PERSPECTIVE

Science in the Public Sphere: Dissemination, Discussion, and Dialogue

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DIALOGUE

Science, Scientists, and Society

Dialogue – Science, Scientists, and Society (2018)

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DOI : 10.29195/DSSS.01.01.0001

By its very nature, the scientific pursuit is a highly creative and individual undertaking. Today it has also concurrently become a highly collaborative enterprise, requiring the participation of many (sometimes hundreds of) collaborators spread over several disciplines and, depending on the precise investigation, it can also be spread over large geographical distances. Given the nature of this collective and often global activity, it has also become one that would not be possible without considerable social investment.

J. Robert Oppenheimer [1] articulated most eloquently the special obligations that the privilege of doing modern science entails. In 1945, at the conclusion of the Manhattan Project, he addressed the Association of Los Alamos Scientists, those who had worked on this project of exceptional co-dependence. His concluding words were:

I think that we have no hope at all if we yield in our belief in the value of science, in the good that it can be to the world to know about reality, about nature, to attain a gradually greater and greater control of nature, to learn, to teach, to understand. I think that if we lose our faith in this we stop being scientists, we sell out our heritage, we lose what we have most of value for this time of crisis.

But there is another thing: we are not only scientists; we are men, too. We cannot forget our dependence on our fellow men. I mean not only our material dependence, without which no science would be possible, and without which we could not work; I mean also our deep moral dependence, in that the value of science must lie in the world of men, that all our roots lie there. These are the strongest bonds in the world, stronger than those even that bind us to one another, these are the deepest bonds - that bind us to our fellow men.

Wittingly or unwittingly, this sense of duty and commitment - this conscientiousness - underlies the best of scientific practice in the public sphere. There is, therefore, a requirement

for a proper forum [2] for the discussion and dissemination of science, particularly those aspects that have a major impact on social issues. The manner in which it is best done is, arguably, through scholarly articles and reports on matters pertaining to public policy that concern science and technology issues. The scientific community in India has long been interested in such matters in a serious way, engaging with public policy from even before Indian independence although there are relatively few avenues where there can be public discussions of such matters.

> Ideas such as self-reliance and the need to secure the benefits of science and technology were already emphasized in the 1958 resolution, and these ideas, in turn, have had a major impact on issues as diverse as public health, the green revolution, animal experimentation, food security and so on.

The engagement between government and the leading scientists in the country has been constant, and many of these consultations have resulted in valuable and comprehensive documents such as the Scientific Policy Resolution of 1958 [3] which laid out the vision of political and scientific leadership on science and technology in India. Ideas such as self-reliance and the need to secure the benefits of science and technology were already emphasized in the 1958 resolution, and these ideas, in turn, have had a major impact on issues as diverse as public health, the green revolution, animal experimentation, food security and so on. Since then, there have been a number of such documents, leading up to the recent TIFAC document, Technology Vision 2035 [4] . However, these have not, as a rule, been as widely discussed, disseminated, and debated in the polity as might have been possible through journal articles. It is telling that national efforts that have gone into producing a large number of reports and position papers [5] have not reached a public forum where issues relating to science and technology education might have been debated widely.

There is an expectation from various quarters that the Science and Technology Academies of India [6] should play a major role in advising and informing governance, especially when it comes to matters that require scientific input. In recent times one of the more public consultations that occurred was in 2009-10 when the issue of introducing the genetically modified vegetable, Bt-brinjal was mooted, a major concern being that this would lead to a loss in biodiversity. After a fierce debate, and despite approval from the Genetic Engineering Appraisal Committee (which since 1986 has effectively granted all permissions to

conduct experiments and to eventually allow any commercialisation of the crop) the minister for environment and forests then declared a moratorium "on the release of Bt-brinjal, till such time independent scientific studies establish, to the satisfaction of both the public and professionals, the safety of the product from the point of view of its long-term impact on human health and environment, including the rich genetic wealth existing in brinjal in our country." [7] This moratorium has not been lifted to date, even though several of the leading scientists of the country, including the then President of the Indian National Science Academy had offered their views to the Government. Indeed, it would appear natural that the science academies should "emerge as the nation's think-tank, [...] advising the Govt. and the country on issues relating to the development of Science & Technology." [8] . This has not happened with any regularity or any consistency.

> We hope that Dialogue will emerge as a unique archival repository of important documents that need to be shared widely and discussed widely.

With this background, the Indian Academy of Sciences' journal *Dialogue: Science, Scientists, and Society* [9] aims to provide a forum for summarizing and reporting studies on science and technology policy. We hope that it will emerge as a unique archival repository of important documents that need to be shared widely and discussed widely. There are a large number of journals that cover the areas that we envisage, but these are mainly located in the global north and have a different range of concerns. Given this, one can also hope that *Dialogue* can also provide a forum for others in the developing world to discuss problems of relevance, and to draw on the experience of colleagues across the globe.

References

1. J. Robert Oppenheimer: 'We are not only scientists; we are men, too', 1945. ("Men" in the text of the speech should be understood to also include the large number of women who participated in the Manhattan Project; the usage is a reflection of the times when the speech was written.) A transcript of the entire speech can be found at https://tinyurl.com/6gqxsu.
2. The few journals in India wherein articles on science and public policy include Current Science

(Bangalore), the Journal of Scientific Temper (New Delhi) and the Economic and Political Weekly (Mumbai). However, these are not exclusively devoted to policy issues.

3. India's first Scientific Policy Resolution was issued in 1958 (a copy can be found at https://tinyurl.com/y895wwpo). Subsequent Science and Technology policy statements issued by the Government of India include (a) the Technology Policy Statement 1983 by the Department of Science and Technology (DST) (https://tinyurl.com/y9ff83h4), (b) Science and Technology Policy 2003 by the DST (https://tinyurl.com/yaxpjcqb) and (c) the Science, Technology & Innovation Policy 2013 (https://tinyurl.com/y9smqrcb).
4. The TIFAC Technology Vision 2035 Report can be downloaded from https://tinyurl.com/ycoz6qsl. Every year, TIFAC brings out a number of reports that examine technology needs as well as the present status of various different areas. These are available at the TIFAC website, https://tinyurl.com/y93otzb9
5. Position papers of the Science Academies over the years include reports on Silent Valley, Infectious Diseases, Guidelines for conducting Recombinant DNA Molecule Research, Iodinisation of Salt, Genetically Modified Crops, Role of basic sciences in Agriculture, Water problems in India, Women scientists in India, the Indian Science Report, Science Education, Guidelines for use of Animals in Experimental Research, A Road Map for Development of Instrumentation in India, Energy Options for India, Energy and Food Security and Intellectual Property Rights in Biology. A recommendation on 'Higher education in science and research & development: the challenges and the road ahead' (2006) was submitted to the Planning Commission for the 11th Five-Year Plan, prepared jointly by INSA and IASc. The Indian Academy of Sciences spearheaded an inter-academy effort, Restructuring post-school science teaching programmes (2008) a position paper explaining the limitations of the present system of post-school science education in India and proposing introduction of a four-year Bachelor of Science programme.
6. These are NASI (the National Academy of Sciences of India), IASc (Indian Academy of Sciences), INSA (Indian National Science Academy), NAAS (National Academy of Agricultural Sciences), INAE (Indian National Academy of Engineering), NAMS (National Academy of Medical Sciences).
7. The summary note by the Ministry of Environment and Forests (MoEF) was reprinted in the daily, The Hindu and can be accessed online at https://tinyurl.com/y9hkkavs. There are numerous other reports, also available online.
8. Adapted from the Mission Statement of the Indian National Science Academy. All the Science Academies [6] have similar objectives when it comes to interfacing with the Government.

9. In addition, there is a closely related moderated online discussion forum, Confluence, http://confluence.ias.ac.in/, that is more adapted to contemporary modes of expression and debate..