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Review of the implementation of the 2030 Agenda for Sustainable Development in Asia and the Pacific: disaster risk reduction

Regional plan of action on sand and dust storms in Asia and the Pacific**

Summary

At the fifth session of the Governing Council of the Asian and Pacific Centre for the Development of Disaster Information Management, the Centre reported that, with regard to regional cooperation on transboundary hazards, it had conducted a risk assessment in Asia and the Pacific to provide a long-term projection of the risk and potential socioeconomic losses and impact associated with sand and dust storms. Building on the findings of the assessment, and in line with General Assembly resolution 75/222 and resolution 72/7 of the Economic and Social Commission for Asia and the Pacific, the Centre conducted an in-depth subregional and thematic consultation with the most affected countries with a view to developing a regional plan of action on sand and dust storms.

At its sixth session, held on 8 February 2022, the Governing Council endorsed the draft regional plan of action on sand and dust storms and recommended further consultations with member States with a view to submitting the draft regional plan of action to the Commission at its seventy-eighth session, in 2022, for its consideration and possible endorsement. The present document contains the draft regional plan of action on sand and dust storms in Asia and the Pacific for the Commission's consideration. The Commission may wish to endorse the draft regional plan of action.

I. Objective

1. The regional plan of action on sand and dust storms in Asia and the Pacific provides a strategic framework and reference for countries in the region to take action at the national and regional levels, in the context of multi-hazard disaster risk reduction, to reduce the negative impact of sand and dust storms and identify anthropogenic measures that could contribute to or mitigate their formation and intensity.

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** The present document was submitted late owing to the consultative process with member States, as requested by the Governing Council of the Asian and Pacific Centre for the Development of Disaster Information Management.

II. Scope and focus: priority areas at regional and national levels

2. The priority areas highlighted in the plan of action were informed by the findings of the risk assessment as well as technical consultations held with States members of the Economic and Social Commission for Asia and the Pacific (ESCAP), expert practitioners, United Nations organizations and other stakeholders on 6 December 2021, and written comments by member States in response to a note verbale sent by the secretariat on 4 March 2022.

3. The plan of action builds on and reflects relevant international frameworks and agreements, including the United Nations Convention to Combat Desertification in Those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa,[1] the Sendai Framework for Disaster Risk Reduction 2015–2030[2] and the World Meteorological Organization (WMO) Sand and Dust Storm Warning Advisory and Assessment System. The plan of action reflects ongoing collaboration between member countries and organizations of the United Nations development system, including ESCAP, the United Nations Coalition on Combating Sand and Dust Storms, the secretariat of the United Nations Convention to Combat Desertification, WMO, the Food and Agriculture Organization of the United Nations (FAO), the United Nations Office for Disaster Risk Reduction and other key partners in the region.

III. Intergovernmental commitments to combat sand and dust storms

4. In recent years, the Commission has adopted a number of resolutions in which it requested the secretariat to support and facilitate disaster risk assessment to strengthen regional cooperation mechanisms as well as to combat the negative impacts of sand and dust storms. In Commission resolution 71/12, member States requested the secretariat to strengthen disaster risk modelling, assessment, mapping, monitoring and multi-hazard early warning systems of common and transboundary disasters. Subsequently, the General Assembly, in its resolution 70/195, emphasized the relevance of the efforts and cooperation of Member States at the regional and international levels to control and reduce the negative impacts of sand and dust storms on human settlements in vulnerable regions. In the same resolution, the Assembly also stressed the need for cooperation at the global and regional levels with a view to preventing and managing sand and dust storms through the development of early warning systems and the sharing of climate and weather information to forecast sand and dust storms and affirmed that resilient action to combat sand and dust storms required a better understanding of the severe multidimensional impacts of sand and dust storms, including the deterioration of the health, well-being and livelihood of people, increased desertification and land degradation, deforestation, loss of biodiversity and land productivity, and their impact on sustainable economic growth.

5. Furthermore, the General Assembly, in its resolution 74/226, encouraged regional, subregional and interregional organizations and processes to continue to share best practices, experiences and technical expertise in combating sand and dust storms to address the root causes and impacts of sand and dust storms, including through improved implementation

[1] United Nations, *Treaty Series*, vol. 1954, No. 33480.

[2] General Assembly resolution 69/283, annex II.

of sustainable land management practices, and to promote regional cooperation in that matter to reduce the risks and impact of future sand and dust storms and to provide affected countries with capacity-building and technical support from the relevant United Nations organizations.

IV. Impact of sand and dust storms on sustainable development

6. As a meteorological phenomenon, sand and dust storms are common in arid and semi-arid areas, and they can spread across large parts of the Asia-Pacific region. Major events can transport dust over great distances so that the impacts of sand and dust storms occur not only in the areas where they originate but also in communities far from the source areas, frequently across international boundaries.

7. Sand and dust storms directly affect sustainable development, and the observation, risk assessment (including from an impact-based perspective), management and mitigation of sand and dust storms ought to be integral components of national and regional efforts towards sustainable development.

8. Sand and dust storms can adversely impact poverty in a community in numerous ways, not least because they are often forms of dryland degradation or desertification. Sand and dust storms have negative impacts on food security by intensifying the damages to the livelihood and food security of millions of small farmers and pastoralists, as well as by damaging agricultural infrastructure, directly impacting production. Those impacts are a major limitation to the achievement of Sustainable Development Goal 2, to end hunger by 2030. Efforts to achieve good health and well-being in communities can also be adversely impacted. Sand and dust storms are risk factors for chronic diseases, such as lung cancer and acute lower respiratory infections, cardiovascular and respiratory diseases, which result in premature death. The well-being of people with diseases such as bronchitis, eye infections, skin irritations, meningococcal meningitis, valley fever[3] and diseases associated with toxic algal blooms is also impacted over time. An increase in the level of sand and dust in the environment and in water resources will adversely affect water quality. In the long term, this will lead to difficulties in providing safe and affordable drinking water for all. Moreover, the economic growth of a community may be affected by sand and dust storms. They can severely damage crops, fill irrigation canals, trigger power blackouts and cause other damage. The failure of power, water, roadways and other important infrastructure may occur as a result of sand and dust storms, interrupting the provision of vital and critical services for the community. All these impacts can affect the sustainability and resilience of infrastructure and small and large businesses. Sand and dust storms can severely impact cities and other communities, hampering their efforts to become inclusive, safe, resilient and sustainable. Climate change and changes in temperature and precipitation levels are modifying sand and dust storm hazard levels and increasing the associated risks. Due to changes in climate conditions, many drylands are becoming drier and consequently more prone to wind erosion and sand and dust storms. Life below water and life on land are directly and indirectly affected by sand and dust storms. Sand and dust deposition in coastal areas adversely affects coral reef ecosystems and life below water. The resilience of communities on land is undermined by many of the risks associated with sand and dust storms. Sand and dust storms also threaten the means of implementation and revitalization of the Global Partnership for Sustainable

[3] Coccidioidomycosis.

Development because of the extensive and intensive socioeconomic losses they can trigger.

9. Eleven of the seventeen Sustainable Development Goals are directly impacted by sand and dust storms:

- No poverty (Goal 1)
- Zero hunger (Goal 2)
- Good health and well-being (Goal 3)
- Clean water and sanitation (Goal 6)
- Affordable and clean energy (Goal 7)
- Decent work and economic growth (Goal 8)
- Industry, innovation and infrastructure (Goal 9)
- Sustainable cities and communities (Goal 11)
- Climate action (Goal 13)
- Life below water (Goal 14)
- Life on land (Goal 15)

V. Sand and dust storms risk assessment in Asia and the Pacific

10. In its resolution 72/7, the Commission requested the secretariat to, inter alia, accord priority focus on the work of the Commission relating to sand and dust storms as a great transboundary challenge and promote regional and interregional networking on sand and dust storms. As a result, the Asian and Pacific Centre for the Development of Disaster Information Management conducted the sand and dust storms risk assessment in Asia and the Pacific, which was published as *Sand and Dust Storms Risk Assessment in Asia and the Pacific*, [4] to provide an analysis of the long-term risk and potential socioeconomic losses and impact associated with sand and dust storms. The report represents the first attempt to assess and analyse the risks posed to society and the environment by sand and dust storms across a large-scale geographical area. It was produced with the collaboration, active support and contributions from other United Nations entities and subsidiary bodies of ESCAP, national agencies, research institutions and universities all over the world.

11. The risk of sand and dust storms was analysed as a function of hazard, vulnerability and resilience, with vulnerability being a function of sensitivity and exposure. The assessment covered several sectors, including human health, transport, energy, agriculture and food security, and the environment, with a transboundary approach at a regional scale. To assess the risk to each sector, indicators and layers were selected for each of the components of risk. At an early stage in the risk assessment, the Asian and Pacific Centre for the Development of Disaster Information Management evaluated the evidence for the risks posed by sand and dust storms to all aspects of the economy, society and the environment. The evaluation involved an appraisal of the knowledge and understanding of impacts as well as the availability of relevant data. The data required for the sand and dust storms risk assessment were gathered by

[4] ST/ESCAP/2966.

the Centre through direct collaboration with organizations, including the Finnish Meteorological Institute, the International Air Transport Association, the Japan Meteorological Agency, WMO Sand and Dust Storm Warning Advisory and Assessment System, the China Meteorological Administration and the Statistics, Energy and Transport Divisions of ESCAP. A number of open-source data sets were used, including the Modern-Era Retrospective Analysis for Research and Applications, Version 2, of the National Aeronautics and Space Administration of the United States of America, the National Aeronautics and Space Administration Socioeconomic Data and Applications Center, and the Global Land Cover by National Mapping Organizations of the Geospatial Information Authority of Japan, Chiba University and collaborating organizations. Additional data were gathered by the Asian and Pacific Centre for the Development of Disaster Information Management from the subsidiary bodies of ESCAP, including the Information and Communications Technology and Disaster Risk Reduction, Statistics, Transport and Energy Divisions. Important data sets were also contributed by FAO and the International Air Transport Association. The sand and dust storms reanalysis data were gathered from the Japan Meteorological Agency and the Modern-Era Retrospective Analysis for Research and Applications, Version 2, reanalysis data set.

12. As detailed in *Sand and Dust Storms Risk Assessment in Asia and the Pacific*, the Asia-Pacific region is the world's second largest in terms of mineral dust emissions, with four main sand and dust storm corridors in the following subregions: (a) East and North-East Asia; (b) South and South-West Asia; (c) Central Asia; and (d) the Pacific.

13. As indicated in the *Sand and Dust Storms Risk Assessment in Asia and the Pacific*, more than 500 million people in India are exposed to medium and high levels of poor air quality due to sand and dust storms, together with 173 million people in Pakistan, 62 million in the Islamic Republic of Iran and 40 million in China. In proportional terms, more than 80 per cent of the total populations of the Islamic Republic of Iran, Pakistan, Tajikistan, Turkmenistan and Uzbekistan are exposed to medium and high levels of poor air quality due to sand and dust storms.

14. In the energy sector, sand and dust storms have a considerable impact on the generation of solar power, costing more than $107 million a year in India, and more than $46 million and $37 million a year in China and Pakistan. The risk to electricity generation posed by sand and dust storms is likely to become greater as governments strive to ensure access to affordable, reliable, sustainable and modern energy for all (Sustainable Development Goal 7).

15. In the aviation sector, the exposure of aircraft engines to dust particles is a considerable risk on flight paths traversing parts of South-Western and Central Asia. Flights to and from the Arabian peninsula, China, India and Pakistan are most affected. The risk of a flight delay, diversion and cancellation due to low visibility caused by sand and dust in the atmosphere at ground level is greatest in Central Asia, southern parts of the Islamic Republic of Iran, the border area between Pakistan and India, and parts of northern China.

16. Large areas of farmland are affected by dust deposition in Turkmenistan (71 per cent of the cropland area), Pakistan (49 per cent) and Uzbekistan (44 per cent). Much of the dust has a high salt content, making it toxic to plants. This reduces yields and is a significant threat to the production of irrigated cotton and other crops.

17. Very high dust deposition occurs in the Hindu Kush Himalaya mountain range and the Tibetan Plateau, the so-called Third Pole,[5] which provides fresh water to more than 1.3 billion people in Asia. The deposition of dust on glaciers induces a warming effect and increases the melting of ice with numerous direct and indirect impacts on society, including impacts on food security, energy production, agriculture, water stress and flood regimes.

18. Cities in parts of South-Western Asia have the highest exposure to sand and dust storms, which make a significant contribution to poor air quality with unhealthy concentrations of particulate matter for millions of people. The risk of impacts from sand and dust storms is projected to increase in the 2030s due to more extreme drought conditions in parts of Western Australia and in central, east and south-east regions of Turkey as well as in Afghanistan and the Islamic Republic of Iran, while the risk of droughts is lower in northern China, the Ganges River basin in India, Kazakhstan and Mongolia, which may be at lower risk from sand and dust storms. The risk is likely greater in the Islamic Republic of Iran and Afghanistan given that levels of water stress are projected to be extremely high by 2030 in those countries. Managing the risks associated with sand and dust storms may also become necessary in areas where such phenomena have not occurred before, but where more extreme droughts are projected to occur, such as in parts of the south-eastern-most part of Australia, south-eastern China, northern Malaysia and northern and southern Thailand.

19. The risk assessment demonstrated that the cumulative effects of sand and dust storms on society are significant, not least because they occur more frequently than most other types of natural hazards. Their impacts are complex, they are very widespread, and they represent an important emerging issue for policymakers. However, the understanding of how sand and dust storms interact with society and the environment is still limited by considerable uncertainties.

20. The lack of data was one of the most prominent challenges throughout the process of conducting the risk assessment. Several types of sand and dust storm hazards are poorly accounted for, and in-depth risk assessments for sand and dust storm events across multiple sectors at national and local levels are needed. At the international level, coordinated multi-country transboundary studies of individual dust storm events are required to fully understand their multiple impacts. The lack of data is particularly acute in economic analysis.

21. Given the frequent transboundary impacts of sand and dust storms, the findings of the risk assessment provide the basis for a strong case for the design and implementation of well-coordinated actions at national, regional and interregional levels to combat the socioeconomic impacts of sand and dust storms.

VI. Operational objectives and specific recommended actions

22. To review and facilitate progress towards the realization of the plan of action, the secretariat, in collaboration with relevant United Nations agencies, should take the following actions aligned with three operational objectives.

[5] The Hindu Kush Himalaya mountain range and the Tibetan Plateau, an area widely known as the Third Pole because its ice fields contain the largest reserve of the planet’s freshwater outside the polar regions.

23. **Operational objective 1**: Improve the understanding of the socioeconomic impact of sand and dust storms with a view to accurately inform policies and investments to reduce their impact and enhance source mitigation.

24. Recommended actions to reach operational objective 1 through regional cooperation:

(a) Develop common guidance and methodologies to conduct impact-based analyses of sand and dust storm events;

(b) Conduct impact-based transboundary studies of single sand and dust storm events across various countries;

(c) Study the effect of dust deposition on different crop types and other forms of food production such as apiculture and pastoralism;

(d) Study the effect of dust deposition on key infrastructure, including agricultural infrastructure (e.g. irrigation canals) and infrastructure in the energy sector (e.g. transmission lines, forms of electricity generation, including wind and solar) and on information and communications technology;

(e) Conduct a comprehensive assessment of the geography of dust sources in the Asia-Pacific region;

(f) Prioritize the study of the long-term impact of sand and dust storms on human health, in source and deposition areas.

25. Recommended actions to reach operational objective 1 at the national level:

(a) Measure the socioeconomic impact of sand and dust storm events at national and local levels by systematically gathering loss data for each event;

(b) Report the impact of sand and dust storm events, as appropriate, through the Sendai Framework monitor system in alignment with the ESCAP *Guideline on Monitoring and Reporting the Impact of Sand and Dust Storms through the Sendai Framework Monitoring*;

(c) Put in place systematic surveillance and reporting to monitor the short- and medium-term health impacts of sand and dust storms in the most exposed and affected areas.

26. **Operational objective 2**: Extend the monitoring system and improve the early warning system to include an impact-based focus, to provide timely forecasts of sand and dust storms and enable targeted measures to minimize exposure and reduce risks.

27. Recommended actions to reach operational objective 2 through regional cooperation:

(a) Increase the number and capacity of observation systems of the phenomenon in the region, especially in South and South-West Asia;

(b) Produce regular impact-based forecasting at the regional level to facilitate transboundary action in the planning, response and recovery phases of the sand and dust storm disaster risk reduction cycle, including with a view to reducing secondary risks;

(c) Develop a common methodology across the region to conduct impact-based forecasting at the national level;

(d) Measure the effectiveness of the early warning systems that are in place with a view to providing best practice and state-of-the-art advice at national level;

(e) Strengthen connections across existing early warning systems at the regional level;

(f) Develop common advisory services for sector-specific early warning related to sand and dust storms.

28. Recommended actions to reach operational objective 2 at the national level:

(a) Strengthen linkages at the national level across agencies and services responsible for responding to forecasting and early warnings about sand and dust storms, including environmental, air pollution, hydrometeorological and meteorological services;

(b) Strengthen the integration of sand and dust storm early warning systems with other natural hazard response systems at the national level;

(c) Increase the number of observation points in areas that are most affected by sand and dust storms and in source areas.

29. **Operational objective 3**: Put in place coordinated regional actions in the most at-risk and exposed geographical areas to mitigate the risk of and exposure to sand and dust storms.

30. Recommended actions to reach operational objective 3 through regional cooperation:

(a) Develop regular and systematic issuance of forecasting and early warnings related to human health, especially in South and South-West Asia;

(b) Study the particular impact of sand and dust storms on electricity production, including in the most remote and off-the-grid areas in South and South-West Asia and in East and North-East Asia;

(c) Strengthen the understanding of the impact of dust deposition to the production of irrigated cotton in South and South-West Asia, and in North and Central Asia;

(d) Jointly assess the impact of sand and dust storms on glaciers and assess the potential impact of secondary disasters, including droughts and floods, in areas where dust may affect water supply in adjacent lowland areas, including in South and South-West Asia, East and North-East Asia, and North and Central Asia;

(e) Consider the possibility of establishing a network of the most-affected cities with high exposure to poor air quality due to sand and dust storms and prioritize impact-based forecasting for these cities with a view to providing early warnings to significantly reduce the exposure of urban residents in particular in East and North-East Asia, North and Central Asia, and South and South-West Asia.

VII. Follow-up and review

31. The implementation of the plan of action requires a concerted effort among member States in the region and various stakeholders at the national and regional levels. The Asian and Pacific Centre for the Development of Disaster Information Management, in collaboration with relevant United Nations organizations and the United Nations Coalition on Combating Sand

and Dust Storms, will provide support to member States with regard to the implementation and regular review of the plan of action.

32. A coordinating group of interested countries will be convened on a yearly basis at the senior political level and on a regular basis at the senior expert level to agree on the implementation of specific transboundary actions as outlined in the plan of action, to facilitate exchanges of best practices at national and subregional levels, and to guide the work of the secretariat accordingly.

VIII. Time frame

33. The plan of action has an initial duration of five years, after which member States are encouraged to review its effectiveness in reaching the desired objective and the related operational objectives and consider renewing the commitment for a further five years thereafter.