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A. Introduction

Although Bhutan is committed to ensuring a future where the natural environment is still well preserved, environmental problems are gradually mounting due to rapid population growth, accelerating pace of development, and socio-economic transformation. In several places where industrialization and urbanization is rapid, localized air pollution is being experienced due to the increasing number of vehicles, industries, construction activities, etc.

One of the significant achievements of the Royal Government of Bhutan is the development of interim ambient air quality and the vehicle emission standards. However, there is not enough monitoring and compliance. This is due to lack of sufficient human resources and funds to establish monitoring stations. Furthermore, there is no policy on air quality management in Bhutan. Most of the work on air quality monitoring has been carried out on a need basis.

Air pollution is emerging as one of the issues of concern in the region, and efforts at the national level as well as at the regional level to address the issue is highly desirable. This has also been recognized as an important area for subregional cooperation by the environment sector working group meetings of the South Asia Subregional Economic Cooperation (SASEC) participating countries (Bangladesh, Bhutan, India, and Nepal). In 2004, the Asian Development Bank (ADB), with the objective of strengthening the existing air quality management (AQM) systems in Bhutan, provided a regional technical assistance (RETA 6159) to develop AQM systems and an air quality action plan for Thimpu city, and to establish an air quality network group.

B. Formation of Network Group

RETA 6159 was implemented for a period of 10 months in May 2004,. Under this program, a Bhutan Air Quality Network was established in June 2004 and subsequently other documents were also completed. It was the first of its kind and the stakeholders are representatives from different ministries and agencies. The following are the members of the network group:

- (i) National Environment Commission (NEC) (coordinating agency) – *Mr. Karma L. Rapten, Mr. Jigme, Ms. Jigme Zangmo*
- (ii) Ministry of Trade and Industry (MTI) –*Mr. Sangay Dorji, Mr. Tshering Phuntsho, Mr. Phuntsho Namgyel, Mr. Karchen Dorj*
- (iii) Road Safety and Transport Authority (RSTA) – *Mr. Phuntsho Wangdi*
- (iv) Ministry of Agriculture (MOA) – *Mr. Jamyang Phuntsho*
- (v) Ministry of Health (MOH) – *Mr. Ganga Rai*
- (vi) Ministry of Finance (MOF) – *Mr. Kunzang*
- (vii) Bhutan Chamber of Commerce and Industry (BCCI) – *Mr. Chandra B. Chhetri*

- (viii) Industrialists (private sector) – *Mr. Norbu, Mr. Tashi Wangdi*
- (ix) Nongovernment organization (NGO) – *Ms. Tshering Lham*
- (x) City corporations – *Mr. Phurba Tshering, Mr. Thinlay Norbu*
- (xi) Traffic Police, Royal Bhutan Police – *Lt. Karma Phuntsho*

Since its establishment the members have been actively involved in the development of AQM systems and an air quality action plan for Thimphu. Some of the main objectives of the network group are to

- (i) *Assist in the collection of air quality data in Bhutan:* Each network member will collect air quality data from their own agency. These data will then be computed and made available in the website or database system.
- (ii) *Discuss issues related to air pollution in Bhutan:* The members of the network group will hold a discussion forum on a bi-annual basis to discuss issues related to air pollution. This discussion forum is not limited to bi-annual meetings but will also meet whenever it is deemed necessary.
- (iii) *Provide information on air quality in Bhutan and for the CAI-Asia Network:* Each member of the network group will be responsible for providing information to the CAI-Asia Network, after approval from their parent organisation. Furthermore, they have been also requested to be members of the CAI-Asia Network.
- (iv) Be part of a regional network such as CAI-Asia: The Bhutan Air Quality Network Group has been requested to be a member. It has been briefed on how to register as a member of CAI-Asia.

After the first BNG meeting held on 24 June 2004, several discussions and meetings were also held to improve and look at the existing capacity of technical staff. The BNG members suggested that there is no technical capacity within the line ministries and agencies. Thus, a training program was requested by the members to be organized on basic theory and methodologies on AQM.

Several short meetings were held with the BNG members. The objective of the meeting was to discuss issues on how the members could assist in the training program and development of AQM systems and in the Thimphu City Air Quality Action Plan. Furthermore, the ADB consultant also met with the BNG members (individually) to discuss and get feedback on the training program, development of AQM systems, and the Thimphu City Air Quality Action Plan. The following were discussed with the BNG members:

- (i) *Ministry of Trade and Industry:* The consultants held a short meeting with Mr. Sangay Dorji, Environmentalist of Policy and Planning Division, to discuss coordination and the existing data collection system within MTI. He informed the consultants that there is no existing data collection system and so far they have not been able to provide or collect any emission data. MTI is in the process of

establishing data collection; however, so far a random sampling has been carried out. He felt that such emission data collection coordination should be initiated and implemented.

- (ii) *Road Safety and Transport Authority:* A meeting was held with RSTA officials (Harka B. Tamang, Phuntsho Wangdi, and Needup Dorji). The officials informed that RSTA has been collecting vehicle emission data and computing. RSTA has established a vehicle emission testing station in four regions, namely, Thimphu, Phuentsholing, Gelephu, and Samdrup Jhongkhar. These stations have been conducting emission on an annual basis. The data is then further sent to the RSTA headquarters for compilation. The existing data collection system has not been streamlined and this is a need that requires immediate attention.
- (iii) *Thimphu Municipality Corporation:* A meeting was held with the TMC environment officer, Phurba Tshering. He said that so far the all the city corporations have not conducted any air pollution programs, as the corporation had been very busy with the implementation of the newly approved plans of Thimphu and Phuentsholing. At this moment, the highest priority of TMC is facilitating the allocation of plots and permission to construct building, city roads, and city pathways. This is mainly due to the peer pressure from landowners and the Government. He felt that such air pollution coordination is essential and should be spearheaded by an organization like the National Environment Commission (NEC). The city corporations do not have any project on air pollution in the near future.
- (iv) *Meeting with Ministry of Health:* A short meeting was held with Mr. Ganga Rai of the Department of Public Health. He said that so far, the department has not implemented any project specifically on AQM. However, in the early 1980s, the Ministry of Health and Education in collaboration with the National Women's Association of Bhutan and the United Children's Fund (UNICEF) carried out a study on indoor pollution. A report has been prepared but it is not available. He said that the report has been misplaced as the ministry has undergone several restructuring. He showed keen interest in becoming a member of the Bhutan Air Quality Network Group and in contributing to the AQM network system.
- (v) *Meeting with the Deputy Minister:* The consultant held a brief meeting with the Deputy Minister to update information on the training program and ongoing activities of RETA 6159. The Deputy Minister suggested that meetings like this should be held frequently involving the stakeholders.
- (vi) *Traffic Police:* There are no trained personnel within the Traffic Police Division who can carry out vehicle emission tests. The division suggested that the police officers and constables would require a training program if air quality monitoring is to be effective.

C. Successes: Awareness Program under RETA 6159

Discussions were held with the Program Coordinator and the Information, Communication and Outreach (ICOS) unit, NEC, on the improvement of public awareness program on AQM. ICOS felt that although several environmental awareness

programs have been scheduled within the NEC work plan, it was recommended that such AQM awareness programs should be included as a part of the NEC work plan.

The following awareness program has been completed under the RETA 6159:

- (i) *Awareness program for chairpersons of dzongkhag yargay tshongchungs (DYTs):* In June 2004, a half-day awareness program was conducted at the Banquet Hall. More than 200 chairpersons of DYTs attended.¹ The program covered the following issues:
 - Basic information on air quality
 - Air pollution: problems and issues in the region
 - Air pollution: problems and issues in Bhutan
 - Policies and strategies
 - Air pollution and health impacts
 - How citizens are responsible for reducing air pollution

- (ii) *Training on air quality:* A national training workshop on air pollution was organized in Thimphu from 9 to 13 August 2004. Dr. Derek Langgons and the national consultants were the resource persons for the training program. There were more than 35 participants from various ministries, departments, NGOs, and the private sector. The main focus of the training program were:
 - Sources of air pollution in Bhutan
 - PM10, NO2, SO2, VOC
 - Vehicle emission control
 - Air quality monitoring
 - Emission inventory
 - Dispersion models
 - Source apportionment studies

The training program focused on the basic theory on AQM and practical usage at the policy development level. There was a divided view from the participants' side. Some felt that the training program should have been more hands-on training such as practical demonstration, whereas others felt that more theoretical issues should be covered. Some of the participants were of the view that the training program was very useful.

The Deputy Minister of NEC graced the occasion on the closing day of the training program. His Excellency also handed out the training certificates to the participants. He also reminded the participants that air pollution is not a problem yet in Bhutan. However, because the capital Thimphu is situated in a valley, capital faces severe air pollution problems during winter when the temperature is low due to the increase in the number of vehicles registered in Bhutan, forest fires, and traditional incense burning.

- (i) *Publication of Development of pamphlet for RSTA:* The RETA 6159 unit in Bhutan has been constantly providing support to NEC and RSTA on AQM awareness programs.

¹ *Dzongkhag yargay tshongchung* stands for district development committee, while *gewog yargay tshongchung* means block development council.

- The pamphlet for vehicle emission awareness campaigns included information on how to reduce and control vehicular emission for RSTA. A copy of the pamphlet is attached.
- (ii) *Development of modules* and preparation of AQM training program for grassroots levels and as and when required as a resource person
- Two modules on AQM training have been developed, one for the planning officers of dzongkhag and the other for grassroots level, i.e., head of village, chairman of DYT. The modules were given to NEC for presentation. It covered basic information on the principles of air pollution and how it affects health and the environment, and monitoring practices and methodologies to control air pollution.
 - The RETA 6159 unit in Bhutan has been continuously providing support to NEC's ICOS unit.
- (iii) *Awareness programs under RETA 6159:* The following workshops/ seminars were organized by NEC. The consultant provided the materials on air pollution and was also the resource person during the workshops.

NEC conducted 5 regional workshops for the gups and chimmis from the 20 DYT, out of which RETA 6159 provided input in 3 of the regional workshops. These environmental awareness and training workshops were aimed at:

- Sensitizing the members of DYT and GYT (*gewog yargay tshongchung*) on environmental issues pertinent to Bhutan and the 9th Five-Year Plan
- Training the members of DYT and GYT in implementing the environmental provisions of DYT and GYT *chathrims* (cooperatives).
- Training the members on implementing the Environmental Assessment (EA) Act 2000 and on the EA process, including air quality monitoring in industries and urban areas such as stack emission, vehicle emission, construction stockpile emission, etc.
- RSTA organized five refresher training programs for driving and the consultant provided inputs on vehicular emission. The training program focused on emission standards, how to reduce vehicular emission, driving ethics, and maintenance of vehicles.

D. Strategies for Bhutan Network Group

In the overall national development context, RETA 6159 had contributed in the development of the Thimphu City Air Quality Action Plan and Air Quality Management system. Furthermore, the TA also assisted in forming a Bhutan Air Quality Network group. The TA focused on providing the local authorities and communities the opportunity to gain knowledge on air quality management and monitoring.

The network group members suggested the following strategies should be adopted for continuity of the air quality programs:

- (i) A proper terms of reference (TOR) such as the roles and responsibilities of the network group should be provided by National Environment Commission. This would enable the members to inform their superiors for further directives. Although the TOR has been provided in the project document, it was deemed necessary for NEC to provide an official letter to the head of the organizations/agencies.
- (ii) An air quality steering committee should be established, comprising of members from NEC, Thimphu City Corporation, Road Safety and Transport Authority, Ministry of Information and Communications, Ministry of Health, Ministry of Works and Human Settlement, the private sector, nongovernment organizations, and chairpersons of DYT. The objective of the steering committee would be to monitor and evaluate the existing air quality programs.
- (iii) Capacity building:
 - to train the laboratory technician on existing equipment usage and testing
 - basic air quality theory and practice and monitoring training programs for the general public at all levels such as DYT and GYT.
- (iv) Secure funds for implementation of AQM system. The network group felt that air pollution is an emerging issue and there is no evidence to recommend to the Royal Government to provide budget to implement air quality activities. Therefore, to begin with external donors should be identified to fund projects on AQM and this should include training components, purchase of equipments, and operational costs to ensure sustainability.
- (v) Monitoring and evaluation: There is a strong need for monitoring and evaluation programs for continuity of AQM and implementation of the existing air quality programs.

E. Conclusions

Air pollution and its likely impacts on the environment and human health are not yet a serious concern for Bhutan. However, with an increase in developmental activities such as infrastructure building, an increase in the number of urban centers, an increase in the number of vehicles and an increase in the number of industries, more and more people are becoming aware of air pollution and the need to address the issue. Right now air pollution is only evident in larger urban centers where the vehicle population is significant and where wood stoves are used for heating purposes in the winter and in the areas where the major chemical and cement industries are located.

The establishment of the Bhutan Air Quality Network Group is the first step in coordinating the air quality issues in Bhutan. In spite of the above initiatives, there is an urgent need for Bhutan to support and recognition by the concerned agencies for continuity in the future. Emphasis on stronger inter-organizational linkages and coordination are important to ensure effective implementation of the air quality programs. Although several agencies are already involved in air quality monitoring and management, there is a need to clearly delineate specific roles and responsibilities between these agencies.

There is also a need for a concerted effort to raise public awareness on air quality issues and its impacts on not only the environment but more so on human health. Awareness programs must also be developed to make the general populace and industrial units conscious. Awareness is also needed to inform the public that sources of air pollution are not only limited to larger industrial units and vehicle emissions but also domestic activities such as the bad management of construction materials and burning.

Adequate measures have also not been taken as yet to develop the capacity of the workshops in rectifying emissions related problems. Therefore, there is a need for a clear policy framework to ensure the timely implementation of AQM systems. If activities related to air quality are conducted in isolation as done now, the danger is that the public will lose faith in the program and seeking their cooperation in future will be difficult.

More investment in terms of both financial and human resources are also needed to carry the program forward. Vehicle emissions testing started about 3 years ago but RSTA still does not have enough testing equipment and staff to make the activity meaningful. More focus and resources are needed to create widespread air quality awareness among the general public in order to reshape the attitude of the Bhutanese people. An improvement in the attitude and civic sense of the Bhutanese will only come about through greater emphasis on capacity building of the technicians, awareness to the policy makers and people's participation.