

## **Mobilizing for Democratization of Science in India: Learning from the PSM experience**

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### **ABSTRACT**

In this paper the author describes the many layered meanings of science popularization programmes being undertaken by the peoples' science movements (PSMs) in India with the aim to democratize the conduct and governance of modern science and technology over the period of last two and half decades. The author argues that the vast people's network built over several decades serves diverse needs from popularization of science, to critiquing science policies and state sponsored environmentally unfriendly projects, to broadening access to literacy, education, health and self-help programmes for sustainable livelihoods. The author argues that the PSMs and their leaders are well aware that public engagement with the formation of 'scientific counter publics' takes roots in India in competition with the ideologies of neo-liberalism, cultural nationalism and neo-traditionalism. The author argues that the challenge facing the PSMs revolves around the dilemmas of building peoples' coalition to deal with the challenge of mobilization for the democratization of governance of S&T in India.

**KEYWORDS:** Science Movement, KSSP, *Vigyan Jatha*, AIPSN, Mass Communication

### **Introduction**

Scholars of 'Neo-Gandhian' tradition have been a major influence on the field of science, technology and society (STS) in India. Their perspective on the enterprise of modern science and technology has impacted civil society discourse of politics of science, technology and development in India. This viewpoint has held that violence is endemic to the institutionalization of science in India.

Among many others, Nandy (1980), Alvares (1995) and Visvanathan (1997) have been the most influential scholars of this genre within the field of STS in India. Their influential accounts have been responsible for some of the movements adopting an anti-science, anti-modern trajectory in politics. This trajectory continues to be driven by the ideology of post-modernism and traditionalism. In the Indian society their academic project aimed at the creation of political space for the enterprise of 'alternate sciences' and the restoration of indigenous knowledge traditions. Their key claim is that 'Modern Science' is incapable of delivering on the goals of social justice and equality, and its cultivation and dissemination is therefore a politically wrong and inadequate project.

Scholars of Neo-Gandhian tradition have considered the agenda of democratization of science as pursued by the peoples' science movements (PSMs) to be a 'narrow' and 'inadequate' Marxist political project (Ravirajan, 2005). Argument of this school is simple: the agenda of democratization of science does not reject modern science per se. In their view, it is politically wrong to hold for the PSMs the view that science has a lot of potential to act as an instrument of people's emancipation in India. In their viewpoint, when assessed from the standpoint of the interests of marginalized sections of Indian people, the project of 'Modern Science' and particularly 'Nehruvian Science' can only be characterized as an oppressive activity. These scholars have been projecting the idea of complicity of modern science with imperialism and colonialism to mobilize the people through their writings against the 'Nehruvian' project of cultivation of modern science and technology.

Particularly because the PSMs hold the view that science can be re-constructed to act as an instrument of social revolution their inadequate critique of 'Nehruvian science', programme of constructive action and public engagement with modern science which persists under all circumstances, and peoples' oriented 'popular science' activity, all of these activities have been dismissed by this school to be a completely flawed project of colonized minds. It is not difficult to see that this view has been constructed by these scholars on ideological grounds. As later

shown in this article in some detail, they have rarely dirtied their own hands and have largely avoided the challenge of providing the public with their own evidence on the critique of PSM's practice. The impact of PSMs' real world experiments on the governance of modern S&T in India has not been analyzed. We here attempt a critical reflection on the sweeping generalization that these scholars are known to make on the PSMs.

This article focuses on the evidence available on the connections of peoples' oriented 'popular science' activity being carried out by the PSMs with the new and emerging forms of governance of modern science and technology (S&T) in India to argue that their ideological stance is misleading and false. After presenting an outline of the Neo-Gandhian critique of PSMs available through their own writing, the article describes the evidence available on the interventions of PSMs for the benefit of academic discourse. Next, it analyzes the historically evolving patterns of development of capabilities of PSM volunteers, the realization of uneven impacts out of the strategies devised by the PSM groups across the length and breadth of country, the weaknesses emerging out of the heterogeneous origins of PSM's popular science practice in different states and the growing threat of communalism to practice for the design of activities of 'democratizing science activism in the changing political context. Finally, the article brings out how the PSMs are trying to face in theory and practice the challenge of approaching the unreached masses to achieve the goals of democratization of S&T through innovative organizational means even under the unfavorable conditions arising on account of the mainstream forces making a shift away from the practice of 'Nehruvian' patterns of governance of S&T to practicing neo-liberalism and identity politics for the period of the last three decades in India.

### **Popular Science, PSMs and the Indian STS Discourse**

In the Indian STS discourse, Visvanathan (2007), Avinash (2004), Raina (1993), Jaffry *et al.*, (1983), and Kumar (1984) are

some of the few relevant academics who have explicitly engaged on the impact of peoples' science movements (PSMs) on the activity of 'popular science' undertaken during the post-independence period. From the Neo-Gandhian school, among the above identified relevant STS scholarship, Visvanathan has been the most direct in his 'academic' political characterization of PSMs. The PSMs have been a completely flawed project of colonized minds, in his view. In his own recent article on the PSMs, he suggests that the peoples' science movements have been practicing the transfer of technology (TOT) tradition of experiments to promote the diffusion of Western science and technology, even though they may be using the '*jathas*' or '*yatras*' using folk culture to carry the message of science. Argument made by him is that the PSM dream is to make India more scientific, and that PSMs hold the view that India would be more democratic as it becomes more scientific (Visvanathan, 2007).

Shiv Viswanathan (2007) posits this PSM attempt to be an act which is false, misleading and dangerous. The knowledge claim advanced is that democracy has got analytically reduced for the PSMs to the following two acts: first, diffusion and second, participation. He also claims that the lingo of the World Bank and left groups like the KSSP, the Delhi Science Forum (DSF), and the *Bharat Gyan Vigyan Samiti* (BGVS) often sounds similar. The attitude of KSSP to traditional knowledge verged on the illiterate and its theory of science is desperately positivist. The DSF and the BGVS are all lesser clones of the same imagination and work at the diffusion end of the TOT map. As a result, they often become extension counters of the regime. Their attitude to traditional systems is patronizing. It can be seen that the above described characterization tallies very well with the Neo-Gandhian ideological representation of the peoples' science movement's connection with science. Given below are some of his knowledge claims which are also clearly rooted in the tendency of these scholars to reproduce the post-colonial imagination of Neo-Gandhian and Neo-Traditionalist world view

based negative teleology of western science that in the view of this school is inherently undemocratic\*. What is the actual knowledge claim of this Neo-Gandhian scholar about the PSMs? It is that the most challenging and better rewarding phases of the TOT model, invention and innovation, are absent from the PSM experiments of engagement with science and technology. Argument made is that since the PSMs have accepted to diffuse Western Science, *ipso facto* they are not inventing.

The PSMs have colonized minds, the claim is that the PSMs are allowing the Western Science based development to exploit the people and commit violence against the nature. It is another matter that it does not square with the fact of how the Kerala Shastra Sahitya Parishad (KSSP) was one of the first few organizations in India to focus on the challenge of environment friendly development and science (Guha, 1988 for the purpose of evidence). It is quite a puzzle how this scholar can posit the claim that the PSM talk of scientific temper shuts out the forms of imagination embedded in the world view of traditional sciences which are not arrogant towards life. After all, the opposition of KSSP to Silent Valley hydro power project was based on the imperative of caring for the biodiversity. It is alright to posit the notion of 'alternate sciences' and claim that they have the real alternative. But their demand from the people to adopt alternate sciences to achieve the goals of democracy cannot be realised by showing the PSMs in such a misleading

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\* Recently Phalkey Jahanavi (2013) expresses the same concern about the representation of science in a special issue of *Isis*, the official journal of the History of Science Society. This special issue dealt with the subject of 'Science, History, and Modern India'. In her introduction, Phalkey Jahanavi (2013) writes about it quite appropriately by suggesting that 'science and technology are practices and bodies of knowledge that inhabitants of the subcontinent have engaged with enthusiasm, and that the people have used to invent themselves in their global, national, and individual lives, but we know remarkably little about the histories of these complex engagements'. As quite rightly suggested by Phalkey Jahanavi, all of these three are well known for having framed modernity, modernization, and, within it, science as a continuation of the state violence and stabilization of authority that had earlier characterized imperialism (Phalkey, 2013).

and false way. The knowledge claim that the PSMs cannot be expected to practice the green and pro-people values has effectively no legs to stand on because the PSM constituents are of the view that environment and development are not polar opposites any more for science as a whole, and they are critical of those scientists who are interested to pursue science in the old conventional way.

Similarly, the claim that the PSMs welcome local knowledge without welcoming its epistemology which is treated as noise and taboo by the PSMs is false. The PSMs are known for taking a critical view of local knowledge, and they do not reject the components which make sense and are valuable for building on them with the help of appropriate cognitive praxis. Their own efforts in respect of the development of indigenous science and technology have been focused on technology blending in a manner that makes the people to successfully compete with the practices of big business. Peoples' technology is their contribution for which the PSMs can take credit for being the first to use and build on the local knowledge by blending with the capabilities available through modern science in a manner that benefits the people and prevents them from becoming museum pieces. The PSMs have shown how it is possible to build on the available local resources, capabilities and markets by upgrading them in a systemic way for the benefit of peasants and artisans. This is an example of how an alternate trajectory of development in S&T is also possible.

The claim that the PSMs have not invented and innovated while engaging with the institutions of 'Nehruvian Science' or Modern S&T, and are operating on the basis of borrowed technology of 'popular science' is a false claim which the scholarship of Neo-Gandhian school of social science has been trying to sustain without evidence. In my view, the Neo-Gandhian accounts demonstrate how prejudiced can the scholarship be in social science and STS when it is not empirically supported by well triangulated evidence and is only ideologically driven. There is absolutely no truth in the claim that PSMs are basically legitimizing the vested interests of scientists or that scientists are only interested to contribute to the dominant global S&T networks or that there is no possibility of

deploying the modern S&T enterprise to deliver on the goals of ecological and social justice.

All of these statements are over-reached, over-stated, ideologically driven and prejudiced 'theoretical' claims which do not hold much water and are blind alleys of cognitive praxis. It seems that the claims have been constructed on the basis of observations derived out of the texts of perhaps one or other activist and stated without finding out the context of the statement or the action or the debate existing within the movement on the issues of theory and perspective on the same issue. Certainly the PSMs cannot be treated as the extension arms of 'Nehruvian Science'; these movements have been critical of the practice of many existing S&T networks. The PSMs are critical in their understanding of S&T and have been opposed to the undemocratic acts of 'State science' in theory and practice. While there can be ideological debates, and these debates exist even within the movement, the expectations from STS accounts are that the scholars would be far more constructive and less prejudicial.

### **Origin and Evolution of PSMs and their Public Engagement with S&T**

Given the fact that we are critical in the previous section of the Neo-Traditionalist and Neo-Gandhian school which has been practicing social science and STS without collecting evidence about the actual practice of the peoples' science movements (PSMs) and finding out what motivated the PSMs to organize themselves, I plan to take in this section a short detour to bring out explicitly and analytically discuss the origins and evolution of PSMs. This section aims to ultimately trace the PSMs' impact on the processes of social and cultural appropriation of science. It aims to assess the public engagement of PSMs with the challenge of creation of 'public knowledge' in order to bridge the gap between science and the public, and vice versa.

### **Nehruvian Science, Public Engagement and PSMs**

First of all, it is important to briefly learn what made the founding members to come together to take up *Yatra or Jatha*

and form ultimately the All India Peoples' Science Network (AIPSN) in 1987 with the help of organizations like *Kerala Shastra Sahitya Parishad* and Delhi Science Forum and develop in 1990 the network of *Bharat Gyan Vigyan Samiti* (BGVS) units. Second, how the creation of an all-India network of popular science and movements working for the democratization of science, was a significant social innovation for India. The leadership of these organizations was able to get across to a wide range of organizations working in the area of popular science. Not all the activists belonged to the left ideology, but included many more political viewpoints. The charter that the *Bharat Jan Vigyan Jatha* adopted united these organizations to come together was only committed to defining the values that will guide the peoples' science activity in India.

Second, even the organizational form chosen to bring together the activists was not the usual 'unitary' top down structure deployed in the mass organizations of the left. The member organizations were required to use this new network structure of AIPSN to coordinate their own contributions. There is no doubt that these organizations have been able to develop in a much better way their capabilities with the help of each other. The AIPSN is a growing national network of statewide organizations. Not only this network continues to exist without the support of government and foreign donors but also it has already completed twenty five years of its existence.

The three main challenges confronting the democratic movement were: (1) 'popularization of science in mother tongue', (2) 'preventing the misuse and abuse of science and technology' and (3) 'organizing the people for alternate S&T policies and practice of self-reliant development'. None of these three objectives can be termed as serving the establishment. Largely emerging due to the crisis of 'Nehruvian Science', these three challenges had only begun to unfold at that point of time. Even more important is the aspect that the leadership of PSM could convince a wide range of organizations to foresee an opportunity in this conjecture, and the charter adopted in 1987 has largely withstood the test of the time. After completing twenty five years when the AIPSN reviewed the challenges, there was at least no one suggesting that the charter needs to be



changed, though the different viewpoints got expressed on the strategies to be developed to tackle the challenge of mobilization of ambivalent publics for the benefit of democratization of the governance of S&T in India.

Further, if we wish to understand better the continuities and discontinuities of the theory and practice of PSMs, it is important to bring out that while the PSMs started at the all-India level by building an organization in the form of All India Peoples' Science Network (AIPSN) in 1987, the founding constituents had already come into existence a decade or two decade ago. At that time there was no talk of the need to change the path of development or the crisis brewing in Nehruvian Science and Education, which became a talking point much after the mid-eighties. *Kerala Shastra Sahitya Parishad* (KSSP) got established as a network of science writers communicating in Malayalam the science content for the benefit of children and adults of Kerala in 1962. The KSSP was tackling a challenge of democratization of Nehruvian Science and Education when it took up the task of communication of science in Malayalam. If the people want to engage with science, then it is necessary that the State should be giving them an opportunity to understand, learn and assimilate the skills of science. Can we leave tackling of the challenge of cultural appropriation of science to a small elite?

Similarly, it is also necessary to keep in view that the KSSP began with the efforts of popular science by taking up the challenge of communication of science in the mother tongue. This was a critical intervention in the democratization of education and science for the Nehruvian period. It needs to be kept in view that the activists of KSSP have not been transmitting the contents prepared by others elsewhere in the world. They have been able to create science literature to suit the context of its target audiences. They have learnt to innovate well over the period. They have been preparing their resource materials needed in a critical way. Mira Nanda (2003) is in fact critical that the PSMs are not standing enough for science, and they have deviated from their original understanding of science and modernity. It is important to learn that the classes being taken on the theme of Nature, Science and Society were not

celebratory. These classes carry a lot of critical content on the role being played by science under capitalism. Even before the crisis of Nehruvian Science came to the fore in an acute form the KSSP was talking about the Kuttanad irrigation projects quite critically.

Similarly, when in 1975 the leaders of Delhi Science Forum created a network of scientists and engineers, they were interested to mobilize the scientists and engineers on the issues of policy for science and technology (S&T) to democratize the practice of S&T in India. The DSF began its own activities by talking of how the institutions of Nehruvian Science and Technology efforts were failing to keep the goals of self-reliant and people oriented development alive, and that the path of development of S&T must be radically changed to achieve the goals of equity and self-reliance in India. The DSF took the lead in opening a trajectory of development of S&T where the aim was to prevent the repertoire of local knowledge and skills from becoming museum articles and upgrading the local capabilities, resources and markets to create technologies capable of delivering ecological and social justice in the areas of leather tanning, carcass recovery, fruits and vegetable processing, agro-processing, non-edible oil processing, blacksmithy, rural engineering, pottery and agro-ecological to rural development.

### **Learning to Organize for Public Engagement with S&T at a Mass Level**

At the time of their formation the peoples' science movements were in infancy in most states except for Kerala, West Bengal, Delhi, Tamilnadu, Madhya Pradesh, Assam, Maharashtra and Karnataka. There was a clear recognition that the breadth and depth of capabilities of most of the founding member organizations were not up to mark even with regard to the implementation of all the above said three challenges, and these constituents will have to be fostered in a systematic way by the leadership. The AIPSN was established to serve the members as a mechanism of collective learning, experience sharing and handholding. The notion of capability building included the fulfillment of the task of creation of progressive consciousness

as well. At the time of its formation the AIPSN recognized that the strength of members was limited to urban areas. The sections that the PSMs attracted had so far their reach only up to the college teachers, doctors, scientists and engineers working in selected S&T institutions.

During the next two years, in Bhopal and Puducherry, the constituents of AIPSN debated the question of how the PSM could be expanded to generate a larger reach. As the sections from where the volunteers were being recruited had also to be expanded the opportunity of literacy was identified as a way to move forward at the all India level. There existed a debate among the then existing constituents on the issue of how much importance the programme of literacy was required to receive, and where the energy of an all-India organization should be put was a key organizational question. Underlying this debate on the scale and scope of the programme the concept of PSM as a mass movement was implicitly under debate, and how the PSM should reinvent itself to develop the democratic notions of 'popular science' as reflected in the above identified three challenges among the unreached mass in practice.

Though the situation of prevalence of differing views on the importance to be accorded among the founding members to the programme of participation in literacy did not persist for very long, the perspectives of different members on what are the main organizational challenges and what kind of strategies need to be pursued have not ceased to exist. In fact, the prevailing view point is that after the involvement of the constituents in the literacy programme the challenges facing the PSMs have changed considerably. The AIPSN has been struggling to keep up with the challenge of development of the capabilities of volunteers and leaders who have come to lead the movement. Due to the lack of a balance in the portfolio of programmes there has been a concentration of leadership in some states in the hands of activists whose capabilities are yet to go beyond the literacy related activities. These challenges need to be attended to today in the face of the fact that the middle classes are unable to yield new leaders, and the volunteers emerging from lower classes are yet to find their feet in the field. In fact, the continuing challenge of upgrading of competence of even all

those who have come into the leadership at all the different levels is the biggest constraining factor for the further development of the movement across the regions.

The PSM activists got to learn that while the success of literacy programme helped to resolve the important issue of how the movement should move, in what manner and where all in the country, they needed many more initiatives on several fronts to deal with the development of an effective repertoire of actions. The question of expansion of PSM was historically decided in India by taking up programmes like *Hamara Desh*, *Cosmic Voyage*, *Joy of Learning*, *Desh Ko Jano Desh Ko Badlo*, *Peoples' Health Movement*, *Resource Mapping and Land Literacy*. These programmes were consciously developed by the leadership of the movement to recruit capable volunteers for the implementation of the challenges identified by the founding organizations. While it is not being denied that the challenges of development of collective capabilities and a larger number of more capable volunteers are still very much alive, the creative energy shown by the movement as a whole during this phase was not geared to diffusing a borrowed paradigm of popular science being implemented by the colonized minds. There was not only innovation taking place but even the agenda of development of social carriers of innovation was kept by the movement in view.

### **When there is Limited Access to Education Media, *Jatha* based Mobilization as a Mass Communication Tool is an Innovation**

While the charter that the founding AIPSN member adopted at the time of the *Bharat Jan Vigyan Jatha* (BJVJ) explicitly recognized that all the three motivations (science in mother tongue, preventing the misuse and abuse, and developing the alternate trajectories of self-reliant and people oriented S&T) needed a follow up in terms of a variety of tools of communication and developmental programmes, the *Jatha* format, which Visvanathan is critical of, got basically developed as a major tool of communication to reach the unreached masses for the reason of their access to public institutions and media being limited and the people were in search of a solution to the

problem. Further, while it is true that some of the AIPSN constituents are more comfortable than others in pursuing the issues of public importance via the tool of *Jatha* (for example the DSF is hardly using *Jatha* to communicate), it cannot be denied that most of the constituents have been ready to learn the tools being developed by other organizations within and outside the network. In fact, even a more important challenge has been one of what should the PSMs do to adapt the tools requiring normally a certain level of skills and formal education to meet the needs of masses that are otherwise unreached by the public institutions and formal media and are neo-literates but not lacking in skills and knowledge. It would not be incorrect to suggest that for the PSMs the foremost challenge has been one of how the process of capability development is required to be undertaken by the activists, and this task is continuing to challenge the PSMs even today.

During the BJVJ a clear and explicit articulation of the challenges helped the founding members of AIPSN to excite the social activism emerging around science at that point of time in the country. The formation of AIPSN has helped the founding members of PSMs to gather support for the formation of new member organizations in a number of states. At the time of the formation of AIPSN states like Himachal Pradesh, Haryana, Andhra Pradesh, Tripura, Uttar Pradesh and Bihar did not have statewide organizations. In states like Uttar Pradesh, Bihar and Orissa the capabilities existing on the ground in respect of the articulation of these challenges were quite weak at the time of the implementation of the BJVJ. In these states the movement got spurred only with the literacy programme implementation. As the limits of *jatha* as a tool of capability development are quite obvious to the PSMs and they very well understand that the use of *Jatha* is not going to serve the purpose of building of competencies for all the challenges, it is only the limits of capacity to attract today competent individuals from among the middle classes, which is creating a constraint for the movement from going forward rapidly, and the PSMs need to innovate on their own tools for their adoption by the subaltern classes who constitute the majority of the people to whom science needs to be reached at the earliest possible.

While there is no doubt that the success of *Jatha* and its perfection are today attributed to the PSM efforts in the circle dealing with science popularization activity, it has never been the chief rationale for the existence of PSMs. The BJVJ was used by the founding member organizations to spread the message of these motivations to the weak states. It was an exercise in the development of a tool for the communication of distinct PSM messages to the people. But those messages were also followed up by 'agenda setting' through the development of literacy based modules for the development of health, gender equality, watershed management, farmer field schools, experimental programmes and institution building. If the challenge of implementation could not be fully taken up, it is not due to the shortage of desire among the PSMs to invent and innovate in respect of the public engagement with S&T.

### **Understanding the Challenge of Real World Experiments and Development of Social Carriers**

We discuss here an innovation that has been undertaken in the country basically on account of the PSM efforts. In the area of S&T for development, the PSM interventions began with questions like: 1) what kind of challenges the Indian people are faced with in respect of the development of S&T and in what way the pathways and models of technological and social innovation building that the Indian economy and society given its specific characteristics needs to create today; 2) how to get the wider democratic movement to realize in practice the essential requirements of the efforts that are going to be involved in the development of technology models for an ecologically and socially just pattern of development and 3) how can the PSMs help develop in a sustained way the capabilities required to undertake an effective mobilization of the people for their active participation in the development of such a pathway.

Attempts to be made by the PSM constituents were consciously designed to avoid the mistakes of earlier efforts of the governmental and non-governmental bodies. Right from the beginning PSMs were conscious of the failures being experienced in respect of the diffusion of innovations in rural

areas. Attention to the failures being experienced by the initiatives being undertaken in the Khadi and Village Industries Commission (KVIC), Council of Scientific and Industrial Research (CSIR) and Ministry of Rural Development and Appropriate Technology Development Cell of the Ministry of Industrial Development (Abrol, 2004 and 2005).

Right from the beginning the PSM technology interventions were consciously tried out by the constituents by keeping in view the challenge of innovation diffusion. Technology interventions to be attempted by the PSM constituents were required to focus on the design and development of feasibility studies, development of technology models, application of suitable business models, enhancement of user capability and development of multi-sectoral network system of group enterprises needed for the creation of new social carriers of innovation making in rural areas. PSM technology interventions were about the development of know-how and the formation of group enterprises required for the purpose of real world experimentation. PSM technology interventions were undertaken in the public sector mode of knowledge development where the mechanism of intellectual property was certainly not the focus for the obtaining of reward and returns for the technology developer and innovation carriers. The processes of knowledge sharing followed the model of open source development. The revenue model involved the use of project grants and the earnings being realized via the sale of products and charging the customers for the provision of knowledge intensive business services.

But the process of building of real world experiments related science, technology and innovation (STI) capabilities for the purpose of taking up the agenda setting exercises for alternate development is still in need of a strategy which will help the PSMs to accelerate the development of social carriers of techniques being innovated by the institutions that the member organizations of AIPSN have evolved over the period of last two decades. At the moment this process of capability development is going on within the latecomer states quite unevenly. Be it education, health or technology application this unevenness exists. The phase of institutional development is similarly in

infancy in most of the cases. The State Resource Centers (SRCs) are trying to meet this challenge; but the AIPSN is yet to take note of their potential with regard to the building of PSM capabilities. In the literacy states where the expansion of PSMs started with the total literacy campaign the pace of this process is certainly somewhat better. While the process of capability building for the purpose of agenda setting for the challenges identified by the founding members has crossed the threshold of formation of a critical mass in these states the question remains of how the AIPSN should make use of the SRCs and the new experiments that they are taking up to benefit the movement as a whole. At present even with regard to the goal of 'preventing the misuse and abuse of S&T' the competence levels are far short of the expectations of the movement as a whole.

While to some extent the progress is visible in the case of the challenge of science communication because of the programmes like 'Joy of Learning', 'Cosmic Voyage', '*Jantarmantar*', 'Children Science Congress', 'book publication for *Janvachan*' and 'Continuing Education', the AIPSN needs to do more in the area of science communication. The challenge is not just one of much more to be done for the sections that are being targeted through the above described programmes but also one of how the AIPSN would accelerate the pace and deepen the process of capability building for the new target groups even in respect of this challenge. The processes being used in the sphere of primary education by *Eklavya*, *Navnirmiti*, *Jodogyan*, Tamilnadu and Karnataka BGVS are assessed to be full of value for science communication to all those latecomer organizations that need to accelerate now their pace of capability building quickly.

Further, as the capability building for the implementation of other two major challenges is even weaker, we also need to galvanize the contribution of the emerging programmes of science learning and public communication of science in areas like climate change, agriculture, food security, health for all, etc. with the campaigns being taken up now on these issues within the network. There is much scope for the integration of the identified challenges in the programmes being taken up by the organization. Programmes of livelihood improvement and rural development through technology application in the areas of rural



nonfarm systems and agriculture that the AIPSN is in the process of taking up can be suitably integrated with the SHGs and *Kisan Manch* that the BGVS has been able to form as a part of the convergence programme being now taken up in a big way.

There are equally important lessons for the PSM from their own experience of the formation of SAMATA groups created after the implementation of literacy among women in different states. Today the SAMATA platform is known for the development of a self-reliant model (MALAR model) for the 'autonomous' development of self-help groups (SHGs) whose efforts were not limited to acting as micro-finance groups and extended to the development of post-literacy programmes of continuing education among the women in different states. Initially this programme expanded rapidly and the PSM has over 20000 SHGs under its own leadership even today. The SAMATA also started 'science in the kitchen' programme. While a larger community kitchen initiative is needed with a view to mobilize the community for the nutrition of women and children, the tool is still waiting for a wider diffusion because the distance to be covered in respect of capability development has been higher. In order to facilitate women's access and ownership of scientific knowledge, technology discussions in the AIPSN have been veering around to tackling the challenge of integrating the SHGs with the work being taken up in the sphere of technology application. SAMATA has an appropriate opportunity, and it can take a lead in the field of drawing women activists into the practice of ecologically and socially just agriculture and activities related to value addition for achieving the goals of nutrition and good health.

Even a more difficult challenge in the form of a programme called *Nav Jagaran*, which is aimed at the development of democratic values and scientific attitude in the sphere of social life, is just beginning to receive attention from some of the member organizations. Particularly in Haryana the concerned challenge has been pursued to the maximum extent. The PSM tools have been adapted and reshaped to carry the message of struggle within and outside on these fronts at the level of community life. In the context of the need for an expansion of the agenda of social reform in the Hindi belt and the growing

rightwing assault on progressive social values in the country its contribution needs to be appraised by the network as a whole. There is much potential for integration of the initiatives of *Nav Jagaran* movement for secularization and social justice with initiatives to be taken up for the democratization of local institutions and of resource use in the country as a whole (use of drinking water, ponds, commons, schools, health, livelihoods and so on).

### **Experts, Lay Publics and Three Distinct Organizational Conceptions**

In this section, we deal with the ‘democratizing science activism’ of PSMs in terms of the conceptions of organizational development of the people oriented ‘popular science’ activity utilized by their activist members. The PSM activists organize their public engagement activities in the following manner: re-framing science by setting agenda for its democratization, undertaking undone science, contesting expert knowledge, making alternate claims on the impacts of policies under perusal, mobilizing scientific resources for ecologically and socially just, self-reliant development and democratizing knowledge production. The partnerships between researchers and activists have been assiduously built by the PSMs for their activities including PSM theory building, re-construction of science, technology, education and medicine and for studying the consequences of how well their popular science is working out in practice.

There have coexisted at the level of the practice of social activism three distinct conceptions of ‘peoples’ science’. Within the PSM these conceptions have played a determining role in the shaping of programmes and organization. One of the conceptions is that the PSM activists should work as ‘socially conscious experts’ providing support to the larger movement as advisors and supporters. In this conception, the main task is defined for the experts to be giving advice and providing organizational support to the larger democratic movement in the struggles involving S&T related policy aspects. As far as their direct contribution to the organization of PSM activity is concerned,

this conception also suggests that PSM activists can try devoting their energy primarily in the sphere of communication of science to the lay people.

The second important conception also remains in place where the PSM activists have tried to take on the role of an interface between the organizations of mainstream S&T and development and the poor and marginalized people who are otherwise likely to be bypassed by the Indian political and bureaucratic apparatus. According to this perspective, the PSM activists can try to ensure that the marginalized people are not deprived of their share of access to mainstream effort going on in the sphere of science, technology and development. This conception holds that scientific temper can grow better through the interface activity of the PSM. By taking up actively the spread of mainstream education and public communication of science and the diffusion of appropriate technology to the marginalized people PSM activists can bring the marginalized people closer to the democratic movement.

The third conception suggests that the PSM activists can also try to work as a counter-hegemonic force which means the people should also develop a critical understanding of S&T and be empowered through the development of their capabilities and consciousness. This perspective suggests that while collaborating with the people, the role of PSM activists is larger and should not be limited to providing relief to the people. Peoples' consciousness and organization must be raised through the PSM activities to the level of a counter hegemonic force. Argument is that the PSMs should define their main organizational task to be one of how they are going to bring about a progressive shift in the role of science in society and democratize the polity, economy and culture. Since the PSMs have to struggle for a change in the way science and technology are being developed as knowledge systems and being implemented by the mainstream institutions which includes public as well as private sectors, it is necessary that the collaboration of expert and lay public should be judged by the yardstick of whether or not the empowerment of lay public at the level of capability and consciousness development is occurring through their action at a reasonable pace.

While there is and will remain a common ground among these conceptions, it should be obvious that there are also important differences. First of all, it seems that the notions of PSM role are associated with the differing conceptions of development. Second, the differences are also seemingly due to the differing conceptions that the concerned protagonists of these three organizational perspectives hold with regard to the role and contribution of science and technology in society. Third, if the protagonists of all these three views are expressing their position on what they think about the limits of contribution of PSMs to the democratic movement, then the question is really one of only how the PSMs hope to resolve the connection between their tactics and the strategy.

In summary, it can be mentioned that though the above discussed three conceptions of organizational development have a consensus on the role of the existing state apparatus in the Indian society, there exist different views among the activists on the challenge of formulation of a longer-term developmental approach that at this stage the PSMs should begin to promote in the country. Broadly the view gaining ground is that developmental progress does not proceed along a single line from backward to advanced; progress is a branching process with choices along the way. Much of the conflict is about those choices. If the choices being made are ecologically and socially just, then the counter hegemonic process can be assumed to be very likely in place and functioning.

Since the PSMs organize their activity using the method of lay/expert collaborations, it is also necessary to bring out their own critical reflection on the experience of these collaborations. Today the PSMs use 'expert-lay public' collaborations to propagate, adopt and adapt science to fit their strategies to the local context and different domains of popular science activity. Analysis of the practice of PSMs indicates that local knowledge or lay perspectives are not sufficient to create effective research outcomes or policy-making. Since there are potential downsides in using science and local knowledge, when done uncritically, the PSMs' collaborations have been aimed at developing their own field groups, technology generating groups and technology system design groups.

The PSMs are learning in practice to value and also be distrustful of the practice of science of mainstream institutions. They have been selective and practicing caution in building the lay-expert collaborations; often their initiatives have been caught between criticizing and engaging in scientific developments with the publicly funded S&T institutions of Nehruvian era in the spheres of agriculture and industry. The PSMs realize that when activists use the pursuit of science as a mechanism for social change, it may take much more time to be successful than if the means of public pressure building through agitations were their only focus. Scientific studies can get involved in prolonged debate. Therefore, democratizing science movements may be caught in scientific pursuits while missing opportunities to make radical demands based on other grounds.

### **Conclusion**

The central message is simple, a) that the movement has been able to develop India-specific tools and practice ‘democratizing science activism’, and b) that the PSMs have been effective, and the science activists are beginning to achieve some success in mobilizing the people for their participation in the activities targeted directly at ‘public engagement with science and technology’ after the execution of literacy campaigns in the country. The PSMs can be seen as constructing an India-specific tradition of ‘democratizing science activism’, and that an innovative agenda for the implementation of science in society on the fronts of education, development and environment is in place to a significant extent due to their efforts in India (Pattnaik and Sahoo, 2006; Mahanti, 2012 and Zachariah & Sooryamoorthy, 1994).

The PSMs cannot be dismissed as a flawed project of colonized minds. The PSMs are well aware that today their public engagement with the formation of ‘scientific counter publics’ takes also roots in India in competition with the ideologies of cultural nationalism and neo-traditionalism. The PSMs are interested to prevent the reactionary ideological trends from consolidating the tendencies of ‘anti-science variety’ on the ground. Therefore, since the challenge facing the PSMs is also

significantly over how to resolve these dilemmas in respect of coalition building on the ground in order to deal with the challenge of mobilization of the people for the democratization of governance of S&T in India, we will perhaps need another academic work to bring out their own experience with the aim to critically reflect on these important issues.

The PSMs are well aware that the authority and meaning of scientific expertise are rapidly changing for the contemporary publics of science and technology in India. Confronting the PSMs are today not only the challenges of governance of S&T that have arisen on account of the decline of Nehruvian institutions of steering and coordination of science, technology and innovation (STI) but also the new and emerging challenges of regulation of science, technology and sustainable development for the achievement of democratic ends which are also now increasingly getting focused on the issue of risk and uncertainty in India. The PSMs realize very well that the landscape of public engagement with science and technology (S&T) is changing fast. The 'state', 'networks of S&T', 'publics of S&T' and 'development interests', all are still in transition. In several areas of S&T and development the country is witness to the rapid formation of 'scientific counter publics'. New networks are in the making, and the PSMs are in search of opportunities for the development of new types of constructive actions in collaboration with the larger democratic movements active among the peasants and workers to build their alliance on the ground.

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