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Focus

Science communication in India: current situation, history and future developments

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Nowadays, India is experiencing a widespread diffusion of science communication activities. Public institutions, non-governmental organisations and a number of associations are busy spreading scientific knowledge not only via traditional media but also through specific forms of interaction with a varied public. This report aims to provide a historical overview of the diffusion of science communication in India, illustrating its current development and its future prospects.

2004 was the Year of Scientific Awareness in India,[1] the most recent of a series of major events that provides some idea as to the extent of the diffusion of public science communication in one of the most populated countries in the world. There are two types of science communication: on the one hand, there is institutional communication, managed at a governmental level for over twenty years by the National Council for Science and Technology Communication (NCSTC),[2] a purpose-designed body dedicated entirely to promoting a large quantity of initiatives, whereby information is conveyed through mass communication and the national education system. On the other hand, there is communication among the population itself, which - since the independence of India from British rule in 1947 -, aims at the dissemination in rural areas of basic scientific knowledge that had only been accessible to the upper classes of society up until that time. The combination of these two types of communication provides a complex image of the variety of levels, methods and languages that characterise science communication in India, with research in this sector only having made its debut a few years ago. A variety that mirrors the diverse and complex social nature of a country that spreads out from the Himalayas to the Indian Ocean, marked by hundreds of years of severe economic exploitation, foreign rule and also ethnic and religious wars.

The most recent history of science communication in India dates back to the end of the Nineteenth Century, when the first science books imported from Britain were translated into the main local languages and distributed amid the upper echelons of society. It was only in 1947, the year India obtained its independence, that the first popular movements for science communication began to form. From the Nineteen Fifties onwards, the new Indian government decreed the need to build the new nation on the basis of a widespread scientific knowledge and awareness. Several science communication activities were promoted, also through the media, and an intensive period of publishing and translation of school and popular science books began, which quickly revealed a major lack of terms and expressions in the Indian languages suitable for conveying modern notions of physics, biology and medicine.

At the same time, as an effect of the sudden accessibility of scientific knowledge to all social classes, small local groups of *science writers* and people involved in activities for the diffusion of scientific culture began to form. The first group to be established was the Kerala Sastra Sahitya Parishad (KSSP)[3] and over the years it went on to become one of the largest and most active associations in this field. The People's Science Movement (PSM) was founded in the Nineteen Eighties, later changing its name to the All India People's Science Network (AIPSN),[4] consisting namely of a committee for the co-ordination of the numerous local and regional non-governmental organisations (NGOs) set up over the years. It is

this very People's Science Movement that led to the creation of one of the most extensive science communication events in the world.

In the Nineteen Sixties, the KSSP devised a new way of involving the masses: *Science Jahtas*. The *Jahtas* were small groups of artists, scientists, teachers, students and unemployed youths, travelling from village to village in a kind of procession, staging proper theatre shows at every stop, accompanied by songs and puppet shows, supported by the distribution of explanatory leaflets. These *Jahtas* quickly became events that village inhabitants looked forward to, and for which they regularly organised a welcome. On the 2nd of October 1987, with the partial economic support of the Indian government, the People's Science Movement set up an event of incomparable dimensions:[5] five different processions, comprising thousands of volunteers, covering 5,000 kilometres in 37 days, staging shows lasting several hours in the villages of the major Indian districts and ending in a great finale in the city of Bhopal, on occasion of the anniversary of the 1984 toxic gas leak that caused hundreds of victims. An estimated one third of India's population attended shows on themes linked to the prevention of diseases, the production of drinking water, the recommended behaviour in the event of climatic catastrophes, biodiversity and many other issues. A similar event was repeated in 1992, and today more than fifty Indian non-governmental associations dealing - among other things - with the diffusion of scientific knowledge continue their work also thanks to the *Jahtas*.

On an institutional level, science communication in India boasts a very advanced level of diffusion and structuring. Declared since the era of Jawaharlal Nehru - Gandhi's right-hand man who was the first prime minister of independent India (the state set up following the British retreat) in 1947 - the need to diffuse scientific knowledge to the entire population was quickly transformed into one of the most heartfelt needs of the country. While on the one hand a large number of local associations were set up and structured, busy spreading knowledge directly among the people and attempting to popularise scientific literature through books, the radio and newspapers, the National Council for Science and Technology Communication (NCSTC), the main organ of government designed to diffuse science, was officially established in 1982. Its story is told by Manoj Patairiya,[6] a scientist and member of the NCSTC since 1991 with many years' experience as a journalist and scientific writer.

"Jawaharlal Nehru was indeed the first to understand how important the diffusion of scientific knowledge is, and he introduced a special provision into the Indian constitution, to make it clear that it was every citizen's duty to adopt 'scientific temper, humanism and spirit of enquiry'.[7] Creating scientific awareness and developing a 'scientific temper' does not merely entail the diffusion of science. It means giving people the tools to develop an ability to think in line with the scientific method, and which is as logical and rational as possible. All NCSTC's efforts - and those of many other organisations set up over the years - are made with this in mind".

It is difficult to list all the activities carried out by the NCSTC, or even those in which it participates. The Council has offices and delegations in all of India's 35 states and territories, where activities are carried out and run in 18 different languages, and it has also set up the NCSTC-Network, which groups together around one hundred organisations, the majority of which non-government run. The science communication programmes run by the local departments reach most of the Indian territory, and the NCSTC also offers direct training for expert communicators specialising in various areas of the sector. The major large-scale events organised by the Council include the National Science Day programmes (a day, a week, or sometimes even an entire month of the year dedicated to an intensive range of science communication activities) and the National Children's Science Congress, which took place for the first time in 1993 and, once a year, gathers over one hundred thousand children aged between 10 and 17 from all over the country and is dedicated to hands-on learning. Last but not least, the NCSTC also produces popular educational material, often organised in kits distributed directly to village populations, as well as articles or *series* for the local media (television, radio and newspapers), for the most part dedicated to themes relating to health and prevention. The Council publishes a newsletter every month, in both Hindi and English, entitled *NCSTC Communications*,[8] and collaborates in the running of over 200 university science communication courses throughout the country.

According to Manoj Patairiya, "for some time now, we have also organised a section dedicated to research, because we are convinced that this is a fundamental area to improve our work". One of the

most important studies carried out by the NCSTC concerns the overall public expectations on the methods and means of science communication. Some estimates show that science currently obtains 3% of the total coverage by the Indian mass media. "Obviously, we hope to increase that percentage value over the next few years. But it is also important to do this in the right way: that's why we asked people what they expected from journalists and communicators", explains Mr. Patairiya. The survey results, published in an article[9] in the *Indian Journal of Science Communication* (a science communication research magazine published twice a year, thanks to the Indian Science Communication Society,[10] a non-governmental association of professional science communicators set up in 1994), provided some important food for thought. More than 12% of interviewees, in a sample of 500 people, said they were interested in scientific issues. The major discrepancies between supply and demand of scientific communication were found in the means used to convey this information (diminishing interest in printed matter, greater demand for televised or popular products, such as street theatre or puppet shows), in the format (high demand for fiction programmes and shows in general rather than books or newspapers), and in the target, which according to interviewees should be most of all women, children, students and farmers, for whom specific forms of communication should be devised.

The future of science communication is also a topic of conversation among journalists, scientists and communicators belonging to the numerous associations operating in this sector. These include the Indian Science Writers' Association,[11] which groups together a large number of people committed to improving the public understanding of science. Yash Pal,[12] one of the most important scientists continuously striving to diffuse science, says: "it is true that a lot is done to promote scientific knowledge in our country, but it is not enough. The "scientific awareness" spreading process must take place first and foremost by contextualising the data and knowledge into the needs of everyday life. We have to make our communication more interesting and interactive. I have been making television *series* and communication magazines for some time, but I only recently discovered that the real challenge lies in children. The Children Science Congress has taught me what it means to tell people something starting from their daily experiences".

Vigyan Prasar[13] is another independent association, which was set up in 1989 thanks to the Indian government's Department of science and technology, and it is among the most active organisations in the production of material for science communication, as well as a meeting point and centre of co-ordination for scientific research institutes, schools, universities, museums and academies. In addition to the various books it has published for both adults and children, Vigyan Prasar also has an on-line publication called *ComCom*, a monthly science communication magazine (which provided extensive coverage of the tsunami last December and of the failure of science communication this natural disaster represented),[14] and *World of Science*, namely archives of explanations of the meaning of the most important scientific terms. The association is also part of the network of *Ham Radio*,[15] a world-wide circuit of radio lovers who build their own radio set (and tell anyone who wants to take part how to do so) and who discuss themes linked to science and technology. Moreover, the association publishes a newsletter once a month, distributed with many local newspapers and magazines, that goes by the name of *Dream 2047*, and VIPRIS, a compilation of the major scientific news announced in the international media over the fortnight prior to the date of publication, in English and in Hindi, as well as co-ordinating VIPNET, i.e. the VIgyan Prasar NETwork, since 1998. VIPNET groups together over 2,000 clubs and associations dotted all around India, and dedicated to the diffusion of science.

The National Centre for Science Communicators (NCSC),[16] - which was founded in 1997 – is responsible for creating the National Directory of Science-Communicating Organisations, Governmental Organisations (GOs) and non-Governmental Organisations (NGOs), organising a large convention on science communication every year and promoting investigative science reporting. A. P. Deshpande, chairman of the NCSC, states the following: "what emerges from our meetings and from our discussions is that journalists should concentrate on researching local stories, diffusing scientific knowledge linked to people's traditions and investigating the major problems affecting the country, rather than simply translating the great stories of the Western press".

The list of activities and initiatives linked to science communication in India could go on almost endlessly.[17] The National Council of Science Museums (NCSM),[18] established over 25 years ago, co-

ordinates the various regional centres dotted around the country, 28 museums and science centres, as well as organising travelling exhibitions, educational activities for schools and public communication events. The majority of public and private medical and scientific research institutes is busy popularising its activities, and often publishes periodical newsletters or small information pamphlets.[19] Television series and radio programmes of a medical and scientific nature are also frequently broadcast. One of the main radio stations engaged in this sector is All India Radio (AIR Delhi),[20] which reaches 99% of India's population, broadcasting in 24 languages and 246 different dialects thanks to over 200 local offices, and which airs daily news reports on science as well as various programmes including *Radioscope*, *Science Today* and *Science Magazine*. One historical example of a television series with a scientific theme is *Bharat Ki Chhap* (*The Identity of India*), produced in 1989, and later translated and broadcast in other languages apart from Hindi, based on the history of the development of science and technology in India. Lastly, there are a number of programmes entirely dedicated to interaction with the public, where experts answer listeners' questions on the air (such as *Kyon Aur Kaise?*, produced by the NCSTC), or with quizzes (such as *Kudaratnama*, co-produced by the NCSTC).

The National Institute of Science, Technology and Development Studies (NISTADS, part of the Council of Scientific and Industrial Research),[21] an institute dedicated completely to research in the field of Public Attitudes and Understanding of Science (PAUS), was set up in 1989. Over the years, the NISTADS has carried out several research projects on the relationship between science and society in India, concentrating especially on themes such as sustainable development, technological innovation, and the cultural distance separating rural areas of the population from scientific knowledge.[22] The NISTADS has an interdisciplinary structure, and currently consists of 45 researchers, of which more than two thirds are graduates of scientific faculties, and the remainder have a degree in arts-related or social subjects. In addition to its research activities, the institute publishes the *Current Literature on Science of Science*, a bimonthly review of the major international magazines dedicated to Science and Technology Studies.

"Scientific research in India is also making huge progress", says Narender K. Sehgal, physicist and journalist, winner of UNESCO's Kalinga Prize for Science Popularization in 1991,[23] "there are currently more than 100 research institutes and over 150 university centres throughout India, and the number of private centres dedicated to research and development is also on the rise. The ratio between public and private is currently around 70 to 30, but the government hopes to balance it out to 50/50, although I believe the levels of funding in both sectors should double to reach international standards. In the meantime, scientific productivity in India is growing considerably, and the figures are definitely promising".

India's engagement in scientific research and diffusion is sanctioned by the *Science and Technology Policy 2003*,[24] a declaration of intent signed by the Indian government that lists the future strategies and objectives aiming to reduce the gap between India and the richest countries in the world. Apart from dealing with the economic aspects and the importance of co-operation on a national and international scale, various parts of the document highlight the importance of the development of Public Awareness of Science and Technology, a conveying of knowledge aiming to "reawaken" the "scientific temper" of every inhabitant of the country.

India, the seventh largest country in the world, has over one billion inhabitants (one sixth of the world's population), who speak more than 1,600 different languages and dialects, the most common being Hindi and, until recently, English. Apart from the problems linked to overpopulation and the shortage of food resources, due to the recent and often disorderly industrial development, the country is now also facing serious problems linked to environmental deterioration, which make incidents of deforestation, desertification and water and atmospheric pollution all the more worrying. In the country's rural areas (the sustenance of two thirds of the population is based on farming), the lack of basic skills, combined with widespread superstitious beliefs, still causes the diffusion of fatal diseases, malnutrition and poverty today.

The Year of Scientific Awareness (2004) saw the renewed engagement on the part of the NCSTC and various non-governmental organisations in an attempt to involve the country's entire population. For the first time, the classic use of *jahtas* was supported by a travelling exhibition, the Vigyan Rail Science

Exhibition on Wheels, mounted on a train, which travelled to a very large number of villages located along the railway lines. But most of all, many of the activities relied upon "need-based" programmes, i.e. programmes built especially according to the needs and problems of each individual region, while a decentralised organisation spurred the involvement of the local communities.[25] Patairiya reports: "There is still a lot to be done to fight the superstitions and religious rituals that are so deeply rooted into villagers' lives. Sometimes we don't have sufficient infrastructures to make our message effective enough, and people continue to trust witch doctors more than real doctors".

There was no shortage of criticism for this type of event either. Many scientists and communicators have complained about the dangers of a science communication based solely on the "deficit model", which is covered exclusively through educational activities. Manoj Patairiya, who actively took part in organising the YSA, concludes: "I believe it is very important that in every initiative communication be developed on two levels of knowledge-sharing. One level concerns knowledge conveyed to the population by experts, and the other concerns traditions and popular customs handed down from generation to generation in villages for centuries, and a symbol of sustainable development that should become part of the country's cultural heritage".

Although India features so much interest and offers so many initiatives and activities dedicated to science communication, and many institutions have been engaged for many years in studies and considerations on the tools and methods required to improve its effectiveness, there is considerable criticism in various parts of the country, from journalists and scientists alike.

The most recent criticism came as a result of the latest political elections, held almost a year ago, and which brought the Congress Party, founded by Sonia Gandhi, back to power after eight years of absence. As David Dickson underlines in his editorial in *SciDev* (17th May 2004),[26] one of the causes of the failure of the Bharaiya Janata Party (BJP) is definitely the widespread discontent among the lower echelons of society, who are witnessing an indisputable economic and industrial development of the country, which does not only fail to provide any benefit to them, but often leads to social and environmental damage. India is turning into a new power in terms of technological research and development, as declared in a recent issue of the British *New Scientist*, which defines India as "the next knowledge superpower".[27] And yet too large a portion of the population still suffers from malnutrition, does not have the appropriate means of sustenance through farming, while over 6 million people in India have contracted the HIV virus.

In the field of scientific research, some criticism arose concerning both the economic aspect and the destination of funds. The country currently allocates approximately 1% of its gross domestic product to research and development (R&D), to reach 2% in the next two years. Nonetheless, a large portion of funds is invested in sectors defined as "secret science", including the military, defence, atomic energy and aerospace research. These are sectors where journalists often have difficulty accessing information, and where communication is complicated by some heavy red tape. In the meantime, biomedical studies are affected by a chronic shortage of funds, causing backwardness compared to other countries in the world.[28]

The new government's challenge will therefore also have to involve the offices of the Department of Science and Technology (DST),[29] and the co-ordination of all the institutions and associations engaged in scientific research. With regard to science communication, ideas, creativity and a new approach will all be vital. Gauhar Raza, a scientist and researcher at the NISTADS, explains[30] "the majority of science communication activities currently carried out at an institutional level and through the mass media is based on transmissive, deficit models. As we aim to establish direct contact with the people - villagers for example - it is fundamental to consider the fact that we cannot ignore the 'cultural distance' that lies between their everyday experiences and the knowledge we want to convey. Communication is a cultural process, a movement that has to be able to shift in several directions, and in different ways".

Translated by Eurologos, Trieste, Italy.

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[12] Prof. Yash Pal has worked for more than thirty years for the Tata Institute of Fundamental Research, <www.tifr.res.in/scripts/homepage.php> as well as for other scientific research institutes. He has been actively engaged in several science communication activities for many years. He is a member of the Indian Science Writers' Association and has collaborated in producing and making TV series, and in organising the National Children Science Congress.
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