WORKSHOP REPORT

"THE INTERNATIONAL WORKSHOP ON SAND AND DUST STORMS''

Istanbul, Turkey, 04-07 October 2016

Table of Contents

Introduction

The International Workshop on Sand and Dust Storms (SDS) was held from 4th to 7th of October 2016 in Istanbul, hosted by the Turkish Ministry of Forestry and Water General Directorate of Combating Desertification and Erosion (ÇEM) and the Turkish Meteorological Service (TSMS) with technical corporation from the United Nations Convention to Combat Desertification (UNCCD), the World Meteorological Organization (WMO) and the United Nations Environmental Programme (UNEP).

SDS Background

The SDS problem has a global, transboundary and multi-faceted impact on environment, health, industry, livelihoods, urban infrastructure and agriculture. In recent times, the intensity and frequency of SDS has increased in some areas, including West Asia. In the Middle East and North Africa, about USD13 billion in Gross Domestic Product (GDP) is lost every year due to dust storms. The Iraqi government recorded 122 dust storms and 283 dusty days in a single year. Within the next ten years, Iraq could witness 300 dust events per year. Dust storms contribute to poor air quality. The World Health Organization estimates that seven million people die globally from poor air quality every year.

Immediate action is needed to prevent and mitigate the impact of SDS both locally and globally. In the West Asia region, SDS has become an impediment to sustainable development and human well-being. In March and May 2012, the region was devastated by probably the worst dust storms in decades. Countries experiencing the negative impacts of SDS in the region made a number of political commitments to address this issue, including the Ankara Ministerial Declaration on sand and dust storms in 2010. The subsequent Action Plan provided a platform for regional co-operation on SDS issues.

In 2007, the 14th World Meteorological Congress highlighted the importance of the SDS problem and endorsed launching of the implementation of a Sand and Dust Storm Warning Advisory and Assessment System (SDS-WAS). The adoption of United Nations General Assembly (UNGA) resolution entitled 'Combating Sand and Dust Storms' (A/RES/70/195) in 2015 has contributed to a greater global ambition to address SDS. At the request of the UNGA, a Global Assessment of Sand and Dust Storms was prepared in partnership between UNEP, WMO and UNCCD and it was published in 2016. This report advocates for further action on SDS at global level. The issue was discussed again at the second session of the UN Environment Assembly (UNEA-2) held in Nairobi, Kenya in May 2016. The UNEA-2 adopted a resolution to establish a global research network on sand and dust storms. WMO SDS-WAS has already developed global research monitoring, early warning and prediction systems which could substantially contribute to the projected global network.

UNCCD is committed to be a key part of global sand and dust storm actions. UNCCD, in collaboration with the SDS community and United Nations' organizations, intend to develop a global policy framework on SDS and a toolkit to be presented at its COP 13 in 2017. As part of the SDS policy framework, a technical guide to assist countries in establishing national policies across sectors (including health, source mitigation, protection and disaster risk reduction, and early warning) will be needed.

The Istanbul SDS Workshop was an opportunity to gather comments and inputs on a draft global SDS policy framework, and reach a common understanding of key stakeholders. There is little that can be done to alter the natural occurrence of dust and sand storms, but the awareness on driving forces and understanding the probability and variability of SDS events are highly important. All factors relating to SDS were discussed, and specific attention was given to climate change and variability, natural resource management and land degradation. Informally, discussions were held to outline the next steps regarding (i) a technical guidance manual for SDS and (ii) an economic impact assessment and risk analysis tools.

Objectives of the Workshop

Sand and Dust Storms have great negative effects on people and society at local, regional, national and international scales. Therefore one of the main goals of the Istanbul workshop was to contribute strategic framework for risk management and to provide inputs for political arrangements on monitoring, prediction, early warning, intervention and combating SDS.

Wider engagement and consultation is necessary in developing a consolidated policy on SDS. The Istanbul SDS Workshop has been an opportunity for key SDS-effected countries from the West Asia and the North Africa regions to provide input to the development of a draft policy framework on SDS.

Outcomes of the Workshop

In parallel with the main objective of the Istanbul Workshop on SDS, the Workshop was able to review and discuss the key issues related to SDS including "Characteristics of SDS, Early Warnings of SDS, Vulnerability, Resilience and Mitigation by means of the Examples of Good Practices based on the Presentation of the Country Cases, and Introduction to a Technical Guide for SDS, Global Economic Impact Assessment of SDS and finally A Regional Research Plan on SDS."

Based on these key issues and discussions during the Istanbul SDS Workshop, the following main recommendations, comments and outcomes were made based on the studied Segment topics as follows:

1. The Characteristics of SDS

In general, work should focus on source and deposition regions, monitoring and prediction of SDS in relation to (i) evaluation of SDS prediction models, (ii) data assimilation and quality of observational data, (iii) simulation and modelling (including dust source parameters, transportation and circulation pathways with timing, prediction and mitigation), (iv) methods and parameters of estimation of source terms (e.g. inverse modelling). There is a need for assessments and other

studies of dust and climate interactions. Biogeochemical SDS effect studies in the marine environment and hydrological basins should be conducted. There is also an urgent need on studies of health effects of SDS in North Africa and Middle East countries. The only evidence available is only from a few epidemiological studies in Southern European Mediterranean cities.

The properties of dust, definitions, classification and a focus on the intensity of dust should be defined, and the seasonal changes and frequency changes of SDS and its affects, scale of storms, dust contents (soil-embedded spores, mineralogical composition etc.) and the control mechanisms on SDS should also be considered.

With respect to climatology, it is important to know how observed climate change and variability have been affecting SDS events particularly their intensity and variability. Differences in regional variability, long-term variations and trends and also the seasonal impacts of SDS should also be considered for making better evaluations of SDS temporal and spatial variability. This should be performed through regional climatological analyses. Use of indigenous knowledge is important for understanding SDS formation. It is also crucial for delivery of the right information to the right people in the right format at the right time.

Sharing reliable meteorological data and information networks in order to produce reliable forecasting for dust is an important issue. Data required for early warning systems for many countries are available from various institutes and ministries including WMO, its Barcelona Dust Forecast Centre, UNEP and UNCCD, etc. However, in spite of the contributions by WMO in order to cover the globe, certain areas such as West Asia and Africa still lack co-operation in observations and accessing reliable data. Turkey and the WMO Barcelona Dust Forecast Centre may cover capacity building including SDS-WAS training for the region.

There is a need to use better technologies for observing visibility to identify dust phenomena. In order to better understand the nature and magnitude of SDS events and mechanisms, it is important to cover palaeo-dust data and peer-reviewed assessment on past SDS patterns that can give a lot of contributions to the scientific

and technical studies. This palaeo data and information may help in differentiation between contemporary natural and anthropogenic sources of dust and types of dust emissions.

Synoptic and meteorological observations of air quality and aerosols important for health issues are missing in some countries. In addition to the existing synoptic meteorological systems already used by the national meteorological organizations based on present and past weather events, a special SDS-WAS coding system should be implemented and applied in national meteorological observational services. This may help to handle not only lack of information but also to provide more additional information and forecast on SDS-related parameters. In this respect, a system for monitoring and prediction should be performed by co-operation through accessing SDS data and forecast products. The SDS database also has to consist other SDS aspects such as soil properties, in addition to meteorological data and information.

Scientific works are still needed to improve models and modelling forecasts because of differences in scales and resolutions. There are 11 models for SDS prediction presently within the WMO Barcelona Dust Forecast Centre, which were formed by multinational initiatives, and some freely-available models. In addition to satellite images, reliable observational data are needed from different countries and observational methods, e.g. sun photometers, ceilometers and LIDAR measurements - from the AERONET and GAW Aerosol Lidar Observation (GALION) networks. Although these networks cover data and information from Europe and the East Asia countries – including China, South Korea, Mongolia and Japan – limited data and information are present for West Asian and Africa countries.

SDS as natural phenomena and as part of the ecological system also has some positive ecosystem effects (e.g. fertilization effects in the marine environment) in contrast to its negative socio-economic impacts globally. Therefore, it is important to link many organizations, mainly health organizations, to cover the effect of SDS in many countries in consideration of the direct and indirect impacts of SDS on ecosystem services, human and animal health and SDS related socio-economic sectors.

There is also a need to focus on the nature of SDS and their effects in poorly studied regions such as the Middle East, and also the related socioeconomic issues including public awareness should be tackled for this region. Indeed, the WMO and UNEP report published in 2013 contains all necessary forecasting and assessment methods, procedures and actions plans for SDS. The recent Workshop in South Korea made significant progress on the socio-economic aspects of SDS.

Open access to all data is needed in order to put early warning systems that can have more precision in prediction of SDS which will not happen without co-operation from other countries, agencies and organizations mainly in the West Asia domain.

2. SDS Early Warning

During the last 10 years, WMO has built the Sand and Dust Storm Warning Assessment and Advisory System (SDS-WAS) with several regional centres, including the North Africa, Middle East and Europe (NAMEE) SDS-WAS centre in Barcelona providing operational SDS forecasts.

Technical support is required for establishing regional and national early warning systems (e.g. dust concentrations, mineral composition, impacts, etc.). Appropriate decision-making procedures are also required.

In order to improve the quality of early warning and forecasting systems, integration of meteorological and land surface observations, air dust concentration and source monitoring in near real time is required. Harmonized methods should be used for data collection for the sake of consistency.

New approaches and mechanisms are needed for effective delivery of early warning and forecasting information and products to the end users, populations and impact areas identified through vulnerability mapping.

Localized early warning modelling systems can be developed to improve regional forecasting information quality, however the high-resolution models should be seamless coupled with larger scale models (initial and boundary conditions) and additional observations.

3. Vulnerability and Resilience

In terms of the science and policy interface, desertification risk assessment mapping information in Turkey is being fed into policy as part of the country's National Action Plan. Similar scientific efforts have informed large-scale afforestation and ecological restoration schemes in China, which are claimed to have reduced dust storms.

For making links between SDS prediction, assessment, impact and consequences, different types of models (e.g. SDS-WAS and economic impact models) and models at varying spatial scales need to be seamlessly coupled, the need is to couple the models and integrate their inputs/outputs (e.g. multi-disciplinary and Earth System modelling).

Risk management is important, and there is a need for monitoring dust/sand storm sources and for mapping of vulnerable populations and socio-economic sectors. In this respect vulnerability issues revolve around the health impacts of SDS. Epidemiological studies have established links between atmospheric dust concentrations and mortality, due to all natural and cardiovascular causes, and respiratory/morbidity. However, more research is needed for a better understanding of the potential mechanisms of toxicity.

4. Mitigation

In order to reduce the negative effects of SDS in a specific region, it is recommended to use/protect endemic plant species that are able to withstand extreme weather and soil conditions (drought, salinity, etc.). Local people should be included to the implementation of strategies to combat SDS. Agencies at both regional and global levels always co-operate and share experiences with each other on any SDS issues. If needed local institutions may be established.

In studies focusing on SDS control, satellite images should be used to compare past and present situations and then future plans can be projected. Such studies should

be based on scientific and statistical data. Models, which can be used to help mitigate of SDS impacts, should address local and regional needs.

Factors that cause and/or accelerate the negative effects of SDS (e.g. loss of land cover, overgrazing, soil cultivation methods, etc.) should be carefully assessed and appropriate measures to prevent/mitigate these effects taken. Socio-economic incentives may be needed to encourage local people to implement these measures on their land. Generally, there is a need to disseminate information among local people on SDS issue and their solutions.

Mechanical and biological methods for the prevention of dune movements should be extended. To improve the productivity of agricultural areas and mitigate the negative effects of SDS, affected lands should be covered by heavy soil at the specified thickness and vegetated by local species which can stabilize the soil.

People in effected countries should be informed by an expert team to reduce SDS impacts on human health.

Monitoring the positive effects of the work done at large scales might take a long period of time. These can be assessed by regularly surveying local people in study areas. These issues must be considered when proposing these projects.

5. Way Forward: Next Steps

The workshop appreciates the joint efforts of UNCCD, UNEP and WMO in their coordination of activities focusing on SDS issues, in particular in writing the Global Assessment of SDS and further initiatives for elaboration of the Technical Guide for SDS.

It is important to harmonize the efforts of various UN bodies in order to avoid repetition and duplication of efforts. WMO has several pre-existing documents relevant to UNCCD's response to the SDS agenda. UNCCD will consult widely on the contents of the technical guide and reflect on the integration of the LDN targets and indicators, including organic carbon (above + below ground).

Discussion after the Global Economic Impact Assessment presentation focused on how to distinguish between geological and accelerated erosion and the need to assess both economic but also qualitative costs.

Better co-ordination and harmonization between UN bodies, countries in the region and different national agencies are needed for realization of the West Asia regional research plan and establishment of regional SDS-WAS centre(s). WMO and UNEP proposed such a regional research plan and completed much relevant preparation in 2013, and it is very important to follow it in further joint realization. The need to co-ordinate potentially overlapping initiatives on different levels was emphasized, to avoid repetition and to achieve synergies. Data availability was raised as a key issue.

Areas where it is not possible to prevent natural sand dune movements could be used as a touristic attractions local for economic income.