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People's Science Movements and Science Wars?

People's science movements in India have been viewed in terms of two opposite cultures: taking the scientist's science and technology to the people and opposing the scientist's science and technology for the people. This article provides a critique of science epistemologies behind those two cultures that has led to the so-called science wars among scholars. The article shows up the myth of science wars in India by identifying a common platform for both sides.

ROLI VARMA

Several grassroots groups coming from a mixture of ideological traditions are part of what has been called the People's Science Movements (PSM) in India. PSM defy definition because they are diverse in size, strategy, focus, and history. The group size varies from a band of few individuals in one area to over 30,000 in other areas. While some are recent, others go back to over 40 years. Some groups focus on a single issue, while others cover a vast range. Some work on reducing disparity in scientific knowledge, while others promote an alternative development model, based on local Indian science and technology (S and T). The core set which brings various groups under the umbrella of PSM is working on the issue of S and T in society and is not a direct division of Indian government. All these groups have given PSM a voice in the media and political arena. Since the 1990s, some PSM groups have been invited to make presentations at the annual sessions of the Indian National Science Congress, which has been a platform for projecting national goals for the application of science.

Some groups which represent PSM are: All India Anti-Imperialist Forum, All India People's Science Network, Azadi Bachao Andolan, Bharat Jan Andolan, Bhopal Gas Affected Working Women's Union, Chilka Bachao Andolan, Chipko Move-

ment, Eklavya, Friends of Rural Society, Ganga Mukti Andolan, Himalaya Bachao Andolan, Jan Vikas Andolan, Kerala Sastra Sahitya Parishad (KSSP), Kishore Bharati, Manav Vahini, Medico Friends Circle, Mines Minerals and People, Movement in India for Nuclear Disarmament (MIND), National Alliance of People's Movement, Narmada Bachao Andolan, National Fish Workers Forum, Patriotic People for Science and Technology (PPST), Sahayog, Samajwadi Jan Parishad, and Vigyan Siksha Kendra, among others.

These groups are committed to different notions of S and T in society and thus encapsulate a diversity of activities. Yet, their activities have been framed in terms of two cultures that have led to what some have called the 'science wars' in India [Nanda 1997]. One school has been viewed as seeking to disseminate the worldview of modern science among traditional people to generate what the late prime minister Nehru called the 'scientific temper'. In sharp contrast, the other school has been viewed as opposing development based on modern S and T that is impoverishing the majority to keep what has been called the 'humanistic temper'.

This article argues that there is a myth about science wars in India because the two cultures problem suggests that versions of reality should be on either side in serious conflict, whereas the PSM works on a common platform. Without two sides that are dramatically opposite of each other,

that cannot be reconciled, there cannot be science wars. First, the article identifies PSM as a new type of social movement, so objectives, modes of action, and compositions of activists are differentiated from movements associated with the Left. The article then discusses various political activities of PSM to show diversity on issues related to S and T in society and how their actions are making a difference. Finally, the article addresses the science wars, which have occupied much scholarly attention since the mid-1990s.

PSM as New Social Movement

Like peace, environmentalism, feminism, human rights, and gay rights, PSM in India fall in the category of 'new' social movements. Melucci (1985: 795) argues that social movements need redefinition because the conflicts of the 1980s have revealed new contradictions. He defines new social movements as "a form of collective action (a) based on solidarity, (b) carrying on a conflict, (c) breaking the limits of the system in which action occurs." Similarly, Touraine (1985: 785) argues that social movements in the 1980s are less socio-political and more socio-cultural. He defines new social movements as "an agent of conflict for the social control of the main cultural patterns." In some significant respects, PSM constitutes those new social movements because they differ in their objectives, modes of operation, and composition of activists from movements historically associated with the Left such as the Tebhaga struggle in 1946, the Telengana peasant uprising in 1948, the Naxalbari upheavals in 1967, and the railway workers revolts in 1974.

First, PSM does not work towards the central goal of destroying existing political structure nor are new ones built after the victory in which economic exploitation of one class by another class is done away with. Instead, PSM work on diverse issues such as: the development of S and T for people, protection of natural environment and forests, opposition to mega projects of global corporations and the World Bank, improvement in the conditions of life and health, building cultural identity, promotion of scientific knowledge among the common people, research related to people's health, innovation in scientific communication, and rediscovering Indian

heritage. It seeks to identify a set of focused objectives within PSM because they consist of many voluntary groups throughout India. The only common thread uniting these groups is that they fall on the interface of S and T in society and are not a direct division of government.

Second, the agenda of PSM is not to target the state by forming trade unions or political parties of the socialist or communist type to win state power by elections or underground activities. Instead, PSM focuses on grass roots activities by forming loose associations. Their organisational structure is rather decentralised, lacking regulation, differentiation, control, and power. Their officials and members consist of voluntary workers who rely on nominal donation. They publicise their causes by speaking publicly and demonstrating against governmental policies. Many groups use art, songs, poems, dances, puppet shows, and plays to wage their struggles. Tilly (1985) has argued that demonstration has become a key form of collective action due to the growth of elections and the beginning of popular participation in national politics.

Third, activists in PSM do not view themselves in terms of a class, that is, a group defined by a socio-economic conditions or in relation to the means of production such as the working class or the feudal landlords. Most activists come primarily from the educated middle classes, and hold employment as scientists, engineers, technologists, policy analysts, journalists, or teachers. Many are students of science or engineering. However, their middle class background does not determine the stakes of their action. They speak on behalf of people of India who are poor, small peasants, agricultural labourers, rural artisans, craftsmen, tribal people, and urban workers. Their demands are class-unspecific. They exhibit features of what Cohen (1985: 663) has characterised as 'self-limiting radicalism'.

This, however, does not mean that PSM have no connection with the Left politics. In fact, KSSP, one of the largest groups in PSM, had early linkages with the Communist Party of India (Marxist). Similarly, many PSM activists have Marxist or Maoist orientations. The very term 'people' in PSM is a Marxist categorisation of disempowered workers and peasants. A movement, which consists of many groups working on diverse issues related to the use of S and T in society, is bound to be shaped by a wide range of thinkers including Marx, Lenin and Mao. However, PSM view class structure as an important but

not sufficient to analyse the Indian society. PSM are rooted in the middle classes and their goals are class-unspecific and diverse. Their modes of action are based on grass roots activities that are informal, spontaneous, and legal. Mahatma Gandhi's philosophy of non-violence, tolerance, spiritualisation of politics, and self-reliance influence many PSM activists. Even though PSM go along with the status quo, they advocate for changes in structured inequality and empower people to stand for themselves.

Political Activities of PSM

After independence in 1947, India emerged as underdeveloped in relation to the west and sought to eliminate poverty and unemployment with large-scale industrialisation. Nehru (1985: 31) believed that without 'catching up' with the scientific and technological advances made in the west, India would remain weak and vulnerable to foreign domination. He felt that Indians must learn to think and behave scientifically to overcome traditional, mystical, supernatural, uncritical, and inward-looking way of life so they can adapt to the modern age. The Communist Party of India (CPI) supported nationalists as representing the interests of national bourgeoisie and sought peaceful transition to socialism through participation in elections [Ram 1973]. It viewed feudal relations of production as hindering capitalist development. With the victory of CPI in elections in Kerala in 1957, it supported the Congress Party and its policies. Western scholars, working within structural functionalism, positivism and anti-communism traditions, also proposed modernisation of third world countries like India [Drucker 1959, Rostow 1960, Huntington 1968]. Modernisation was seen in terms of the acquisition of western S and T, industrialisation along western lines, urbanisation, literacy, spread of technical roles, social mobility, and cultural secularisation.

KSSP, which was formed in Kerala in the early 1960s, initially accepted the basic premise of modernisation of India. They emphasised changing people's outlook from 'traditional' to 'scientific' [Kanan 1979, Zachariah 1994]. Their understanding of scientific thinking was rather conventional. It meant relying on facts, accepting nothing on blind faith, changing old beliefs in the light of new evidence, drawing conclusions on the basis of independent evidence, being critical, keeping an open mind, and challenging the forces

of supernaturalism and superstition. They realised that science was one among many knowledge systems, yet stressed its supremacy in the study of society.

However, as KSSP experienced obstacles in communicating their scientific goals to people, the lack of scientific temper as the root cause of India's problems was criticised inside the movement. For one thing it amounted to blaming people for their misfortune. It was argued that the scientific temper like any other behavioural attribute could not be made a universal requirement for modernisation [Kumar 1984]. The Dependency School identified underdevelopment or poverty of the third world (periphery) as the basis of development or wealth of the west (core) [Frank 1975, Amin 1976, Wallerstein 1979]. They rejected the possibility of self-sufficient capitalist development in the periphery without breaking its historical linkages with the core. Indian scholars such as Amiya Kumar Bagchi, Nirmal Chandra, Sanjaya Lall, Deepak Nayyar, Ashok Rudra and Ranjit Sau showed that the main cause of the backwardness of India was due to the reproduction of economic and political structures in accordance with the interests of the metropolitan powers and the dominant classes. Against the emphasis on internal behavioural factors, critics emphasised external political economic factors for modernisation or development of the third world. The so-called 'traditional', 'unscientific' or 'backward' behaviour was perceived as a product of economic and political circumstances prevalent in the country. As a result, the scientific temper formed smaller components of PSM in the late 1970s and early 1980s and the focus has since shifted to education, health, alternative S and T, and a number of related areas.

KSSP has been using the slogan "Science for Social Revolution". They believe that science can find solutions to social problems and thus empower the vast majority of the poor. Unlike earlier positivism, however, they no longer prioritise scientific knowledge over traditions and culture. Further, they have been popularising science differently. For instance, KSSP has set up medical camps to carry out mass education programmes on AIDS and maternal health. Similarly, Sahayog has been working on reproductive health education, delivery services, the context of AIDS, and local practices that make the population potentially vulnerable to the spread of HIV. The All India People's Science Network has been forging linkages that affect the transfer of scien-

tific knowledge between the scientific community and the people. The Medico Friends Circle has been campaigning against global corporations marketing non-essential and dangerous drugs in India. The same group exposed cover-up of the health effects on the gas victims when MIC leaked from the Union Carbide plant in Bhopal in 1984, killing over 2,500 and affecting 2,00,000 people. Many groups have initiated experimental science teaching programmes based on the discovery or inquiry method as opposed to rote learning in rural areas. Generally, these groups no longer aim to teach atheism or confront religion even when they experience opposition from those representing religious orthodoxy [Kannan 1990]. They believe that the issue of religion and tradition can be addressed successfully only after significant economic and political changes have occurred.

Most of these groups feel that scientific knowledge and technology should not be concentrated in the west and in the hands of Indian elite, and it should be distributed fairly. As pointed out earlier, India has been trying to revitalise its economy by introducing S and T, which has been developed in the west. However, India has been unable to acquire modern S and T at the right price under the right terms and conditions mostly because the carriers of S and T are global corporations. There are proprietary rights in technology in the forms of patents, trademarks, and brand names; the basic designs, blue prints and know-how remain in the private possession of global corporations. Furthermore, those in authority in India have been making a disproportionately large allocation of the available S and T for the benefit of the Indian upper classes. Thus, many PSM groups are working to overcome these barriers to make S and T work for the benefit of the common people and India.

In its attempt to incorporate western S and T, India has acquired 'technological dualism' or 'technological polarisation', that is, the use of different production functions in the advanced and traditional sectors. The reality of India is that the huge investment in the modern sector coexists with extremely poor human conditions. Over all, gains from the growth of the modern sector has been increasing, rather than decreasing the problems of development by deepening dualism between the limited modern industrial sector and the vast rural hinterland. Modernisation and related development programmes have not met the needs of the neediest. PSM realised that they could not perform a catalysing

role in empowering people with science, when it has been increasingly becoming an oppressive instrument in the policies of modernisation and development. This led to redefining the role of science in PSM to the "mobilisation and participation of the people for their own development – as distinguished from the kind of 'development' handed out to them" [Kannan 1979:1]. PSM rejected the idea that they can solve people's problems from outside; instead proposed to learn from the people [Bhalla and Reddy 1994].

People in India have been getting organised to oppose destruction of their livelihood in the name of scientific progress and national development. With deforestation, rural women have to traverse greater distances to collect fuel, fodder, and other basic necessities, which has cut time available for wage labour and stretched the normal working day up to 14-15 hours. These women waged the world famous Chipko Movement by clinging to trees to save them from being felled. The National Fish Workers Forum is fighting off the threat of mass displacement and damage to the ecosystems by the industrial fishing practices of gigantic factory ships. Bhopal Gas Affected Working Women's Union and the Medico Friends Circle have been working for medical and economic relief of gas victims due to a poisonous gas leak in the Union Carbide plant. Azadi Bachao Andolan has been campaigning against the entry of global corporations in India. MIND, a newly formed group, has been demonstrating against the policy of nuclear weaponisation in the region and providing the scientific and intellectual resistance to some of the myths perpetrated by the Indian government.

One of the most influential movements is against dams, which have been displacing many local inhabitants. In 1979, the government of India approved the Sardar Sarovar Project to build 30 large, 135 medium and 3,000 small dams, stretching over 1,300 km of the Narmada river across three states of Madhya Pradesh, Maharashtra and Gujarat. It has been submerging the homes, villages, cultivable lands, and forests along with disrupting environmental quality. Officially, it has displaced over 2,00,000 people and is likely to reach the displacement of over one million people. The government is unable to provide the dam-displaced people with equivalent land. It has spawned vehement opposition to industrial development in the region by the Narmada Bachao Andolan. In 1993, the movement compelled the World Bank to withdraw from

the project. Similar withdrawal by three global corporations took place in 1998 and 1999. Now the movement is fighting the US power utility Ogden Energy Group, which has decided to invest into the hydro-electric project. In response to the case filed by the movement against Sardar Sarovar Project in 1994, on October 18, 2000 the Supreme Court ordered the dam to be completed as 'expeditiously' as possible.

In 1993, several groups that opposed the prevailing model of industrial development came together to form the National Alliance of People's Movements. They redefined development in terms of equality, peace, happiness, and self-reliance. They want people to be involved in the decision-making, and have control over the natural resources in their vicinity. They advocate self-reliance of both urban and rural communities for their basic needs, with limited dependence on expanded markets. For them, industrial production should be labour-intensive, decentralised, and based on renewable energy. They propose sustainable use and conservation of soil, water, forests, and other resources. They believe that such actions would develop creative mass energies towards self-reliant and participatory development. They held a third convention in March 2000 in which individuals, organisations, movements, and parties from all over India participated.

Mahatma Gandhi had earlier proposed cottage and small-scale industries to ease the problems of poverty and unemployment; but Nehru's government saw them as a temporary solution until India became fully industrialised. In 1971, mostly because of PSM activities, the ministry of industry also opened a cell for appropriate technology. Since then it has been supporting research into local technologies in leading institutes. It has led to up scaling technologies such as the heat-efficient and smoke-reducing stoves, solar rice cookers, water control devices, sanitation, alternatives to chemicals in agriculture, indigenous seed conservation, and bio-gas production for energy. Governmental agencies working in the areas of alternative technology, however, are not a part of PSM; instead, they have taken PSM's theme of learning from people into the production of technologies that are appropriate in rural areas. PSM have their own projects to disseminate technologies appropriate to the socio-economic environment.

Some PSM groups like PPST have been defending the traditional Indian system itself to propose it as an alternative. Their

work has been to reassess modern science that has grown within the context of colonialism and imperialism, to evoke a debate on western versus Indian science, and to popularise that heritage of the Indian system that was destroyed during the British rule. They argue that the claims of truth in modern science are no more universal than claims of truth in Indian science. They think that the Indian society has its version of truth and thus interpret knowledge accordingly. They affirm the epistemological right of Indian people to understand the world from their own cultural and metaphysical assumptions.

The theme of appropriate development or alternative society is not without criticism. The implementation of appropriate S and T or a return to the golden past is seen as a panacea for many problems facing India. Yet, there are no plans on how to implement goals of appropriate development or alternative society on a wider scale.

Science Wars?

Much of the science practised throughout the world draws on the basic principles, formulae, and concepts that were elaborated, among others, by Copernicus, Galileo, Newton, Harvey, Boyle, Bacon, and Descartes in Europe between 1500 and 1700. The knowledge of the scientific revolution replaced ancient teachings of Ptolemy, Aristotle, and Galen. Today, modern science is understood as the application of mathematical hypotheses to nature, the combination of mathematics with experiment, the distinction between primary and secondary qualities, the geometrisation of space, and the acceptance of the mechanical model of reality. Modern scientific methods mean systematic reasoning, critical observation, logical thinking, proof/verification, objectivity, and honesty in recording observations and experimental results. Philosophy of science, which dominated until the 1970s, accepted the basic premise of modern science and suggested that it is the autonomous pursuit of knowledge [Merton 1973]. Generally, science is understood as neutral, independent of social, cultural, and political factors, which is produced according to rational or cognitive factors. If social or cultural factors enter in the scientific discourse, they are viewed as creating bias.

Against such ideology, scholars in science studies have proposed that scientific knowledge is influenced by social and cultural factors and thus deviates from the traditional ethos of science. They believe

that decisions on scientific methods are shaped by disciplinary cultures, availability of funds, networking politics, and so forth. Instead of the institution of science, they focus on the conduct of science such as facts, theories, methods, technical designs, and experiments to show how social context is essential in the scientific activities. For instance, historian Mackenzie (1978) has shown that Pearson's correlation statistic was to produce a scientific basis for eugenic ideology to support the emerging professional class; in contrast, Yule's Q statistic was tied to public health to support the programmes of the established upper classes. Feminist scholar Keller (1985, 1983) has demonstrated the gender bias in locating the seat of genetic control in the single master molecule (a masculine trait) over interaction (a feminine trait). Social constructivist Latour (1987) has found scientific controversies among scientists to be more important than established facts because this is where facts are either accepted or rejected. Similarly, Knorr-Cetina (1981) found that there is no single scientific method and scientists to be opportunistic in their use of methods. My own research on scientists working in industry found that the immediate business needs and the availability of funds from business divisions shape research activities. Similarly, the research agenda of scientists working in academia is often influenced by collaboration with industry [Varma 2000, 1999, 1995].

Some science studies scholars have also challenged the Enlightenment's faith in universal knowledge. They go beyond social factors shaping scientific activities and propose that science itself is social. They believe that all claims about nature, world, and physical reality are social and cultural constructs, and the world beyond one's observations does not exist. They view modern science as ethno-science of the west, which far from being neutral and objective, reflects the dominant ideologies and power relations of western cultures. Instead of modern science, they believe in 'standpoint epistemologies' or 'subjugated knowledges'. For instance, feminist scholar Harding (1998), in her recent book, asserts that all knowledge systems are situated, local ones thus contradict the widely held assumption that modern science is universal. Similarly, Haraway (1991: 195) argues "for politics and epistemologies of locations, positioning, and situating, where partiality and not universality is the condition of being heard to make rational knowledge claim." Cultural critic Ross (1991) considers western science as a

counterculture for non-western communities, and dedicates his book to "all of the science teachers I never had." Post colonialists, such as Nandy (1990) and Alvares (1990) argue that modern science fails to give due recognition to the Indian culture and helps constitute the western culture in which it was produced. Environmentalist Shiva (1988) finds that Indian women are closer to nature and thus have an especially privileged viewpoint to protect nature.

In the 1990s, self-proclaimed defenders of science launched an attack against scholars in science studies by characterising them as 'the academic left'. With the publication of *Higher Superstition* by Gross (a biologist) and Levitt (a mathematician) in 1994, the so-called science wars have broken out in the west. The Sokal affair is considered a pivotal point of the science wars in which Sokal (1996a, 1996b), a physicist, published an article supporting cultural critiques of science in *Social Text* only to reveal that his article was a parody. His affair was carried on the front page of *The New York Times*, followed by many other publications and by the news radio in the US and around the world [Bone 1996, Claudio 1996, Kimball 1996, National Public Radio 1996, Scott 1996] (<http://weber.u.washington.edu/~jwalsh/sokal/>). Conservatives like Pat Buchanan equated the science wars with the cold war in its potential impact on Americans. Recently, Koertge (1998) compiled articles of 'science warriors' to expose postmodernist myths about science.

Unlike science studies, Gross, Levitt, and Sokal argue that social and cultural factors do not influence the core of science or the truth of scientific propositions. They find modern science as objective, neutral, value free, and progressive. They think that science corresponds to truth about nature because of facts, logical reasoning, scientific methods, experimental validity, disinterestedness, and impersonal standards. They believe that there is a world out there, existing independently of the knower, which is accessible through science. Nanda (1998) goes one step further and proposes 'modern science without apologies' for India. She argues that the cultural position that prescribes non-western science for India as the worst form of colonial condescension.

There are serious problems in the furore over science studies. First, defenders of science talk about the principles of scientific investigation yet do not apply the same principles to dismiss science studies. Instead of empirical investigations or case

studies, they dismiss science studies with caricature, condescension, and parody. They portray critics of science as 'the bible of North American science', 'doctrinaire', 'eco-apocalyptic rhetoric', 'goddess worshipping', 'hotbed of postmodern irrationalism', 'hostile', 'ideological', 'left's disenchantment with science', 'muddle-headed', 'nonsensical thesis', 'radicals', 'sloppy thinking', 'too marginalised to change the world', 'refugee from an unsatisfactory scientific career', and so forth. They do not acquire detailed knowledge of science studies but proceed to judge it anyway. They fail to address how science studies have established themselves in the last 30 years and why they have a large following in universities both in the US and around the world. They do not provide a 'scientific proof' why scientific epistemologies are necessarily better than alternative ones; instead, they keep reiterating their ideological convictions.

Second, even though defenders of science do not find a theoretical core among the critics of science, they still refer to them as constituting 'the academic left'. Marxists, postmodernists, environmentalists, feminists, multiculturalists, social constructivists, post colonialists, Afro-centrists, AIDS activists, and post-structuralists – all are lumped together as belonging to the Left. The minimum requirement of being a part of left wing politics is to believe in the class analysis of a society. The Left views S and T only as one important factor affecting social change, and not the factor. Most of the groups listed by defenders of science concentrate only on the issues at hand and seldom function within the broader class analysis. Instead of class, there is mostly gender and race mantra in science studies. Further, a majority of those singled out by defenders of science rarely count themselves as a part of left politics. Such attack puts defenders of science in the same social conservatism category as Alan Bloom, William Bennett, Roger Kimball, Hilton Kramer, and Dinesh D'Souza.

Third, science studies are more than just promoting cultural relativism. A field, which has evolved in the last 30 years with extensive theory and research, is bound to have some scholars who believe that sciences are epistemologically relative to each and every culture's beliefs. But this is certainly not true for all scholars in science studies. Hess (1995, 1997) has shown that most science studies scholars are like natural scientists in that both assume a real, material world beyond their observations. Many scholars in science studies believe

that observations are shaped by social factors or structured by cultural categories, but they are, at the same time, shaped and structured by an external reality. Instead of assuming the supremacy of modern science, however, they argue that other knowledge claims deserve the same respect. Such investigation is likely to offer a basis for deciding which claims one should believe in and why.

Finally, it is important to point out that science has become an integral part of modern society and the goals of science studies is to provide a forum for discussion on the social and ethical dimensions of scientific activities. Because of such role science studies are not always popular. Yet, science studies have acquired prominence and established themselves by showing the role of society, culture, race, gender, and class in scientific activities, which defenders of science are refuting. If modern science was not limited in its scope and had developed its own scientific methods to remove value, it would not be open to interpretations by science studies. Nonetheless, the critique of science is a matter of science practice. It appears that too much has been made of two little of the science wars.

The concept of science wars as evolved in the west is not applicable in India because PSM activists and scholars in science studies in India stress unity in natural sciences and society by showing the existence of social issues in natural sciences and vice versa. There is little debate on S and T being socially neutral, each possessing an internal objective logic of its own, which is the case in the west. Instead, the link between science and society in India is viewed as organic, not separate. The science wars in India seen in a dichotomy – scientific versus humanistic temper – is also not appropriate because PSM work on a common platform on the interface between science and society, and the intellectual trend in India cannot be identified as two mutually exclusively views on science epistemologies.

As pointed out earlier, PSM is a growing movement on the interface between science and society, so its parameters are not fixed. Till the late 1970s, there were only few groups in PSM; however, after mid-1980s they blossomed all over the country. They are motivated by the reality of extreme economic and social inequality in Indian society and focus on different aspects of S and T. The earlier goal of generating scientific temper has died many deaths and is no longer seen relevant within the

movement. If scientific temper is mentioned in PSM, it is to critique the Indian government (Indian Science Congress) or international symposiums (e.g. the Asian branch of the International Science Policy) that continue to discuss the need to inculcate scientific temper among people. PSM use science in the broadest possible sense to develop the movement in the country.

There is a need to separate the old agenda of scientific temper from the new agenda of popularisation of science in PSM. The former prioritises scientific knowledge as opposed to other knowledge systems. It believes in changing people's from fatalistic, supernatural, traditional, and mystical prejudices to scientific rationality. The latter, however, believes that scientific progress should not be confined to the elite and the educated sections of Indian society. Many groups, therefore, work to popularise science in a number of areas such as health, education, nutrition, housing, environment, communication, agriculture, and sanitation so people can also enjoy benefits of science. The same groups also realise the threat science poses to people and environment in modernisation and development policies. Consequently, they also work with those in PSM who oppose the prevailing model of development based on western S and T as being destructive to people and environment. Even Nanda (1985) who has identified herself on the side of the scientific temper in India in the 1980s, supported alternative techniques of development.

In the late 1980s and early 1990s, there was a reorientation in the agenda of PSM. The focus shifted to oppose the policy of heavy industrialisation based on the trickle down concept. From such opposition, an alternative model has also emerged, which views that development should be based on S and T that are oriented towards directly meeting people's needs and providing a better balance between humans and nature. Often such S and T are seen as small scale, labour intensive, and decentralised. Yet, these S and T are not viewed as an end in itself; but a mean or a first step towards modern S and T. It is believed that once social and economic development has reached a certain level or certain social reforms have taken place, some versions of modern S and T would also become suited to India. Their rallying slogan has been 'Vinash Nahin, Vikas Chahiye' [Bakshi 1996]. They do not exclude those in PSM who popularise science to build an alternative social order; instead include all interested in supporting their causes

with the long-term goal of developing PSM. The main characteristic in PSM is diversity, and not antagonism or hostility.

Some scholars like Shiva, Nandy and Alvares, and some PSM groups like PPST do defend the traditional Indian systems to develop them as alternatives. They speak of Indian glory before the British colonialism when Indians had lived at the pace of and in harmony with nature. They think that sustainable development and people's empowerment are possible by rejecting modern worldview and going back to Indian traditions. Yet, it is not clear whether they are rejecting *all* aspects of modern S and T and supporting all aspects of traditional Indian systems. There are many changes that have taken place generally associated with modernisation and development policies such as communication, electricity, electronics, hospitals, laboratories, media, transport, universities, and scientific institutes with which these scholars are quite happy. Ashok Jhunjhunwala of PPST is involved in bringing the Internet cheaply and quickly to rural population [McGivring 2000]. These things as such are not viewed as evil; instead, tailoring Indian society to suit modern S and T without examining its objectives, notions, and values are viewed as evil. This difference is crucial as it amounts to a choice between different paths of development, different notions of social organisation, different views on the relationship between people and nature, and so forth. Similarly, there are many social changes have taken place in India which are considered 'progressive' such as untouchability, sati or widow burning, endogamy, witchcraft, quack medicine, and so forth. These oppressive aspects of traditional India have been criticised. Instead of getting support, Nandy (1988) got alienated when he rationalised traditional practice of widow burning. He has responded to his critics with the concepts of 'critical traditionalism' and 'critical insider'. Still, his and others concepts of traditional India are rooted in the critique of modernisation; it is not being generated from their belief in religion or tradition.

Against alternative sciences, Nanda argues that the social agendas of western science in India is to liberate the oppressed people, oppose patriarchy, demolish the traditional justifications for the caste system, reveal equality of all human beings, and free the mind from fear of gods. She claims that only by internalising scientific view and rationality, India could guard itself against Hindu fundamentalism. This is a nice, but flawed view of modern science.

For one thing, science is not a single tool for social emancipation though science has had an impact on society and some times for social emancipation. Changes in people's consciousness, values, styles, and actions are a product of many phenomena including science, leadership, history, culture, economic, and education. Caste system, untouchability, patriarchy, evil customs, inequality, and injustice can not be demolished by scientific rationality alone. Even people, who take an oath to abide by the scientific temper, do not lead their lives according to the scientific rationality [Sarukai 1999]. Besides, historically fascism has been a product of western societies when they were strong in S and T. Lack of scientific temper cannot be held responsible for the rise of fundamentalism and thus fascism in India. The Indian elite started building India after independence by accepting the spirit of scientific temper. If there is a shift, it is because of the failure of modernisation and development policies.

Yet, increasing fundamentalism and religiosity does not mean being anti-modern science, which Nanda is afraid of. India has been desperate to industrialise itself along the lines of the west as rapidly as possible and not to be left behind in terms of the scientific and technical superiority acquired by the west. Because of such desperation in India, the security that science enjoys tends to be higher than the security religion enjoys. The present Indian government headed by the Bharatiya Janta Party (BJP) is the political wing of the Rashtriya Swayamsevak Sangh (RSS), an ultra-right Hindu revivalist movement. They have been agitating for some time to restore the glory of Hindu India that was destroyed by Muslims during the 300 years of Moghul rule. In 1992, they mounted an all-India agitation that led to demolition of Babari mosque. BJP emerged as the single largest party in February 1998 elections. Within three months of taking the office, this Hindu government exploded five nuclear bombs on May 11 and 12. The nuclear programme in India started in the 1970s, but previous non-Hindu governments had shown restraint. So, proposing Hinduism for India does not mean abandoning modern S and T; it only means giving a religious flavour to modern S and T. In other words, have bombs and call them Hindu bombs. Instead, of conducting nuclear testing when conditions are scientifically suited, conduct tests on Buddha's Poornima (birth).

Because nuclear and other compelling S and T of the 21st century can spawn

whole new classes of abuses and are controlled by the Hindu government, they warrant more opposition than ever before. After 50 years of independence, India is seeking the status of great power, not by economic achievements or by addressing science to the cause of poverty, but through nuclear jingoism. With such a narrow path taken by India one hope is new social movements like PSM, which are functioning for change by involving people to act for themselves. PSM are opposing big science because, instead of helping people, it is leading to social and economic disaster for India. They are reclaiming science to work for people in India. [EW]

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