

Abstract of the Special Committee Report on Dust and Sandstorm Issues

1. Background to the Report

Dust and sandstorm (DSS) that are devastating Northeast Asia and which have caused considerable damage to transportation systems and public health, are a common concern of Japan, Korea, China and Mongolia. The prevention and control of DSS events have therefore arisen as issues of great concern in all these countries. DSS have previously been considered natural phenomena that originate in deserts and arid areas. However, the greater scale and frequency of DSS events in recent years are considered to be the result of anthropogenic factors, such as overgrazing and the over-cultivation in inland China.

In December 2002, the Ministry of the Environment of Japan established a “Special Committee on DSS Issues”, which has been chaired by Professor Iwasaka of Kanazawa University and convened at the Overseas Environmental Cooperation Center (OECC). The purpose of this committee is to compile and summarize the scientific knowledge on DSS issues and to elaborate the basic strategies for future programs (knowledge accumulation, monitoring, mitigation measures, etc.) developed by DSS experts.

This report describes the achievements of intensive discussions that have been held in nine committee meetings.

2. Programs and Considerations Regarding DSS Issues

(1) Background and present situation of DSS

Mineral or soil particles that are blown up into the atmosphere by winds in arid and semi-arid areas such as the Taklamakan Desert, the Gobi Desert, and the Loess Plateau in inland China, are then carried by westerly winds and often reach Japan. The phenomenon called *kosa* in Japanese describes the entrainment of mineral and soil particles in the atmosphere and their deposition in a distant area. In such cases, the particles themselves are also called *kosa*. The phenomenon of *kosa*, referred to as DSS in more general terms, is often observed in March and April, or sometimes in November in Japan.

The total number of days that a DSS event was observed at 108 meteorological observation points (i.e. observatories and observation posts) in Japan had rarely exceeded 300 days annually before the late 1980s. Since 1988, however, the total number of days on which a DSS event has been observed

at these stations has often exceeded 300 days a year, and reached an especially high number of recorded observations of approximately 700 to 1,200 days in three years, from 2000 to 2002.

A similar trend has been reported in China and Korea. The total number of DSS events, cause of *kosa*, in Northern China from the 1950s to the 1990s declined, but conversely the number of very strong DSS events increased over this same period. Since 2000, the number of observed DSS events has risen significantly. In Korea, the annual number of days of observed DSS events has been increasing since the 1980s. For instance, there were 3.9 days on average during the 1980s, 7.7 days during 1990s, and the number of days in 2001 reached 27 days.

Damage caused by severe DSS events was reported during 33 years of the 52 years from 1949 to 2000 in China, and approximately 140 regions were affected by these events. The most severe damage to humans and cattle resulting from a DSS event occurred in Northwest China in May 1993. In a DSS event that originated in three provinces, 85 people lost their lives and 264 people were injured in this single event. In addition, 370,000 ha of agricultural products were damaged and 120,000 head of domesticated animals either died or went missing. In addition, damage to the infrastructure and manufacturing industry was reported. In total, the direct economic loss was estimated at approximately 7.3 billion yen. In Korea, a total of 4,949 kindergartens, primary schools and junior and senior high schools were ordered to be closed for the first time due to a DSS event in March 2002. Subsequently, the number of outpatients in the respiratory, dermal and optical departments of medical institutions in Korea suddenly rose considerably.

In Japan, in addition to air pollution from the suspended particles, the reduced visibility, staining of laundry and vehicles, and the damage to agricultural activities are cause for concern. It has been pointed out that DSS events have the potential to neutralize acid rain on the one hand, but on the other they are said to adsorb atmospheric pollutants and to transport them to Japan.

(2) Scientific approaches to understanding DSS phenomena

Regional weather, geography and soil properties, land usage, and many other factors affect the entrainment and transport of DSS particles, and currently, intensive research and studies on the mechanisms of entrainment and the transport processes has been conducted. However, it is still difficult to identify the exact source of entrainment for a particular DSS event. The information on soil moisture, wind velocity, or other data for parameterization is insufficient to evaluate and forecast the annual fluctuations and long-term trends of DSS events in the region. In order to understand any DSS event, it is important to compile scientific data on the atmosphere, ground surface, vegetation, and human activities in the DSS source region and along the DSS pathway beforehand.

Various aspects of the environmental impact of DSS events have been observed as a result of their greater magnitude and the intensification of development in societies of the region. Some other issues have been raised along with advancement of the science related to DSS. The health impacts, for example, were previously rarely considered as part of the damage resulting from DSS events. These impacts have since become one of the central concerns, as very strong DSS events have hit populous urban areas. Considering the current trend, the accumulated knowledge concerning the physical properties (e.g. particle size distribution, shape, surface structure, etc.) and chemical properties (e.g. chemical and mineral composition, adsorbed pollutants such as acid substances or pesticides, etc.) should be surveyed and analyzed.

(3) Possible measures and their evaluation

Measures to deal with DSS events include short-term measures, such as forecasting and early warning systems, which allow time to prepare for protection against direct damage in the source area and affected regions, as well as long-term measures, such as re-vegetation and land use changes to prevent and control dust entrainment. The priority measures among these options should be considered in order to proceed in a planned and staged manner.

Currently, the meteorological agencies of Japan, China and Korea have been able to some extent to provide DSS forecasts and early warnings. For a more accurate DSS forecasting and early warning system in Japan, the monitoring and forecasting of DSS events that may hit Japan should be established from actual entrainment to long-range transport.

In the DSS source areas, the control of sand movements using windbreaks or a checkerboard pattern of protection devices and re-vegetation through the establishment of natural protected zones are all important measures. For selecting natural protected zones in particular, it requires the consideration of historical, social, and ecological factors in the region. For the prevention of overgrazing and over-cultivation in DSS source areas and their surrounding areas, socioeconomic factors must be specifically considered.

Consequently, implementing DSS measures must be appropriately selected in consideration of the expected effects, socioeconomic livelihood factors, cost-benefit ratios, etc. Evaluation of the results of implementation is especially important to know if the project has achieved the intended results.

(4) International cooperation to deal with DSS issues

The DSS issue is a common concern of Japan, Korea, China and Mongolia, and international organizations are also paying attention to this subject. Japan should therefore cooperate with them and promote efforts at collaboration.

DSS issues have been discussed at the Tripartite Environment Ministers Meeting among Japan, China and Korea (TEMM). Utilizing this political framework, extensive international collaboration should be sought. In addition, Japan, Korea, China and Mongolia and four international organizations, including the United Nations Environment Programme (UNEP) with the support of the Asian Development Bank (ADB) and Global Environment Facility (GEF), formed an international cooperation project namely “Prevention and Control of Dust and Sandstorms in Northeast Asia, ADB Regional Technical Assistance Project (RETA 6068)” in January 2003. The outcome of this project, the “Regional Master Plan for the Prevention and Control of Dust and Sandstorms in Northeast Asia” was issued in March 2005. Further steps to accomplish the proposed measures in this Master Plan will be necessary.

3. Proposed Plan for Promotion of DSS Measures

DSS measures are long-range endeavors that require the establishment of a concrete implementation framework and the financial mechanisms to support such efforts. Therefore, a series of activities and targets should be elaborated from short-, medium- and long-term viewpoints. Numerous organizations are also involved (or are expected to be involved in the future) in DSS issues, which include the related countries of China, Korea and Mongolia, international organizations, bilateral aid agencies in other countries, research institutes, private enterprises, etc. Assessment of the overall activities, the avoidance of duplication, and the utilization of available resources, such DSS measures with a higher cost-effectiveness should be consistently implemented. Among these measures, Japan should consider its responsibility with regard to DSS issues, and its future plans are proposed here below in consideration of the possibility of international work-sharing and collaboration.

In order to deal with DSS problems, the compilation of scientific knowledge, an overall assessment of project implementation, the elaboration of a scheme for monitoring, early warning and mitigation, and any other necessary measures should be implemented in collaboration with China, Korea, Mongolia and international organizations. These measures should not be isolated, but be linked effectively to maximize the impact.

(1) Promotion of domestic and international frameworks on DSS issues

Regarding liaison and coordination among government agencies in Japan, the ministries and agencies involved in DSS issues established a coordination meeting in February 2005. This regular coordinating meeting aims to ensure collaboration and the maintenance of consistency for project implementation. This meeting will play a central role in the compilation of related information in Japan and other countries, and the functions of the meeting should be enhanced so that the ministries and agencies involved can utilize this information for the effective implementation of projects.

Research activities are especially important to progress on DSS projects; thus, the promotion of information exchanges between governments and research institutes, including financial support for research activities, are anticipated. Establishment of a platform for periodical dialogues on DSS issues between governments and researchers is also a possible option.

As for international activities, the relationship between Japan and related countries should be maintained through the network of people established under the ADB-GEF project and follow-up activities should be carried out with the aim of information exchange and consensus building. In future, this network should be further developed to operate as a source of information for each country, including Japan.

DSS issues have already been discussed at the Tripartite Environment Ministers Meeting (TEMM), the Ministers Meeting on Dust and Sandstorms involving Korea, China, Japan and Mongolia, and at the 5th Ministerial Conference on Environment and Development in Asia and the Pacific 2005 (UNESCAP/MCED5). In addition, further discussions on various opportunities within the existing frameworks should be held for the effective solution of DSS problems.

(2) Human networking and capacity building (including program officers, experts, researchers on DSS)

The quality and quantity of human resources on DSS issues varies significantly depending on the fields related to the problems and the situation of the countries involved. Workshops, seminars, and symposia will be effective means of promoting mutual capacity building besides the conduct of joint research and surveys. Training and the dissemination of basic knowledge on DSS for citizens and technical officers in the DSS source regions are especially important for the effective implementation of DSS mitigation measures.

(3) Promotion of research and surveys, accountability for the investment (including disclosure and public announcements)

There still remain many unsolved scientific questions with regard to DSS events, and research and surveys must therefore be promoted first. In the meantime, accountability for investments in DSS mitigation measures must be assured even though the direct and indirect effects of such measures cannot be quantified due to the limitations of their scientific basis. Thus, full disclosure and public announcements on DSS measures and projects are important for consensus building.

The DSS monitoring measures recommended by the ADB-GEF project on DSS, in particular, provide the basic data for planning DSS measures and must therefore be one of the priorities. To achieve this, monitoring in Japan, and the sharing of data obtained through various relevant projects

on monitoring DSS should be promoted. Mitigation measures in the DSS source areas are also important and the good practices of past projects should be analyzed and shared among the Northeast Asian countries through the ADB-GEF project on DSS.

In order to enhance the cost-effectiveness of DSS monitoring networks, utilization of the data obtained in various fields of DSS mitigation is recommended. For example, providing DSS monitoring information on websites, collecting and providing data on atmospheric pollutants carried by DSS particles, providing DSS event data on dust entrainment and transport on mainland Asia to meteorological agencies and services, etc. will be possible ways and should be progressively considered.

(4) Collaboration with other related frameworks (establishment of platforms for collaboration and cooperation at both the domestic and international levels)

The projects and frameworks that relate to DSS issues include the Acid Deposition Monitoring Network in East Asia (EANET), Atmospheric Brown Cloud Project – Asia (UNEP/ABC), Global Earth Observation System of Systems (GEOSS) of the Earth Observation Summit, Thematic Programme Networks (TPN) of the UN Convention to Combat Desertification, etc. In addition, the improvement of the livelihoods of local communities in the DSS source areas is related to the initiatives for poverty reduction promoted by United Nations Millennium Development Goals (MDGs). It is therefore recommended to closely collaborate with these related projects and to exchange information in order to be complementary, to avoid duplication, and to promote each project in more efficient ways.

(5) Socioeconomic implications of DSS

In the short- and medium-term, the direct effects of DSS impacts in the source and affected areas are of priority interest in most cases. However, the indirect effects induced by DSS events should also be considered. For example, if an agricultural region is hit badly by a DSS event, it will be a major burden for the national economy to support its agricultural industry to recover to its original level. On the other hand, the agricultural products from other regions will flow into the market to compensate for the shortages of products from the DSS-affected regions. The extent of DSS effects may therefore spread to material and capital flows. The interrelationships between DSS events and socioeconomic activities will become more complex as productivity in Northeast Asian region grows significantly. In future, forecasting in the field of economic and production activities will be an important component of the evaluation of the effects of DSS events. This field of study has already been launched by a Korean research group, and Japan should closely follow the progress of this research initiative.