

## 1. Introduction

In India, the issues concerning air quality management were officially recognized way back in 1905 when the government promulgated the Smoke Nuisance Act for protection of the marble structure of the Victoria Memorial Hall in the city of Kolkata (Calcutta). This was followed by similar enactments in several other cities of the country. The primary responsibility for the implementation of the Act was vested with the Factories Inspectorate and thus the concerned officials of the Inspectorate formed the first formal group on air quality management with a limited mandate.

At the national level, the need for air quality management received recognition in the wake of the Air (Prevention and Control of Pollution) Act, 1981—a central legislation which became applicable throughout the country. The officials of the Central and State Pollution Control Boards were authorized to implement the Act. Thus, the officials of the Pollution Control Boards constituted a formal group on air quality management at the national and local levels.

The Central Pollution Control Board (CPCB), as the apex body, laid down national standards on ambient air quality and source specific emission standards for implementation at the local levels through the concerned officials of the State Pollution Control Boards (SPCBs).

Subsequently, several organizations, including industry and automobile sectors whose activities have a bearing on the air quality, have designated personnel within the respective organizations for ensuring compliance of the air quality standards.

Alongside, academic and research institutions formed an informal group on air quality related issues through the education, training and research activities.

Concerned with the growing problems of air pollution, several non-governmental organizations (NGOs)/citizen groups such as the Centre for Science and Environment (CSE), The Energy & Resources Institute (TERI) in New Delhi and SOCLEEN in Mumbai formed an informal group on air quality issues.

On the other hand, the media formed yet another informal group for dissemination of information and mobilization of public opinion.

In recent years, the judiciary has been playing an important role in promoting air quality management initiatives (such as in the city of Delhi) through judicial interventions on public grievances voiced in the Public Interest Litigations (PILs)/writ petitions on air pollution.

Thus, the various groups among the stakeholders in air quality management which have been formed at the formal and informal level include the following:

- (i) Government organizations responsible for formulation of policies, enactment of laws and for their enforcement;
- (ii) Organizations for industry and automobile sectors which are origins of air pollution;
- (iii) Academic and research institutions and professional societies;
- (iv) NGOs/citizen groups;

- (v) Audio-visual and print media; and,
- (vi) Judiciary.

## **2. Analysis of Stakeholders**

The stakeholders represent diverse areas, expectations and capabilities. Often, the stakeholders confront one another with conflicting interest and perceptions. The government agencies such as the Pollution Control Boards find it difficult to cope with the increasing responsibilities not only for air pollution control but also for dealing with other issues of environmental concern. Lack of commensurate financial resources, professional manpower and wherewithal are among the hurdles faced by these agencies. The entrepreneurs in industry and automobile sectors, barring a few, consider the cost of air pollution control as a non-productive externality. The small-scale industrial units have problems in switch-over to cleaner technologies due to financial and managerial constraints. The academic and research institutions, as well as the professional societies are not provided with necessary funds and opportunities for involvement in the decision making process. According to several NGOs and the media, lack of transparency is a major bottleneck and the relevant information from concerned sources is not easily accessible. The judiciary is not well acquainted with the technical aspects of air quality management and, at times, the judicial interventions are not backed by reliable database and analysis. Lack of awareness at various levels of the stakeholders is the common factor which comes in the way of effective and sustainable air quality management measures. Lack of networking among the stakeholders has been yet another major hurdle for concerted and cohesive approach.

## **3. Steps Taken Under RETA 6159**

For raising awareness and establishing an air quality network, the steps taken under RETA5159 include the following:

- (i) Networking with the national government agencies, local government units, NGOs, academia, and the industry sectors;
- (ii) Collection and collation of updated data/reports on air quality management issues;
- (iii) Coordination with the CAI-Asia website;
- (iv) Networking and coordination through workshops/interaction meetings;
- (v) Review of air quality management systems in India for identification of gaps and requirements for an integrated approach; and
- (vi) Interaction with the RETA 6159 implementing agency and local agencies for the preparation of city action plan for air quality management.

A list of organizations and individuals involved in air quality management was prepared in consultation with CPCB and contacts with them were established through personal interaction and through correspondences, e-mails, and telephone calls. The RETA Training Workshop organized during 26-30<sup>th</sup> July 2004 provided a useful forum for networking with the participant agencies/individuals. The participants were imparted training on monitoring, assessment and modeling methodologies and instruments. They were also given an expose of the CAI-Asia network.

A survey questionnaire enlisting the relevant data to be collected from various agencies for assessment of the air quality management issues in Indian context was

prepared by the International Consultant and finalized by the RETA team. The survey was a step towards establishing the structured information needs, and sources of information relating to air quality management. The various sources were contacted for eliciting data/information including the following:

- (i) Geographic, demographic and economic data for major urban areas;
- (ii) Air quality monitoring systems;
- (iii) Mobile, stationary, and area-wise emission sources for emission inventories;
- (iv) Meteorological data and initiatives for dispersion modeling;
- (v) Impacts of air pollution and efforts for assessment of social costs;
- (vi) Policies and standards;
- (vii) Air quality governance, institutional structures, and financing; and,
- (viii) Public awareness and stakeholder involvement.

A literature survey was conducted for collation of updated repository of research activities/reports concerning various aspects of air quality management. The collated data/reports were made available to CPCB and to the CAI-Asia. Based on the literature survey, the information was collated as follows:

- (i) Title of the research paper/report
- (ii) Focus
- (iii) Abstract
- (iv) Time period
- (v) Region/city
- (vi) Author
- (vii) Organization/institution
- (viii) Web link where available

Following the RETA Training Workshop, networking initiatives were reinforced through several interaction meetings with the stakeholders in which the RETA team has been actively associated. These include the following:

- (i) Workshop jointly organized by the World Bank and CPCB
- (ii) Interaction meeting with the donor agencies
- (iii) Workshop of SAARC countries
- (iv) Meetings of the Indian Association for Air Pollution Control
- (v) Inter-country Collaborative Forum
- (vi) Training Workshop on International Vehicular Emission Model
- (vii) Air Quality Management Workshop organized by NEERI and State Pollution Control Board
- (viii) Seminar on Asthma sponsored by the Cerena Foundation

The RETA team has been involved in the preparatory activities and in various sessions of the BAQ Workshop held at Agra during 6-8 December 2004 which was attended by a large number of delegates from India and from other countries.

The RETA team also participated in the First Sub-Regional Workshop held at Bangkok on 5<sup>th</sup> and 6<sup>th</sup> July 2004 and thereafter the Second Sub-Regional Workshop held at Agra on 5<sup>th</sup> December 2004 which provided a platform for networking with the RETA teams in other countries.

While the First Sub-Regional Workshop was primarily for launching the project, the Second Workshop dealt with the outcomes of the initiatives taken under the project. In the Second Workshop, the project team including the Unit Coordinator and the AQM Experts made the following presentations:

- (i) Networking Initiatives and Data Collection under RET6159
- (ii) Draft on AQM systems identifying the gaps and needs
- (iii) Overview of Action Plans to be developed

Based on the interaction and feedback from the Implementing Agency, the future directions were worked out in the Workshop. Subsequently, the report on AQM systems was revised and the Action Plan for the city of Ahmedabad was prepared in consultation with IA, State Pollution Control Board and concerned local agencies.

#### **4. Initiatives for Creation of Local Network**

The creation of a local area network for air quality management was one of the major objectives of RETA6159. To this end, the RETA Team had several rounds of interaction with various groups of stakeholders and the Team was also involved in activities for raising awareness at different levels. To assess the present status of networking and to promote establishment of local area network, the Team interacted with the concerned agencies and existing networks at different levels which include the following:

- (i) Ministry of Environment & Forests (MOEF)
- (ii) Central Pollution Control Board (CPCB)
- (iii) State Pollution Control Boards (SPCBs)
- (iv) Confederation of Indian Industry (CII)
- (v) Society of Indian Automobile Manufacturers (SIAM)
- (vi) Factories Inspectorate
- (vii) Urban Development Authorities
- (viii) Research Institutions (NEERI and IITs)
- (ix) Non-Governmental Organizations (CSE in Delhi and SOCLEEN in Mumbai)
- (x) Professional bodies (Indian National Science Academy and the Indian Association for Air Pollution Control)

**Ministry of Environment and Forests.** The Ministry, as the nodal agency for planning, promotion and coordination of environmental activities in the country, is responsible for air quality management through various measures such as formulation of policies, notification of laws/regulations, environmental impact assessment of development projects, public hearings, promotion of clean technologies and raising awareness at different levels. For the implementation of such responsibilities, the Ministry needs to have a network for interaction with the concerned agencies of the government, NGOs, and the general public. The Ministry has established an Environmental Information System (ENVIS) with a network of Distributed Information Centers (DICs) on specific subject areas. For instance, the Central Pollution Control Board (CPCB) has been designated as the DIC for Air Quality. The Ministry has set up a website of its own (<http://envfor.nic.in>). From time to time, the Ministry organizes meetings with the stakeholders on specific issues such as ambient air quality and emission standards. However, there is no formal network on air quality management

involving the stakeholders. Also, there is no formal network for eliciting relevant data/information (e.g. fuel consumption and number of motor vehicles) from the concerned agencies on a regular basis.

**Central Pollution Control Board (CPCB).** CBCP as the apex professional organization and field formation of MOEF for implementation of air quality objectives, provides technical inputs to MOEF and assists in enforcement of air quality related policies and programs. The Peer and Core Group set up by CPCB, consisting of specialists and representatives of stakeholders, help in networking with the stakeholders in a limited manner. For networking with the State level pollution control authorities, the Central Pollution Control Board (CPCB) holds periodic meetings with the chairmen and Member Secretaries of the State Pollution Control Boards (SPCBs). In these interaction meetings, various issues including air quality monitoring and air pollution control measures are discussed. For dissemination of information to the stakeholders, a website has been created by CPCB ([www.cpcb.nic.in](http://www.cpcb.nic.in)). Similarly, most of the State Pollution Control Boards have since created their own websites. Notwithstanding these initiatives, there is scope for extending the network in its coverage and contents. As a first step in this direction, it will be useful to have a formal network of the Pollution Control Boards along with the selected stakeholder representation.

**Industry Associations.** The Confederation of Indian Industry (CII), the Federation of Industries and Commerce of India (FICCI), the ASSOCHAM, the Indian Chemical Manufactures Association (ICMA), and the Indian Chamber of Commerce (ICC) represent a large section of the industrial community in India. These organizations have been playing an important role in promoting the interest of their members. Recognizing the need for environmental protection along with industrial development, these organizations are addressing the issues relating to air pollution control. From time to time, workshops, training courses and interaction meetings are organized. Assistance is also offered to industry members for adoption of clean technologies and ISO14001 certification. To give focused attention to environmental activities, some of the Industry Associations have set up Environmental Committees. For instance, the FICCI has constituted an Environmental Committee consisting of industry members and independent experts. The Unit Coordinator RETA6159 is serving as a member of this Committee.

The Society of Indian Automobile Manufactures (SIAM) has been actively involved in air quality issues as related to the automobile sector. A good network among the automobile industries and a linkage with the regulatory agencies has been established through SIAM.

**Other Agencies.** The Factories Inspectorate, barring a few exceptions, does not have a networking system. However, the National Safety Council, an autonomous organization, provides the network through the training courses and resource materials. The Central Labour Institute (CLI), the Industrial Toxicology Research Centre (ITRC) and the National Institute of Occupational Health (NIOH) are among the important agencies in the country which are in a position to provide technical support and networking.

The Urban Development Agencies have been taking a proactive role in recent times. For instance, in Ahmedabad, the civic authorities including the Municipal

Corporation and State Transport Department have taken initiatives for air pollution control and networking with the NGOs and citizen groups.

Among the research organizations, the National Environmental Engineering Research Institute (NEERI) and its regional centres have been actively involved in generation of air quality monitoring data in different parts of the country under the National Air Monitoring Programme (NAMP) coordinated by CPCB along with SPCBs.

NGOs such as the Centre for Science and Environment (CSE) in Delhi, the Energy and Resources Institute (TERI) in Delhi, Society for Clean Environment (SOCLEEN) in Mumbai and several other citizen groups in various parts of the country are playing an important role for raising awareness and serving as advocacy groups. The CSE has launched a Clean Air Campaign and it is disseminating information on air quality issues through its website and through its magazine. Similar initiatives have been taken by TERI and SOCLEEN.

The Indian Institutes of Technology in Delhi, Kanpur and Mumbai have taken special interest in research and educational activities on air quality issues. Some of the other educational institutions (such as, Pune University) are also taking active role in air quality issues.

The professional organizations notably, the Indian National Science Academy (INSA), the Indian Institute of Chemical Engineers (IICHE) and the Indian Institute of Engineers (IIE) have organized seminars/symposia/workshops on air quality issues which helped in creation of awareness and networking.

To assist the Central and State Pollution Control Boards as also others involved in air quality management, the Indian Association for Air Pollution Control (IAAPC) has taken an important initiative through establishment of an air quality group consisting of a cross section of stakeholders from concerned agencies and individuals. The Association has been recently reconstituted under the chairmanship of the Unit Coordinator, RETA 6159. The Association comprises subject matter specialists from the academic and research institutions, industry representatives, NGOs, Pollution Control Boards and various other stakeholder representatives. The Association has organized networking sessions/popular lectures/ technical workshops and publication of a journal for dissemination of scientific findings and other information. The Association has also established a Website for networking with the stakeholders in different sectors.

## **5. Achievements of RETA 6159**

The networking initiatives taken under RETA 6159 have triggered some positive outcomes which include the following:

- (i) The National Air Monitoring Network is being expanded to include the monitoring stations operated and maintained by the industries and various institutions. So far, the air quality data collected by the stations were outside the national air monitoring program.
- (ii) As the Implementing agency of RETA 6159 and as the national coordinating agency for air monitoring activities, the Central Pollution Control Board (CPCB) has undertaken surveys of the monitoring stations of various industry.

- (iii) The shortcomings in some of the monitoring stations have been identified and the requirements for their inclusion in the national air monitoring network have been enlisted by CPCB.
- (iv) The State Pollution Control Boards have been advised to establish/strengthen the AQM Cells with trained personnel.
- (v) Source apportionment studies have been initiated through interagency collaboration.
- (vi) Policy decision has been taken by the government to assess the impact of progressive tightening in emission norms.
- (vii) An exercise has been undertaken to review the ambient air quality standards and source specific emission norms.
- (viii) The emission testing standards for on-road motor vehicles have since been amended.
- (ix) Instrumentation and training facilities created in the Central Road Research Institute (CRRRI) are now available to various agencies for use of the International Vehicular Emission Model (IVEM) developed by the University of California, Riverside, USA.
- (x) Funding support has been provided for AQM initiatives in some cities such as Kolkata and Ahmedabad.

## **6. Strategic Requirements**

The Indian Association for Air Pollution Control (IAAPC) meets the long felt needs for a formal structure for networking on AQM issues. However, for sustenance of this initiative, it will be necessary to get support from various sections of stakeholders including the Government. The Association brings out the journal the expenditure of which is met out of the membership subscriptions and donations. For maintenance of the website and for networking activities, the Association will need additional funds for employment of 2-3 personnel exclusively for the job with facilities of computers and office infrastructure. As of now, it is operating in the premises of one of the members and with the voluntary service provided by the members.

Alongside, it will be useful to create a formal structure at the policy level of the government which has to play a pivotal role in AQM. The Central and State Pollution Control Boards which are mandated to implement the Air (Prevention and Control of pollution) Act have established a network which needs to be strengthened. It could possibly be initiated by constituting a formal group under the aegis of the Ministry of Environment and Forests with the technical assistance of the Central Pollution Control Board.

Some of the strategic requirements for AQM are listed as follows:

- (i) Air quality monitoring network should ensure coverage of representative areas.
- (ii) Measures need to be taken for proper and maintenance of monitoring stations.
- (iii) Depending on resource availability and capabilities, the monitoring network needs to have a mix of mobile/fixed stations, active/passive monitoring facilities, and background/hotspot monitoring systems.
- (iv) Priority needs to be given for preparation of area specific emission inventories.
- (v) Use of mathematical modeling will greatly help in optimizing the cost of monitoring.

- (vi) A network for regular and systematic transmission, collation and analysis of relevant data/information from the concerned sources (such as for fuel consumption, transport and industrial development) needs to be put in place with the MOEF/CPCB as the focal point at the centre and the SPCBs at the State level.
- (vii) Studies are needed to assess the cost-benefits of AQM including health impacts.
- (viii) Training facilities need to be augmented for AQM personnel including operators of equipment/instruments.
- (ix) Investment projects need to be promoted in critically polluted areas for adoption of cleaner fuels and technologies.
- (x) Public awareness and participation in AQM initiatives need to be geared up.

## **7. Way Forward**

With the enactment of the central legislation for prevention and control of air pollution in 1981, air quality issues received country-wide attention. However, it took several years to build up the monitoring facilities and to create a database on air quality status and trends. The NAMP initiated by the CPCB in collaboration with NEERI and the SPCBs led to a beginning of the air quality monitoring network in 1984. Over the years, the monitoring stations have increased in number and the capabilities for monitoring have improved through various capacity building initiatives supported by the Government and also through the bilateral cooperation (e.g. Indo-German collaboration). Dissemination of air quality data through the reports/popular publications/newspapers since the mid-eighties helped in raising awareness on air quality issues. With the increasing awareness, the public demand for air pollution control increased and it was reflected in the representations and public interest litigations/writ petitions. The judicial interventions in response to the litigations/petitions also helped in enforcement of air pollution control measures, tightening of emission standards, switch over to cleaner fuels and shifting of polluting industries.

Notwithstanding various developments, there is need for establishment of a well conceived network for a common understanding among the stakeholders representing diverse sections of the society. The existing networks, as discussed in the report, are mostly sporadic in nature with the involvement of particular interest groups which may not serve the long term needs for integrated air quality management.

Since the Government has the major responsibility of ensuring air quality management for betterment in the quality of life for its citizens, it is necessary that a formal and sustainable network is established by the Government for involvement of stakeholders representing diverse areas of interest. The network will also ensure transparency in formulation of policies and interventions for air quality management. At the national level, the MOEF needs to set up such a network for policy related issues on air quality management. It could be assisted by the CPCB with the necessary air quality data and other technical inputs. To this end, the existing network of CPCB, NEERI, SPCBs and other agencies needs to be strengthened through a Standing Committee/Steering Group. Similar networking structures for policy interventions are also needed at the State and at the local levels.

Along side, networking among the specific interest groups of stakeholders (such as, advocacy groups, research and educational institutions, industrial associations, legal practitioners, professional organizations and media personnel) will need to be promoted.

The donor agencies (bilateral and multilateral) will also need to have a network to ensure linkage and coordination.

In respect of transboundary air pollution, the initiatives taken through the Male Declaration involving some countries of South Asia and Acid Deposition Monitoring Network (EANET) in East Asia are coordinated by the UNEP Regional Centre for Asia and the Pacific. Similarly, at the national level, for transboundary issues of air quality management involving different States, an independent coordination mechanism needs to be established for networking among the concerned agencies.