

CHAPTER 4 CONCLUSIONS AND RECOMMENDATIONS

4.1 Conclusions

On the whole, the establishment of a regional network for DSS monitoring, forecasting, and early warning entails the introduction of a fundamental structure within the national level of the four partner countries (i.e., the PRC, Japan, the Republic of Korea, and Mongolia) as well as on the regional level. On the national level, the Meteorological Administration and Ministry of the Environment of each partner country should be the designated national focal point where all DSS-related data will flow and be shared on real time basis. Smooth collaboration with non-MA agencies will be encouraged and improved. On the regional level, a decentralized organizational set up is deemed practical since it allows various stakeholders in the region to participate under a formal operational structure of data sharing and reporting and under the coordination and supervision of partner countries' respective national focal agency.

During the course of this study, one major accomplishment toward the development of a monitoring indicator system for the regional network for DSS monitoring, forecasting, and early warning was the agreement among the four partner countries on the initial set of common monitoring data/indicators. The data set is comprised of: (a) instrument-measured visibility, (b) PM₁₀, and (c) LIDAR based observation data.

The review of current conditions of the four partner countries for DSS monitoring and early warning has revealed that the downstream countries of Japan and the Republic of Korea have better infrastructure and capacity for DSS monitoring and early warning. Therefore, development of the regional network at their end would entail more of the national and regional organizational arrangements to strengthen data sharing for all aspects of forecasting and early warning. The upstream countries of the PRC and Mongolia, on the other hand, are where most of the DSS events originate and occur. And yet, their infrastructure and capability (especially for Mongolia) are apparently insufficient. As such, the development plan for a Northeast Asian DSS regional network for the prevention and control of DSS initially focuses on improving and upgrading the network of monitoring stations as well as on capability building for DSS monitoring and early warning in these countries.

4.2 Recommendations

Speedy operationalization and quality performance of the network will depend on the level of skills the national coordinators possess and the efficacy of the communications between the national coordinators and the members, partners, and other stakeholders and the regional support structures including the UNEP, the UNESCAP, and others. The operationalization of the network would also depend on the commitment of the various country parties on the formulation of well-focused program of work. As such, the key elements of a program to implement the regional network for DSS are set out in Box 4.1 while Table 4.1 lists the recommendations for the overall phased development with the corresponding action plan involving all four partner countries within the purview of a regional network.

Preliminary discussions during meetings with scientists and administrators in each of the four partner countries formed the basis of the proposed action plan. Some actions have a suggested time-frame while others are a continuing concern. Some require considerable reorganization while others would be relatively simple to implement.

DSS forecasting and early warning system in source areas play an important role in coping with the disaster impact of DSS in advance. On the other hand, in downstream partner countries of DSS should assess the impact on air quality by DSS. Therefore, the predicting system for the concentration and deposition in PM₁₀ in the Republic of Korea and Japan during DSS event or afterward should be implemented and developed in line with forecasting and early warning system.

Box 4.1 Key Elements of a Program to Implement the Regional Network for DSS

- (a) Develop the framework for the conduct of assessment and monitoring of DSS related events (including early warning) at regional, sub-regional and national levels using in combination the various systems of information technologies and space-based technologies;
- (b) Support a national focal point/agency to enhance and improve the linkage of national databases with regional and sub-regional databases applying digital and communication technology;
- (c) Develop a regional framework for the conduct of joint or collaborative information gathering and database consolidation for scientific information on DSS related matters, including desertification control;
- (d) Formulate programs that will provide for analysis and interpretation of data into usable form;
- (e) Encourage the use of information generated by the network and devise systems for the transfer of this information to decision makers, and relevant end users (including citizens of affected areas); and
- (f) Develop training and research programs for capacity building at the national level.

Table 4.1 Proposed Phased Development Program for a Regional Network for DSS

Phase	Recommended Projects	Action Plan
Phase 1 (6 – 12 mos.)	Establishment of Data Sharing Mechanism in Real Time for Short Term Forecasting	<ol style="list-style-type: none"> (a) Determine the national focal point/agency within each partner country's national DSS monitoring network; (b) Get agreement on the proposed hierarchy of monitoring stations to designate Class A and B stations and assess the cost of upgrading equipment and data transmission (where required). (c) Develop a set of common guidelines to govern the linkages among the national participating institutions and delineate the scope to which the DSS network can utilize the information. All national network members should bear the responsibility for providing their respective DSS monitoring and assessment information to the national focal point. (d) Hold a region-wide technical workshop regarding the construction of DSS network technologies to get agreement on which to use and how. Agree on the common language(s) to be used. (e) Conduct a survey within each partner country to determine the types and patterns of fields in the database to define the content and format of the information to be exchanged in the Meta databases with uniform criteria and formats for DSS monitoring and early warning. (f) Organize one Asian regional workshop with the objective of exchanging information and comparing notes. This workshop should be followed by a study tour of the PRC and Mongolia to allow participants to visit the field monitoring stations and view local conditions in the source areas.
	Enhance Scientific and Technological Cooperation and Exchange	<ol style="list-style-type: none"> (a) Organize an international symposium aimed at facilitating the exchange of ideas and experiences regarding monitoring and assessment and early warning. (b) Organize a study tour of selected country that is advanced in DSS monitoring modeling. The study tour participants should be relevant personnel of the network. (c) Capacity building such as training, dispatching of experts, or other activities (though already included in Phase 3 of the current phased development configuration) should be launched as soon as possible if and when resources become available.

Cont. Table 4.1

Phase	Project	Action Plan
Phase 1 (6 – 12 mos.)	Get Preliminary Agreement on Appropriate Indicator Systems for Northeast Asian Regional DSS Monitoring and Assessment	(a) Identify potential funding sources for national and international (incl. bilateral and multilateral) agencies and private sector. Look at innovative mechanism to raise and distribute funds (e.g., Trusts, Foundation, etc.) (b) Expand the network by identifying new sites and upgrading others. Install new dust monitoring equipment.
Phase 2 (3 years)	Expansion of the Regional Monitoring network	(a) Identify potential funding sources from national and international (including bilateral and multilateral) agencies and private sector. Identify mechanisms and manner to raise and distribute funds (e.g., Trusts, Foundation, etc.). (b) Expand the network by identifying new sites and upgrading others through the installation of new dust monitoring equipment.
Phase 3 (3-5 years)	Capacity Building	(a) Upgrade the forecasting technology and modeling capacity in all partner countries, especially in Mongolia. (b) Improve infrastructure and support facilities to support national DSS related activities (training courses, study tours, production of manuals, etc.). (c) Strengthen data management capacity and improve efficiency of network communication of the National DSS centers. Specific activities will include: i) increasing the response speed and information handling capacity of the web servers; ii) expanding data storage capacities of the database servers as well as increasing rate of e-connectivity; and iii) securing authorization from relevant authorities for the designated agency to take charge of the national network's day-to-day operation.

Getting the structure right includes training and other capacity building measures. As such, capacity building is an ongoing or continuing action found in all phases of developing the Northeast Asia DSS network. This includes training, experience sharing workshops, and field visits to the collection and monitoring sites. While the exchange of data and ideas through networking is an important element of the network, exchange visits will be crucial because there is simply no substitution for human interaction.

Training will be one of the crucial elements in view of the objective of building and enhancing institutional capacities at the national and regional levels for DSS monitoring and early warning. This will take the following forms:

- Human resources - There are a variety of effective training approaches, such as providing technicians for the necessary training and guidance on the spot in the participating countries and inviting trainees to the appropriate facility in one of the four partner countries for in-depth study or exchange of ideas regarding space based technologies, monitoring techniques, assessment methods modeling, and network and information management technologies.
- Equipment and technology for early warning and forecasting - To be able to identify the weak points in the delivery of services, the regional network (however configured) should be viewed as a process of data and information flow, through

data capture, acquisition, processing, storage, and packaging. These are then disseminated to end-users, policy decision makers, private sector and the general public (in the case of impending hazards such as severe DSS events). All the data, information, institutional arrangements, human resources and technology) must be integrated to facilitate an efficient flow of information. This applies at all levels of operation (local, national, regional). Inevitably, equipment should be upgraded.

4.2.1 Implementation

As mentioned, the physical development of the monitoring network focuses on developing and improving the monitoring stations in the PRC and Mongolia. Table 4.2 presents the recommended phased development of the stations in these two partner countries with corresponding preliminary costs.

Table 4.2 Phased Development of Network Monitoring Stations in the PRC and Mongolia

Country	Phase ¹	No. of Stations Covered	Recommended Activities	Estimated Cost ('000 US\$)
PRC	1	Initial 25	<ul style="list-style-type: none"> Establish national focal agency and integrate identified monitoring station in the network. Purchase and install needed hardware and software for identified stations for instrument-measured visibility, TSP, PM₁₀ and LIDAR. Upgrade communication network. 	4,916.90
	2	Add'l. 18	<ul style="list-style-type: none"> Expand network of monitoring stations. Purchase and install needed hardware and software for 	3,260.10
	3		<ul style="list-style-type: none"> Introduce long term DSS forecasting capacity by remote sensing (annual trend). 	3,130.00
Mongolia	1	Initial 6	<ul style="list-style-type: none"> Establish a national focal point and integrate identified stations in the network. Purchase and install AWS, TSP, PM₁₀, visibility sensors, soil moisture sensors, and LIDAR for identified stations. Construct ground monitoring stations. Establish and improve communication facilities/network. 	8,340.90
	2	Add'l. 12	<ul style="list-style-type: none"> Expand network of monitoring stations. Purchase and install AWS, visibility sensors, soil moisture sensors, and PM₁₀ 	1,611.60
	3		<ul style="list-style-type: none"> Capability building for DSS modeling, simulation and forecasting by remote sensing. 	1,923.80

¹ Phase 1 – short term; Phase 2 – medium term; and Phase 3 – long term.

4.2.2 Financing Strategy

Some things could be done within 12 months. Others will take much longer. This will depend on raising the funds required, either through the various national governments' budgeting

processes or through the raising of external funds. There are also constraints imposed by the need to proceed in an orderly fashion so that the upgrading and equipping of the monitoring stations can be in step. Data acquisition, data transmission, data processing, storage and retrieval, and dissemination have to be developed in ways that give maximum benefit and cost effectiveness.

In the proposed action plan for the first year, money should be spent in developing a set of common standards, conducting a survey, holding workshops, holding technical training courses and language training courses. Because there are many uncertainty factors in developing a set of common standards, it is impossible to give a relatively accurate cost estimate. For just the same reason, it is impossible to provide an accurate cost estimate of conducting a survey, holding workshops, holding technical training courses and language training courses. When the network is operational, the cost of organizing international workshops and the costs of developing and updating the standard operational manuals will become the part of the operating and maintenance cost.

According to sustainable financing principle, different source of money should be supplied to each budget line. Contributions from network members and partners, bilateral or multilateral donors, contributions from regional, subregional and international institutions, donations from private sector can be used to fund equipment and software for monitoring, early warning, and data transmission (perhaps through a Foundation or Trust Fund). Contributions from national governments and donations from private sector can be used to fund current operating investment. Contributions from network members and partners, bilateral or multilateral donors, contributions from regional, subregional and international institutions, donations from private sector can be used to fund operating cost arising from cooperation.

4.2.3 Cooperation with Other Regional and International Organizations

As a transboundary problem it is clear that government-to-government agreements could be put in place.

One of the important obligations of the Regional Network for DSS and its host institution(s) is to coordinate network-building efforts and provide specific technological assistance and guidance. Programs will be designed for promoting the role of science and technology in preventing and controlling DSS, on the one hand, and blending indigenous knowledge and modern science and technology, on the other, especially in the early warning system.

The launching of the proposed Regional Network for DSS would provide opportunities for members of the international community to put in concrete terms scientific cooperation against DSS in Northeast Asia. In particular, interested, affected, and developed country parties will be able to work more closely and effectively, within the framework of the regional network, with international regional and subregional organizations. Reference has already been made to the WMO network and to the Acid Deposition Monitoring Network in East Asia and the contributions that each of the partner countries makes now. Opportunities exist to further enhance these linkages and extend them to cooperation in the Asia-Pacific region (including Australia and other relevant countries), USA, and Central Asia. Close cooperation with existing networks and programs on long-range transboundary air pollution in Northeast Asia should be maintained.