JCOM

ACTIVISTS AS "ALTERNATIVE" SCIENCE COMMUNICATORS

'Science for social revolution': People's Science Movements and democratizing science in India

T. V. Venkateswaran

Abstract

Often, new social movements engaged with science and society are characterised as contesting objectivity; the neutrality of modern science seeking to legitimise 'lay perspectives'. It has been an article of faith among scholars to view third world movements as anti-science, anti-modernity and post-developmentalist. This commentary describes ideological framework, modes of action and organisation of the All India People's Science Network (AIPSN), one of the People's science movement (PSMs) active for more than the past four decades. They dispute the dominant development trajectory and science and technology-related policies for reinforcing the existing inequities. Nevertheless, they see 'science' as a powerful ally for realising their radical emancipatory vision of 'science for social revolution'. Mobilising 'science activists' as unique alternate communicators, they strive for lay-expert collaboration. The canonical framing of third world social movements as postcolonial and anti-modern does not capture this unique case from India. Further studies are required to tease out such strands of social movements elsewhere.

Keywords

Community action; Popularization of science and technology; Science communication in the developing world

DOI

https://doi.org/10.22323/2.19060308

Submitted: 19th October 2020
Accepted: 18th November 2020
Published: 24th November 2020

Introduction

New social movements (NSMs) associated with NGOs, associations, foundations, consultancies, and think tanks have emerged as significant agents for forging the public perception of science in contemporary society, supplementing traditional science communicators such as science museums, science centres, science journalists and institutional public relations. Scholars characterise the emergence of NSMs in contemporary times as a response to the growing "practice of science communication using the logic of public relations and corporate communication" [Maeseele, 2009, p. 55] in the context of the commercialisation of science, brought

forward by the 'science-industrial complex'. NSMs "contest and reframe scientific knowledge by aiming to instigate epistemic shifts in institutionalised scientific conceptions and discursive changes in the social values underlying science" [Maeseele, 2009, p. 55] that "situate themselves in their roles as alternative science communicators" [Maeseele, 2009, p. 55].

NSMs world over is said to "contest the seeming objectivity and neutrality of science and seek to legitimate lay perspectives" [McCormick, 2007, p. 609]. Drawing on Escobar [1995, p. 13] that 'development' crucially hinges 'exclusively on one knowledge system, namely, the modern Western one' displacing the 'non-Western knowledge systems', poststructuralist and postcolonial scholars posit NSMs in India as neo-traditionalist. Academic studies [Kala, 2001; Parajuli, 1990; Shiva and Mies, 2014] often present third world new social movements as a project of creating 'alternative science' rooted in 'tradition' by challenging 'the whole edifice of modem resource management and development' that simultaneously 'renew and reassert subjugated traditions of knowledge in a new situation' [Parajuli, 1996, pp. 32–33].

This commentary presents a unique case of a third world science movement, All India People's Science Network (AIPSN), a network of 40 organisations, that elude the familiar postcolonial, cultural relativists, and anti-science framework of the 'third world' grassroots NSMs movements. The commentary has following sections: 1) a short snapshot of the people's science movement, 2) perception of science technology and society, 3) a framework for 'science for social revolution 4) science for people, a snapshot of the panorama of AIPSN activities 5) lay-expert collaboration, 6) key challenges and 7) conclusion.

1. People's science movement — a snapshot introduction

India is home to 13.5 billion people (one-sixth of the world population) speaking about 1,652 'mother tongues' and writing in more than 25 different scripts. The adult literacy rate is 69.3%, the average schooling is 6.5 years (female 4.7) with a Gross Enrolment Ratio of 27.4. Yet, in about 50% of the villages, the basic literacy level is less than 50%. Society has been historically stratified into about 40,000 hierarchical sub- populations, called a *Jati* or a caste, with each caste traditionally following a specific profession, practicing endogamy and discriminating against 'lower castes' in the hierarchy, rationalised by an elaborate traditional worldview. Justified or camouflaged as a cultural practice, discrimination based on 'caste' and 'gender' is still rampant, despite constitutional abolition of the practice of 'untouchability'. According to Chancel and Piketty [2019], India is more unequal today, than at any time since the British Raj. Home to about a hundred billionaires, extreme poverty is widespread; about 3.7 % of the population survives on income levels about half a dollar per day and 32.2% at one dollar per day. On the other hand, India is a destination for 'medical tourism'. Even patients from Europe arrive seeking medical intervention. The excellence and achievements in the fields of space, information technology, atomic energy, nanotechnology, is well known. Pre-modern inequities supplemented with colonial exploitation and postcolonial underdevelopment has led to lopsided growth "making the country look more and more like the islands of California in a sea of sub-Saharan Africa" [Dreze and Sen, 2013, p. 2]. In this milieu, economic outcomes are often shaped by social identity, and consequently, disparities and discrimination are intertwined, making the agenda of social and redistributive justice interdependent [Deshpande, 2011].

All India People's Science Network (AIPSN) is one of the People's Science Movements (PSMs) that include, Bhopal Gas Affected Working Women's Union, Chipko Movement, Eklavya, Friends of Rural Society, Kerala Sastra Sahitya Parishad (KSSP), Kishore Bharati, Movement in India for Nuclear Disarmament (MIND), Medico Friends Circle. AIPSN address the thorny question of the role of science and technology in furthering the goals of social and redistributive justice for the marginalised people and communities.

Although many of the network members were active from about mid-1960s, the AIPSN was formed in 1988 with 26 member organisations. Today it has 40 members spread across the country. The combined membership of all the network members of AIPSN is about 5,00,000. Within three decades of its formation, AIPSN has gained a significant presence in all major states and has organisational reach of over half the districts in the country (see Abrol [2014], Krishna [1997], Krishna [2014], Pattnaik and Sahoo [2014], D. Raina [1997], Raza, Singh and Kumar [2012] and Sahoo and Pattnaik [2012] for an overview of AIPSN and some of its member organisations).

The organisation operates mainly through voluntary work and local donation of funds. As a principle, AIPSN neither receives regular grants nor accept funding from foreign funding agencies. AIPSN organisations have a 'mass' membership that includes village teachers, working mothers, women, youth, students, farmers, industrial workers, service sector professionals along with scientists, and experts working in the academic institutions [V. Raina, 2004]. 'Science' signifies "all branches of knowledge" [Parameswaran, 2013a, p. 130], and the membership includes experts from the natural sciences, social sciences, and humanities.

Consistent with its emphasis on democracy and participation, the organisation is more aligned with "rational-legal" approaches compared to the "charismatic" style commonly found among many third world NGOs [Krishna, 1997, p. 400]. The style of everyday functioning is characterised by informality, simplicity, frankness, friendship, and the absence of rigid hierarchical structures. No one person continues in an official position for more than two terms [Krishna, 1997, p. 399]. A conscious effort is made to include women, people from excluded sections and youth into the decision-making bodies. AIPSN organises their activity using the method of lay/expert collaboration.

Several initiatives such as People's Technology Initiative and the People's Health Movement (Jan Swasthya Abhiyan), are organised in broader coalition with other agencies. Besides specific task groups, acting like think tanks, such as the National Working Group on Patent Laws (during the TRIPS negotiations), the All India Drug Action Network address emerging policy issues when a new therapeutic drug policy is formulated. Unique partnerships with governmental agencies are established in areas such as literacy, scientific literacy, school education, public health livelihood and food security to ameliorate the living conditions of marginalised people. For example, the Community Health volunteer programme, called Mitanin, field-tested in the Chhattisgarh state in India during 2002 [Sundararaman, 2007], to lay the foundation for the all India level Accredited Social Health Activists (ASHA) programme by the National Rural Health Mission [Baghel et al., 2017]. The mass literacy campaigns of the mid-1990s was yet another partnership of PSMs, NGOs and the government [Parameswaran, 1998; Saldanha, 1998].

In the past four decades, PSMs have influenced "decision making in science and technology on the environment, big dams, science education, energy and GMOs" [Krishna, 2014, pp. 146–147] and have become an "important actor effectively intervening into national science and technology systems and decision making in science" [Krishna, 2014, pp. 148–149].

2. AIPSN framework on science, technology and society

In their recent work, Mede and Schäfer [2020] show the emergence of 'science-related-populism' driven by the "participatory turn," and alternative epistemologies, that suggest antagonism between "a 'morally superior' good side (the people) and a 'morally inferior' bad side (the academic elite)" in the West, energising the discourse of science and democracy. In the context of India, populism is constructed by setting the allegedly environmentally harmonious 'indigenous knowledge' against the allegedly inherently reductionist and violent 'modern science' [Nanda, 1999].

However, AIPSN takes a realist position, arguing that, if the application of technology does increase the productivity, then the knowledge that went into shaping the technology must at least partially 'reflect the objective reality' [Sengupta, 2013, p. 69]. In their view, society is divided into two classes, one "getting continuously impoverished" and a small minority who are "continuously enriched both absolutely and relatively at the expense of the former and also at the expense of planet earth" [Parameswaran, 2013a, p. 130]. The enterprise of science, a driver of productive forces, is supported by and supports capitalism. In this framework of functional ideology, the ecological threats and deprivations are explained as a natural consequence of 'profit-first' economic system. The profit calculus of capitalist does not consider the short or long term social and environmental cost of their investment [Isaac, Franke and Parameswaran, 1997, p. 38]. As the handmaiden of capitalism, advances in science and technology only accentuate the crisis, creating 'haves' and 'have-nots' both within a country and between nations.

However, the AIPSN critique cannot be bundled with traditional 'abuse' of science paradigm. Within the 'abuse' paradigm, by way of regulation and citizen vigil, solutions are in principle feasible within the capitalist framework. Nor are their views naive 'scientism'. Ekbal and T.M. Thomas Isaac [2013, p. 30] write, "[I]f science is defined as merely the accumulated knowledge of laws of nature, it is neutral and objective. But if science is defined in a broader sense to include the process of asking questions and the application of the laws, i.e., as a social activity, it cannot be neutral. The questions raised and the uses made of the answers are socially determined." The unseen hand of the profit-seeking economy not only impacts the utilisation of the science and technology, but also the enterprise of knowledge production itself. Further, under capitalism, the advances of science and technology may benefit a small section, enhance their income, while the adverse impact may befall on the lower strata of the society and the third world. Specific research questions benefiting the public may be overlooked for not being in the interests of the elites.

Neither the destructive effect of the application of modern science nor its inability to address specific questions facing the marginalised communities are a result of the intrinsic malady of modern science and technology, but is a consequence of elite

hegemony. "PSM's critiques of the way science and technology affect the lives of people are not a critique of science itself, but a critical understanding of science under capitalism, where its full potential is denied and often misused. In this understanding, the PSM differentiates itself from the understanding of many anti-science groups, who view science itself as a source of exploitation and deprivation of the majority" [Sengupta, 2013, p. 70].

PSMs unabashedly declare "The have-nots do not want "fair distribution of poverty…[but] they want the satisfaction of basic needs and to be assured of minimum comforts. For this, production has to be increased several times…." [Parameswaran, 1996, p. 294]. Admitting there are "limits to the increase in production" [Parameswaran, 1996, p. 294] it "rejects the proposition that people must accept pollution for the sake of industrialisation just as it opposes the argument that workers should accept a reduction in wages in order to attract industries" [Isaac, Franke and Parameswaran, 1997, p. 38]. If a just society can thrive without exploitation, progress is possible without destroying the ecology.

3. Another world is possible

PSMs articulate their goal "to build a secular and democratic public sphere that will provide the opportunities for free scientific debate and resolution of people's problems on a fully democratic and scientific basis, untainted by the hegemony of corporate capital and sectarian community interests" [Ganesh, 2013, p. 115]. The agenda includes leveraging the liberating potential of scientific worldviews, and fighting against the "anti-science tendencies that tend to divide the people into sectarian community lines" [Ganesh, 2013, p. 115]. Wresting the control of science, economy, and society from the hegemonic control of the elites and freeing up the marginalised people from the oppressive 'traditional social order' are the twin tasks of 'social revolution'. Without 'social revolution', third world or the marginalised people within the third world cannot fully benefit from the advances of modern science and technology. Solutions cannot come from within capitalism or the discriminatory social systems of the past; social revolution is the only alternative.

In this framework, questions such as "[h]ow do we bring back societal concerns into institutions of science? How do we democratise these institutions, so that larger social goals determine the priorities in science? How can diseases that affect the poor become objects of research if the budget is coming from the corporate sector who are not interested in developing medicines for people who cannot pay? How do we bring the concerns of the poorer countries, who have neither the money nor the scientific resources to address their problems [into the research agenda]? How do we bring equity back into the system of advancing scientific knowledge?" [Sengupta, 2013, p. 72] define the immanent agenda of the 'people's science'.

Distinguishing between 'exchange value' and 'use-value' on the one hand and 'demand' in the economic sense from 'need' in the human sense on the other, PSMs point out that creating products like non-therapeutic narcotics or weapons may increase the GDP of the economic unit; however, they do not enhance quality of life [Parameswaran, 2013b, p. 62]. PSMs' post-developmentalist vision takes 'human development' to means "increasing freedom from animal limitations of merely staying alive and being able to ramble into the realm of truly human avocations - culture - to read, to trek, to sing, to hear songs, to play" [Parameswaran, 2013b, p. 62]. This framework is not a 'return to nature' rejecting 'urban facilities', but a

call for a future egalitarian society wherein the full potential of science and technology can be deployed for a good living for all, without destroying planet earth. These notions, put-together, define the PSM ideology framework 'science for social revolution'. The articulations of PSMs resonate with the ideas of the 'eco-socialist' project [Pepper, 1993] that envisages decentralised, democratic, and collective local control over state institutions for resource use.

4. Science for people

In the context of lack of access to quality school education, the 'popularisation of science' is primarily seen as a part of the democratic struggle to remove "knowledge inequality alongside other forms of discrimination" [Isaac, Franke and Parameswaran, 1997, p. 35]. PSMs develop communication materials on science, such as books, and periodicals, and deliver lectures and demonstrations in the mother tongue of the audience. Keeping in mind the social inequalities in India and the resource-poor rural schools, PSMs pioneered the development of affordable low cost/ no-cost hands-on science kits. Nationwide programmes such as Joy of Learning (1994), Cosmic Voyage (1995), People's Reading movement — Jan Vachan Andolan (1995), International Year of Astronomy (2009), Eyes on ISON (2013), Surya Utsav (Solar eclipse festival) (2019) played a crucial role in communicating aspects of modern science in an easy to understand manner.

While the intrinsic value of 'scientific literacy' is appreciated, PSMs enlist scientific 'world views', (such as the evolution of life, humans and universe) to rupture the mystical, revelatory aspects of the traditional episteme/'traditional ways of knowing' and supplant it with secular public reason grounded in reality. Often identified as 'scientific temper' [Nanda, 1998; Nanda, 1999; Raza, 2018], this agenda in the Indian context, addresses caste segregation, discrimination in access to shared resources, myths of female inferiority perceptions, of the women's fault in bearing girls, and female infanticide. The campaign against sex-selective abortions, *SAMATA* (gender equality) movement (1998–), and *Ask Why campaign (2018)* question 'tradition' and present a picture of a multi-cultural heritage, including the heritage of science and technology that has drawn and nourished itself from a broad diversity of sources.

The 'barefoot geographers', trained by professional geographers to prepare a participatory action plan for local area development [Franke, 1995], mobilising 'women self-help groups' to establish 'Nutrition based Kitchen Gardening' to address high nutritional deficiency and malnutrition, development of Small Hydro-electric Project with 3 to 5-megawatt capacity as an alternative to 'big' dams, innovation unit for traditional wild apricot oil extraction empowering the poor [Chamberlain et al., 2015] are a few illustrations of People's' technology initiatives. The idea of PSMs is not to make 'traditional' technology into a museum piece but allow them to achieve economies of scale and scope collectively. These grass-root innovations connect resources, capabilities, and markets accessible to poor people, fulfil basic needs and sustainably support the livelihoods of the poor. Making the small producer powerful by way of organising them into group enterprises, the idea of local area planning, S&T voluntary organisations as intermediaries between formal sector S&T institutions to incubate entrepreneurial leadership among the poor are some of the common elements of the PSM grass-root innovation framing [see chapter 5, Smith et al., 2017]. In this manner,as

organisations that 'instrumentalise science in public and political discourse' PSMs appear as 'alternative and strategic science communicators' [Fähnrich, 2018]

Responding to the real problems thrown up by the uneven and highly disruptive processes of modernisation, such as ecological destruction, PSMs see it as their task to ferret out the political, economic and social aspects behind challenges such as climate change, energy, and hunger [Raghunandan, 2013, pp. 105–108]. Intervening in the ecological debates surrounding the 'Silent Valley' dam [Zachariah, 1993], and articulating the immediate, long-term health and rehabilitation issues following the Bhopal gas disaster [Raghunandan and Jayaprakash, 2020] during the mid-1980s catapulted PSMs into the area of science-society interactions. Combining the expertise of scientists with lived experience of 'lay' science activists, PSMs shape their critical understanding of developmental policies to create a people-oriented science-society linkage. Working groups consisting of domain experts, social scientists and science activists prepare the critique and articulate alternatives (see Sengupta et al. [2018] for an illustration). Alliances are often formed in coalition with other democratic movements, agitations are organised alongside lobbying with legislators and administrators. For example, allying with activists working in the fields of women's liberation, health, human rights and journalists, PSMs organised a relentless campaign 'save the girl child' [Ravindra, 1987], which subsequently has evolved into a social programme of the Government of India. Through such campaigns, AIPSN communicates "critical content on the role being played by science under capitalism" [Abrol, 2014, pp. 18–19].

Recent intervention in agricultural biotechnology is illustrative. In disentangling the dispute that characterises the 'GM technologies as intrinsically and catastrophically harmful', and projecting the other view of 'disagreement over the nature of the GM crop technology ownership and the effect of such ownership on agriculture in India', Satyajit Rath and Prabir Purkayastha [2010, p. 147] observe that the "disagreements fall into two distinct categories". India's National Farmers Commission prioritised "genetic modification to the incorporation of genes that can help impart resistance to drought, salinity and other stresses" [Purkayastha and Rath, 2010, p. 147] but, the "major investments in GM crops made by Monsanto and others have been for herbicide-tolerant ("Roundup- Ready" soy-bean) or pest-resistant crops (Bt maise and Bt cotton)" [Purkayastha and Rath, 2010, p. 147]. Unfortunately, genetic modification addressing biotic factors has only a short window before pests and weeds evolve and overcome the resistance.

Short windows of utility are best suited for agribusinesses like Monsanto. By the time a pest has developed resistance, the patent period has lapsed. By then, big business is ready with the next generation seed. Trapped in the high-cost seeds treadmill, farmers resort to what appears as 'irrational' behaviour, by applying a higher level of pesticide. The very purpose of the GM technology is thus frustrated [see [Kranthi and Stone, 2020] for an analysis of the Indian experience]. While in China, with the extensive cultivation of Bt cotton, the use of pesticides saw a sharp drop, Indian farmers tended to use even higher amounts of pesticides than with non-Bt cotton, due to the nature of the technology choice. Alternative GM technologies via "open-source biology" platform for making transgenic plants exist. However, with the erosion of public sector research in the neo-liberal regime, alternatives that benefit poor farmers are hardly given attention [Purkayastha and Rath, 2010, p. 147]. Out of 21 plants approved for field trial as of 2018, only four

were developed for abiotic stress tolerance; that all of them are being developed in public sector institutions is telling [Ahuja, 2018]. The articulation of the PSM on this issue had an impact on the farmers' movement to take a nuanced opposition to the introduction of the GM crops [Mollah, 2019, p. 110], and the parliamentary committee in 2012 imposed a moratorium following a widespread protest by several movements, including AIPSN [Rajya Sabha Secretariat, 2017].

5. Lay expert collaborative communication

True to its purpose, mobilising science for social revolution and organising science for the people, the communication efforts of PSMs try to build dialogic space. The main conduit for communication is not mass media, but many localised face-to-face interactions, with 50 to 100 participants at each. Typically, a nationwide campaign involves organising 20,000 to 50,000 local events. The primary social carriers of PSMs are 'science activists', who organise and run these events. A few of the 'science activists' are science experts or professional communicators. A large majority are schoolteachers, blue-collar workers (such as a bank, and post office workers), housewives with collegiate education, students of higher educational institutions and farmers. Science activists equipped at the national level, pass information and skills on to volunteers at the state level, who in turn train volunteers at the local level to conduct national-level programmes. The discussion that follows a presentation or demonstration provides scope for dialogue between public and the science activists, which in turn acts as feedback.

While other forms of mass reach, such as cycle rallies, poster exhibitions and, public meetings are used, one of the unique modes of communication shaped by the PSMs is 'Science *Kala Jathas*'. '*Jatha*' (literal meaning — procession) is a traditional socio-culture form of a gathering of people during various social and religious occasions, usually accompanied by songs, music, and performance. Infusing the '*Jatha*' with Brechtian style street plays, skits, and songs, '*Jathas*' is transformed into an empowering and expressive theatre, critiquing the social conditions. *Jathas* are organised periodically, and a group of 'science activists' travel from place to place and present the views of PSMs on an issue to the public. The venues for most of these communicative events are 'informal' spaces, such as markets, and street corners, where entry and participation by marginalised people is more likely (see Saldanha [1993] for a critical evaluation of the use of *Kala Jatha* in a PSM campaign). The number of events organised, and the number of people mobilised indicate the success or failure of the campaign. For example, during the *Samatha Jatha* (1993), about 1000 events were organised, reaching 2,00,000 men and women in total over a month [Srivastava and Patel, 2006]. The discourse of AIPSN implies that there is scientific content in every social issue and vice-versa. The objective of these campaigns is to make audiences reflect on the "causes of one's deprivation and move towards amelioration of their condition by organising and participating in the process of development" [Mitra, 2007, p. 3], a formulation made by the PSMs.

6. Challenges

Using their framework of 'science for social revolution', PSMs are constructing an India-specific tradition of 'democratising science activism' on the fronts of education, development, and environment [Abrol, 2014, p. 30]. However, the AIPSN faces three vital challenges:- 1) the retreat of the State from social welfare, 2) the emergence of new eco-consciousness, and 3) the arrival of digital activism.

PSMs engage with the State, cooperating, negotiating, and resisting depending upon the situation and opportunity. As a heterogeneous entity, the State used to provide 'conjunctural opportunities', that permit the alteration of specific elements in a social formation, by a given agent (or set of agents) during a particular situation [Jessop, 1982, pp. 252–253]. Social movements exploited these conjunctural opportunities to demand "their rights to greater access to a more generous idea of development" [Rangan, 2000, p. 222]. These interventions sit in stark contrast to the poststructuralist and postcolonial theory on third world social movements. Nevertheless, the State is recusing itself from critical sectors like health, education, and social welfare as part of its neo-liberal agenda, leaving these spaces to 'corporate social responsibility'. PSMs are increasingly finding it difficult to appeal to the moral economy to entitle and empower impoverished people. Recently, several organisations working in 'alternative technology' came together, reviewed their three decades of experience, and drafted a vision for future directions [*Thrissur Declaration* 2014]. Nonetheless, a question remains: how, through the mere adoption of these technological options, can social carriers achieve desirable and alternative social relations within society, in the context of the retreating State?

With the emergence of a more affluent middle class, the 'environmentalism of the poor' [Guha and Martinez-Alier, 1997; Martinez-Alier, 2002] of yesteryear is slowly augmented with a variety of environmentalism that emphasises the quality of life and personal satisfaction, guided by post-materialist values. These new urban environmental movements are increasingly appealing to youth and the urban middle class [Mawdsley, 2004; Mawdsley, Mehra and Beazley, 2009]. Likewise, youth and experts are distracted by digital activism and turned off from 'off-line' activism. Indeed, the vibrant Indian free software community is an ally, yet PSMs are unable to harness digital activism. Perhaps, the relationship between social class and online participation, economically well off harnessing the digital space more than the marginalised among the membership, may explain this disinclination. The unique feature of PSMs was the participation of experts and lay public. The in-kind resources, such as knowledge, time, and skill voluntarily contributed was the central resource of PSMs. If educated youth are distracted by digital activism and new urban environmentalism, PSMs may find its critical membership baseundermined.

7. Conclusion

Despite the adjectives like 'non-West,' 'another reason,' 'alternative science,' and 'hybrid science', 'colonial science', by the postcolonial scholars, as Phalkey [2013] observes, "science and technology are practices and bodies of knowledge that inhabitants of the subcontinent have engaged with enthusiasm, that they have used to invent themselves in their global, national, and individual lives." Far from outright rejection of development and modernity, "idioms that gave meaning to the developmental rationale of modern India" are used by the new social movements "as a point of departure for a critique of the actual direction of development, which has exploited, excluded and marginalised popular classes" [Nilsen, 2007]. New social movements in India seek, 'development', without destruction; the rallying call for the National Alliance of People's Movements was '*Vinash Nahin, Vikas Chahiye*' (Development, not destruction) [Bakshi, 1996, p. 255].

Multiple organisational platforms of movement provide sites for the experts and 'lay' to meet as peers. By forging such lay-expert collaboration while harnessing 'science for social revolution', the AIPSN steer clear of 'scientism', an uncritical celebration of modern technoscience or 'populism', demonising 'modern' science and uncritically privileging 'traditional knowledge'. The mobilisation of 'activists' as alternate science communicators helps democratisation as well as organically nurture lay-expert collaboration in shaping the critique of modern science in the Indian context.

Further, when a policy is contested, it is done so by showing that the arguments are 'bad' or 'incomplete' and perhaps additionally articulating a better way of doing it. 'Alternative science' rooted in 'traditional knowledge' are not brandished. It then appears that 'scientization' — the control of governmental decision-making by technical experts and bureaucracy, where citizens have little influence- is not the indictment. The main arraignment of the social movements appears to the 'undone science', the systematic nonproduction of knowledge which could help confront industrial and/or political elites or pursue research agenda that would benefit the historically disempowered groups [Frickel et al., 2009; Hess, 2016]. The struggles for a space for democratic control and autonomy is not directed against the State, but the primary thrust is against capitalism, the market and oppressive traditional order.

Hitherto, the science and technology institutions were public (called Nehruvian institutions in the Indian scholarship). The challenge of governance of the S&T was the central imperative of democratisation. With the increasing privatisation of public institutions, and the issues of risk and uncertainty gaining importance, the authority and meaning of scientific expertise are rapidly changing. How far the functional ideology of 'science for social revolution' would be adequate to meet these emergent challenges is yet to be seen. Nonetheless, the canonical framing of third world social movements as postcolonial, anti-modern is inadequate to capture this unique case from India.

The third world, including India, despite notable progress in the last few decades, is still plagued by illiteracy, deprivation, and oppression. Social justice concerns for redistribution along with gender, ecology, and livelihood are still the primary imperatives of these social movements. Further studies are needed to understand how third world 'non-populist' movements elsewhere are dealing with the redistributive and social justice concerns in the democratisation of science movements.

References

Abrol, D. (2014). 'Mobilising for Democratisation of Science in India: Learning from the PSM experience'. *Journal of Scientific Temper (JST)* 02, pp. 10–32.

Ahuja, V. (2018). 'Regulation of emerging gene technologies in India'. *BMC Proceedings* 12 (S8). https://doi.org/10.1186/s12919-018-0106-0.

Baghel, A., Jain, K. K., Pandey, S., Soni, G. P. and Patel, A. (2017). 'A study on awareness and practices of mitanin (ASHA) in rural areas of Bilaspur district, Chhattisgarh, India'. *International Journal Of Community Medicine And Public Health* 4 (5), p. 1637. https://doi.org/10.18203/2394-6040.ijcmph20171776.

Bakshi, R. (1996). ''Development, Not Destruction': Alternative Politics in the Making'. *Economic and Political Weekly* 31 (5), pp. 255–257.

Chamberlain, A., Raghunandan, D., Kumar, S. and Greenhalgh, C. (2015). 'Design in Context, from India to Wales: Appropriate Approaches to the Development of Socio-Technical Solutions to Support Indigenous Knowledge'. In: At the Intersection of Indigenous and Traditional Knowledge and Technology Design. Ed. by N. Bidwell and H. Winschiers-Theophilus. Santa Rosa, U.S.A.: Informing science press.

Chancel, L. and Piketty, T. (2019). 'Indian Income Inequality, 1922-2015: From British Raj to Billionaire Raj?' *Review of Income and Wealth* 65 (51), S33–S62. https://doi.org/10.1111/roiw.12439.

Deshpande, A. (2011). The Grammar of Caste: Economic Discrimination in Contemporary India. New Delhi, India: Oxford University Press.

Dreze, J. and Sen, A. (2013). An Uncertain Glory: India and Its Contradictions. Princeton, NJ, U.S.A. and Oxford, U.K.: Princeton University Press.

Ekbal, B. and Isaac, T. M. T. (2013). 'Science for Social Revolution'. In: Science for Social Revolution — A reader. Ed. by M. P. Parameswaran. Thiruvananthapuram, Kerala, India: Kerala Sastra Sahitya Parishad, pp. 9–51.

Escobar, A. (1995). Encountering Development: The Making and Unmaking of the Third World. Princeton, NJ, U.S.A.: Princeton University Press.

Fähnrich, B. (2018). 'Digging deeper? Muddling through? How environmental activists make sense and use of science — an exploratory study'. *JCOM* 17 (03), A08. https://doi.org/10.22323/2.17030208.

Franke, R. W. (1995). 'Promoting participation—Seeking sustainability: The ITK Dilemma'. *Reviews in Anthropology* 24 (3), pp. 159–168. https://doi.org/10.1080/00988157.1995.9978124.

Frickel, S., Gibbon, S., Howard, J., Kempner, J., Ottinger, G. and Hess, D. J. (2009). 'Undone Science: Charting Social Movement and Civil Society Challenges to Research Agenda Setting'. *Science, Technology, & Human Values* 35 (4), pp. 444–473. https://doi.org/10.1177/0162243909345836.

Ganesh, K. (2013). 'People's Science Movement in India'. In: Science for Social Revolution — A reader. Ed. by M. P. Parameswaran. Thiruvananthapuram, Kerala, India: Kerala Sastra Sahitya Parishad, pp. 110–115.

Guha, R. and Martinez-Alier, J. (1997). Varieties of Environmentalism. London, U.K.: Earthscan.

Hess, D. J. (2016). Undone Science: Social Movements, Mobilised Publics, and Industrial Transitions. Cambridge, MA, U.S.A.: MIT Press.

Isaac, T. M. T., Franke, R. W. and Parameswaran, M. P. (1997). 'From anti-feudalism to sustainable development: The Kerala Peoples Science Movement'. *Bulletin of Concerned Asian Scholars* 29 (3), pp. 34–44. https://doi.org/10.1080/14672715.1997.10413092.

Jessop, B. (1982). The capitalist state: Marxist theories and methods. Oxford, U.K.: Martin Robertson.

Kala, P. (2001). 'In the Spaces of Erasure: Globalisation, Resistance and Narmada River'. *Economic and Political Weekly* 36 (22), pp. 1991–2002.

Kranthi, K. R. and Stone, G. D. (2020). 'Long-term impacts of Bt cotton in India'. *Nature Plants* 6 (3), pp. 188–196. https://doi.org/10.1038/s41477-020-0615-5.

Krishna, V. V. (1997). 'Science, Technology and Counter Hegemony — Some Reflections on the Contemporary Science Movements in India'. In: Science and Technology in a Developing World. Springer Netherlands, pp. 375–411. https://doi.org/10.1007/978-94-017-2948-2_13.

Krishna, V. V. (2014). 'Changing Social Relations between Science and Society: Contemporary Challenges'. *Science, Technology and Society* 19 (2), pp. 133–159. https://doi.org/10.1177/0971721814529876.
Maeseele, P. (2009). 'NGOs and GMOs'. *Javnost - The Public* 16 (4), pp. 55–72. https://doi.org/10.1080/13183222.2009.11009014.
Martinez-Alier, J. (2002). The Environmentalism of the Poor: A Study of Ecological Conflicts and Valuation. Cheltenham, U.K. and Northampton, MA, U.S.A.: Edward Elgar.
Mawdsley, E., Mehra, D. and Beazley, K. (2009). 'Nature lovers, picnickers, and bourgeois environmentalism'. *Economic and Political Weekly* 44 (11), pp. 49–59.
Mawdsley, E. (2004). 'India's Middle Classes and the Environment'. *Development and Change* 35 (1), pp. 79–103. https://doi.org/10.1111/j.1467-7660.2004.00343.x.
McCormick, S. (2007). 'Democratizing Science Movements'. *Social Studies of Science* 37 (4), pp. 609–623. https://doi.org/10.1177/0306312707076598.
Mede, N. G. and Schäfer, M. S. (2020). 'Science-related populism: Conceptualizing populist demands toward science'. *Public Understanding of Science* 29 (5), pp. 473–491. https://doi.org/10.1177/0963662520924259.
Mitra, A. (2007). India: Non-formal education. UNESCO.
Mollah, H. (2019). An outline history of All India Kisan Sabha. Delhi, India: All India Kisan Sabha.
Nanda, M. (1998). 'Reclaiming Modern Science for Third World Progressive Social Movements'. *Economic and Political Weekly*, pp. 915–922.
— (1999). 'In Search of an Epistemology for Third World People's Science Movements'. *Rethinking Marxism* 11 (3), pp. 104–123. https://doi.org/10.1080/08935699908685598.
Nilsen, A. G. (2007). 'On New Social Movements and 'The Reinvention of India''. *Forum for Development Studies* 34 (2), pp. 271–293. https://doi.org/10.1080/08039410.2007.9666380.
Parajuli, P. (1990). 'Politics of knowledge, models of development and literacy'. *Prospects* 20 (3), pp. 289–298. https://doi.org/10.1007/bf02195070.
— (1996). 'Ecological ethnicity in the making: Developmentalist hegemonies and emergent identities in India'. *Identities* 3 (1-2), pp. 14–59. https://doi.org/10.1080/1070289x.1996.9962551.
Parameswaran, M. P. (1996). 'Kerala Shastra Sahitya Parishad: Yesterday, today, tomorrow'. *Les Sciences Hors D'Occident Au XX Siecle, Sciences et Development* 5, pp. 281–298.
— (1998). 'Experience of mass literacy campaigns in India: 1988-1996'. *Indian Journal of Social Work* 59 (1 PART II), pp. 420–421.
— (2013a). 'A Manifesto for the People's Science Movement'. In: Science for Social Revolution — A reader. Ed. by M. P. Parameswaran. Thiruvananthapuram, Kerala, India: Kerala Sastra Sahitya Parishad, pp. 130–135.
— (2013b). 'Experience of Pan Indian PSM'. In: Science for Social Revolution — A reader. Ed. by M. P. Parameswaran. Thiruvananthapuram, Kerala, India: Kerala Sastra Sahitya Parishad, pp. 52–65.
Pattnaik, B. and Sahoo, S. (2014). 'Communicating Science in India through People's Science Movements (PSMs)'. *Journal of Scientific Temper (JST)* 02, pp. 33–85.
Pepper, D. (1993). 'Anthropocentrism, humanism and eco-socialism: A blueprint for the survival of ecological politics'. *Environmental Politics* 2 (3), pp. 428–452. https://doi.org/10.1080/09644019308414088.

Phalkey, J. (2013). 'Focus: Science, History, and Modern India. Introduction'. *Isis* 104 (2), pp. 330–336. https://doi.org/10.1086/670950.
Purkayastha, P. and Rath, S. (2010). 'Bt brinjal: Need to refocus the debate'. *Economic and Political Weekly* 45 (20), pp. 42–48.
Raghunandan, D. (2013). 'A Perspective for People's Science Movement in India'. In: Science for Social Revolution — A reader. Ed. by M. P. Parameswaran. Thiruvananthapuram, Kerala, India: Kerala Sastra Sahitya Parishad, pp. 99–109.
Raghunandan, D. and Jayaprakash, N. D. (2020). 'Bhopal gas disaster: Delhi Science Forum and People's Science Movement in India - In memory of Dr. Amit Sengupta'. *Saúde em Debate* 44 (spe1), pp. 120–134. https://doi.org/10.1590/0103-11042020s110.
Raina, D. (1997). 'Evolving perspectives on science and history: A chronicle of modern India's scientific enchantment and disenchantment (1850–1980)'. *Social Epistemology* 11 (1), pp. 3–24. https://doi.org/10.1080/02691729708578826.
Raina, V. (2004). 'Political diversity, common purpose: social movements in India'. *Inter-Asia Cultural Studies* 5 (2), pp. 320–327. https://doi.org/10.1080/1464937042000236775.
Rajya Sabha Secretariat (2017). *Report on the Genetically Modified Crops and its Impact on Environment*. Report No. 301. New Delhi, India.
Rangan, H. (2000). Of Myths and Movements: Rewriting Chipko into Himalayan History. New Delhi, India: Oxford University Press.
Ravindra, R. (1987). 'Struggle against Sex Determination Techniques: Unfinished Battle'. *Economic and Political Weekly* 22 (12), pp. 490–492.
Raza, G. (2018). 'Scientific temper and cultural authority of science in India'. In: The cultural authority of science: Comparing across Europe, Asia, Africa and the Americas. Ed. by M. W. Bauer, P. Pansegrau and R. Shukla. Abington, U.K. and New York, NY, U.S.A.: Routledge, pp. 32–43.
Raza, G., Singh, S. and Kumar, P. V. S. (2012). 'Public Understanding of Science: Glimpses of the Past and Roads Ahead'. In: Science Communication in the World. Springer Netherlands, pp. 139–150. https://doi.org/10.1007/978-94-007-4279-6_9.
Sahoo, S. and Pattnaik, B. K. (2012). 'Understanding People's Science Movement in India: From the Vantage of Social Movement Perspective'. *Sociology of Science and Technology* 3 (4), pp. 8–72.
Saldanha, D. (1993). 'Cultural in Literacy Communication Campaigns: Social Relational Contexts, Processes and Hegemonic Organisation'. *Economic and Political Weekly* 28 (20), pp. 981–989.
— (1998). 'Literacy campaigns and basic education: Status and issues'. *Indian Journal of Social Work* 59, pp. 382–406.
Sengupta, A. (2013). 'Learning from the Past and Looking to the Future'. In: Science for Social Revolution — A reader. Ed. by M. P. Parameswaran. Thiruvananthapuram, Kerala, India: Kerala Sastra Sahitya Parishad, pp. 67–79.
Sengupta, A., Zaidi, S., Sundararaman, T., Onta, S. and Weerasinghe, M. C. (2018). 'Tackling the primary care access challenge in South Asia'. *BMJ*, k4878. https://doi.org/10.1136/bmj.k4878.
Shiva, V. and Mies, M. (2014). Ecofeminism. London, U.K. and New York, U.S.A.: Zed Books.
Smith, A., Fressoli, M., Abrol, D., Arond, E. and Ely, A. (2017). Grassroots innovation movements. London, U.K. and New York, U.S.A.: Routledge/Taylor and Francis Group.

Srivastava, K. and Patel, I. (2006). 'Community mobilisation, gender equality and resource mobilisation in adult education'. *International Journal of Educational Development* 26 (2), pp. 153–165. https://doi.org/10.1016/j.ijedudev.2005.07.022.

Sundararaman, T. (2007). 'Community health-workers: scaling up programmes'. *The Lancet* 369 (9579), pp. 2058–2059. https://doi.org/10.1016/s0140-6736(07)60326-2.

Thrissur Declaration (16th October 2014). Time for a new vision on alternative technologies and organisational forms for social transformation. statement of participants at the workshop on Alternative Technologies and Organisational Forms for Social Transformation. Thrissur, India. URL: http://www.southsolidarity.org/wp-content/uploads/sites/2/2014/11/Thrissur-Declaration.pdf (visited on 10th August 2020).

Zachariah, M. (1993). 'The Silent Valley (Kerala, India) Dam Abandonment: A Case of Successful Community Mobilisation'. In: Mobilising the Community: Local Politics in the Era of the Global City. Ed. by R. Fisher and J. Kling. Vol. 41. Newbury Park, CA, U.S.A.: Sage, pp. 171–190.

Author

T. V. Venkateswaran, a science communicator, science writer and founder chief editor of 'India Science Wire' is a senior scientist with 'Vigyan Prasar', National Institute for Science Communication, New Delhi. He has authored more than 50 popular science books and conducts widely watched the weekly TV show 'Eureka, conversation with an Indian scientist' in Rajya Sabha TV (RSTV). His research profile includes science in premodern Tamil region, innovative science education, development of science communication knowledge products, science communication in Indian cultural cosmos. E-mail: tvv123@gmail.com.

How to cite

Venkateswaran, T. V. (2020). ''Science for social revolution': People's Science Movements and democratizing science in India'. *JCOM* 19 (06), C08. https://doi.org/10.22323/2.19060308.

ISSN 1824-2049. Published by SISSA Medialab. jcom.sissa.it