends to focus on understanding the contested category of Indian middle classes as 'consumer-citizens' (Baviskar, 2005; Fernandes, 2006; Khandekar, 2013; Mawdsley, 2004; Upadhya, 2017). South Asian studies scholars have demonstrated how middle-class activism has shifted from worker to consumer. Whereas prior movements organized around issues of labor and compensation – what are commonly seen as the 'old' or 'red' social movements (Baviskar, 2005) – Indians now mobilize because of the perceived failures of the state and the supposed greed of labor unions. Middle class citizens excoriate transportation workers who go on strike, and express desires to consume clean air and green spaces, thus eliminating industrial jobs and livelihoods. Fernandes (2006) argues

that the middle classes see themselves as alienated from the state, which, in their view, has privileged the subaltern through the system of reservations that allocate government jobs to the so-called 'backwards castes'. For the middle classes, the state welcomes the illiberal participation of the uncouth masses, who bring their regional clientelistic, and sometimes violent patronage politics to the more cultured realm of national governance. On this reading, middle class activists fear the subaltern for defiling the moral and cultural purity and economic stability of middle classes. Here, English-speaking, educated middle classes become activists because they seek to either suppress or transform the depravities of the unruly Other. Indeed, elite activists' attempts to create a risk-based anti-nuclear consciousness amongst villagers subjected to nuclear development have often abutted the politics of what Chatterjee (2004) calls a Machiavellian 'political society', whose members do not abide by the imaginaries of virtuous, self-sacrificial, modest politics that emerge from the anti-nationalist struggle, and are supposed to govern the behavior of our national leaders (Bhadra, 2012).

Yet it may be in the political society of state governments where the levers of power reside against centralized development (Witsoe, 2013), subject to the credibility economies generated from religious and caste power politics. Elite Indian anti-nuclear activism shows that even in the space of nationalized politics, attestive, science-based, totalizing civic epistemologies do not exist. Rather, nuclear power is a battleground for clashing democratic imaginaries of how to make power visible and achieve political legitimacy, where non-monolithic publics are partially and incompletely constituting one another. These spaces of partial constitutions and indigestion should not only be thought to reside in the Global South but can yield insights into the so-called bastions of liberal democracy in the Global North, which are already spaces of epistemological and ontological fragmentation. Far from a morally relativizing project where the credibility economies of dictatorships are on par with liberal democracies, or a mode of mere cataloguing multicultural, political difference, understanding they variety of techno-democratic practices and visions opens up spaces for imagining together our entwined, differently situated worlds.

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## Notes

1. The newspaper articles were gleaned from the civil society media archives, the Centres for Documentation and Education at Mumbai and Bengaluru, where newspaper clippings were kept in binders. Consequently, although I was able to ascertain publication date, author and publisher in most cases, the page ranges were missing. I have digital photographs of all the news clippings and have made them available to Indian anti-nuclear activists.

2. The problems at Tarapur were discussed in congressional hearings before the Joint Committee on Atomic Energy to discuss 'investigations of charges relating to nuclear reactor safety', where the problems of Tarapur were feared to reproduced in the atomic power plant in Edison, New Jersey. The hearings cited an article in *Mother Jones* with the title 'What you don't know may hurt you' (Jacobs, 1976). The article recounted how Clifford Beck, head of the Government Liaison-Regulation Office at the US Atomic Energy Comission, was visiting Tarapur in December 1972 and 'was suddenly transfixed by an incredible sight: Indian workers, perched high in the rafters of the largest nuclear plant in Asia, were using bamboo poles to operate the reactor's radioactive waste system!'
3. Personal interview, Dhirendra Sharma, November 14, 2015
4. Personal interview, Surendra Gadekar, March 28, 2013
5. *The Indian Post* alone seemed to portray activists as emotional and irrational, such as quoting BARC director, PK Iyengar, expressing his regret that the debate was not conducted in more scientific terms, but in a tenor that was more 'emotional and philosophic'.
6. Shivarao Shantaram Wagle (Dr) v. Union of India (1988) 2 SCC 115: AIR 1988 SC 952.
7. Manoj H Mishra vs Union of India and Others, 1994.

## ORCID iD


Monamie Bhadra Haines https://orcid.org/0000-0002-7724-4893

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## Author biography

Monamie Bhadra Haines is currently an Assistant Professor at Nanyang Technological University in Sociology. Previously, she was an American Council of Learned Societies postdoctoral fellow in Global Science and Technology Studies at The Ohio State University. She received her PhD in the Human and Social Dimensions of Science and Technology program at Arizona State University.