



The Sand and Dust Storms Compendium

State-of-the-Art Knowledge

Sand and dust storms (SDS) are common in arid and semi-arid regions. They typically occur when strong winds lift sand and dust from bare, dry soils into the atmosphere, and often transport particles hundreds or thousands of kilometres.

The Sand and Dust Storms Compendium is the most comprehensive summary of state-of-the-art knowledge yet published on these phenomena. It highlights recent concerted efforts by the global community to build the capacity of vulnerable countries to address the impacts of SDS. The Compendium provides guidance, tools, and methodological frameworks to aid in monitoring, prediction and early warning; impact mitigation, vulnerability and resilience; and source mitigation.

There are clear synergies between efforts to mitigate the impacts of SDS and other sustainable development targets. Activities to mitigate SDS and improve resilience to their effects will also benefit vulnerable societies and ecosystems more broadly. Avoiding, reducing and reversing land degradation will benefit biodiversity, food security, community cohesion and security, and reduce migration pressures, alongside reducing SDS impacts, resulting in healthier ecosystems, human populations, and societies.

SDS Compendium: Key Messages

SDS Challenges

Sand and dust storms (SDS) are given many local names: examples include the sirocco, haboob, yellow dust, white storms, or the harmattan. They are a regionally common and seasonal natural phenomenon exacerbated by poor land and water management, droughts, and climate change. The combination of strong winds and airborne mineral dust particles can have significant impacts on human health and societies. Fluctuations in intensity, magnitude, or duration can make SDS unpredictable and dangerous.

In some regions, SDS have increased dramatically in frequency in recent years. Human-induced climate change, desertification, land degradation, and drought are all thought to play a role. While SDS can fertilize both land and marine ecosystems, they also present a range of hazards to human health, livelihoods, and the environment. Impacts are observed in both source regions, and distant areas affected directly and indirectly by surface dust deposits. The hazards associated with SDS present a formidable challenge to achieving sustainable development.

SDS events do not usually result in extensive or catastrophic physical damage. However, the accumulation of impacts can be significant. In source areas, they damage crops, kill livestock, and strip topsoil. In depositional areas atmospheric dust, especially in combination with local industrial pollution, can cause or worsen human health problems such as respiratory diseases. Communications, power generation, transport, and supply chains can also be disrupted by low visibility and dust-induced mechanical failures.

SDS are not new phenomena – some regions of the world have long been exposed to SDS hazards. SDS events typically originate in low-latitude drylands and subhumid areas where vegetation cover is sparse or absent. They can also occur in other environments, including agricultural and high-latitude areas in humid regions, when specific wind and atmospheric conditions coincide.

SDS events can have substantial transboundary impacts, over thousands of kilometres. Unified and coherent global and regional policy responses are needed, especially to address source mitigation, early warning systems, and monitoring.

SDS impacts are multi-faceted, cross-sectoral and transnational, directly affecting 11 of the 17 Sustainable Development Goals – yet global recognition of SDS as a hazard is generally low. The complexity and seasonally cumulative impact of SDS, coupled with limited data, are contributory factors. Insufficient information and assessments on these impacts hinder effective decision-making and planning to effectively address SDS sources and impacts.

SDS Response

The goal of SDS policy and planning is to reduce societal vulnerability by mitigating the effects of wind erosion. A multi-sectoral process bolstered by information-sharing involves short- and long-term interventions, engages multiple stakeholders, and raises awareness of SDS.

Source and impact mitigation activities are part of a comprehensive approach to manage the risks posed by SDS, from local to regional and global scales. Local communities in source areas are directly affected and will need to take very different actions to those impacted thousands of kilometres away. Engagement and participation of all stakeholders is crucial to effective SDS decision-making and policy, underpinned by up-to-date scientific knowledge.

Source mitigation: Land restoration, using soil and water management practices to protect soils and increase vegetative cover, can significantly reduce the extent and vulnerability of source areas, and reduce the intensity of typical SDS events. Such techniques are also vital for land degradation neutrality and when integrated into sustainable development and land-use priorities, will contribute to food security, poverty alleviation, gender equality and community cohesion as well as SDS mitigation goals.

Early warning and monitoring: Any effective SDS early warning system demands a whole-of-community approach. Building on up-to-date risk knowledge, monitoring, and forecasting, all stakeholders (including at-risk populations) should participate to ensure that warnings are provided in a timely and targeted manner, and that sector-appropriate actions are taken to reduce or avoid impacts.

Impact mitigation: Preparedness reduces vulnerability, increases resilience, and enables a timely and effective response to SDS events. It involves individuals, communities and organizations as well as industry and businesses. An effective preparedness strategy includes mitigation measures and protective actions informed by robust science, vulnerability analyses, and risk assessments.

Cooperation, collaboration and coordination: The United Nations Coalition on Combating Sand and Dust Storms was launched in September 2019 and has five working groups: adaptation and mitigation; forecasting and early warning; health and safety; policy and governance; and mediation and regional collaboration. The United Nations Coalition will help leverage a global response to SDS through collaboration and cooperation from local to global levels, making the issue more visible, enhancing knowledge-sharing, and mobilizing resources to upgrade existing efforts.

“The Sand and Dust Storms Compendium: Information and Guidance on Assessing and Addressing the Risks” is a collaborative publication led by the Secretariat of the United Nations Convention to Combat Desertification (UNCCD) in partnership with the UNCCD Science-Policy Interface (SPI), the World Meteorological Organization (WMO), the World Health Organization (WHO), the United Nations Environment Programme (UNEP), UN Women, the Food and Agriculture Organization of the United Nations (FAO), the United Nations Office for Disaster Risk Reduction (UNDRR), the United Nations Development Programme (UNDP) and external experts and partners. The [SDS Compendium](#) and [Summary for Decision Makers](#) are available now, along with an interactive toolbox.



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