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Enhancing Management, Adaptation, Resilience, and Strengthening Mitigation Strategies Against Sand and Dust Storms (SDS) in the Islamic Republic of Iran

May 2025

Project Information:

Funding: USD 304,000 (Co-funded through Government Cost Sharing and UNDP)
Duration: January 2023 to December 2025
Implementing Agencies / Partners: Department of Environment

Background:

The World Meteorological Organization defines a sand and dust storm (SDS) as a phenomenon where strong winds lift sand and dust from dry soils into the atmosphere, transporting particles over vast distances. Around 2,000 million tons of dust enter the atmosphere annually, affecting 330 million people and posing environmental, economic, and health risks. While some emissions are natural, unsustainable land and water management worsens the issue. Advances in monitoring and forecasting strengthen early warnings and mitigate impacts.

Iran faces significant environmental, economic, and health challenges from SDS, which originate from both internal and external sources.

Internal dust hotspots span over 5 million hectares across 23 provinces, while external sources primarily affect Iran through transboundary movements from neighboring countries.

SDS contributes to land degradation, water scarcity, biodiversity loss, public health risks, economic damages to agriculture and infrastructure, and social challenges such as migration.

Effectively addressing SDS requires integrated, sustainable, and multisectoral strategies focused on prevention, mitigation, adaptation, and regional cooperation.

Objectives:

- Enhance Iran's capacity to manage, adapt to, and mitigate the impacts of SDS.
- Strengthen national mechanisms for SDS forecasting, early warning, mitigation, and adaptation.
- Improve technical assistance to enhance SDS forecasting, early warning capacities, and impact assessment.

- Enhance knowledge and understanding of feasible SDS mitigation and adaptation measures.
- Improve inter-sectoral and sub-regional coordination and cooperation on SDS mitigation and adaptation.
- Support sustainable land management, ecosystem restoration, and community resilience to SDS impacts.

Challenges:

- Increasing intensity and frequency of SDS events due to both internal and external drivers, including land degradation, climate change, and cross-border factors.
- Severe impacts on human health, agriculture, biodiversity, and key economic sectors such as transportation sector, exacerbating existing vulnerabilities.
- Lack of regional institutions, mechanisms and intergovernmental coordination, particularly in addressing the challenges of transboundary SDS phenomena.
- Degradation of wetlands and protected areas leading to significant ecological imbalances and reduced natural resilience.
- Lack of integrated early warning systems and limited capacity for coordinated transboundary SDS monitoring and management.
- The need for more effective institutional and technical frameworks for effective and timely SDS response and coordinated management.

Key Components:

1. Development and strengthening of SDS forecasting, monitoring, and early warning systems within the Department of Environment and Iran's Meteorological Organization.
2. Promotion of sustainable land and water management practices among national stakeholders to reduce dust emissions.
3. Capacity building for local communities living in vulnerable areas affected by SDS, as well as for government institutions and technical personnel.
4. Public awareness raising and implementing educational campaigns on SDS impacts and mitigation.
5. Strengthening regional cooperation through information sharing and technical collaboration on SDS management.

Expected Outcomes:

- Strengthened SDS forecasting, monitoring, and early warning systems in Iran.
- Adoption of effective and sustainable SDS mitigation and adaptation measures.
- Strengthened institutional coordination and capacity for SDS management at national and sub-national levels.
- Increased public awareness and resilience to SDS impacts.
- Enhanced regional collaboration and knowledge exchange on SDS management.

Results to Date:

- **Improved SDS forecasting readiness:** National SDS modeling capacity was strengthened through the procurement of high-performance computing equipment, enabling more accurate forecasts. Additionally, a comprehensive proposal established the groundwork for a national and regional SDS forecasting and early warning center, paving the way for enhanced prediction and preparedness against SDS impacts.
- **Technical assessments completed in Khuzestan and Ilam provinces:** In Khuzestan and Ilam provinces, technical assessments surveyed over 10,000 hectares, leading to the finalization of site-specific plans. These integrate key land stabilization measures: windbreaks, sediment traps, vegetation planting, and fencing to mitigate SDS impacts. Additionally, the assessments

produced a comprehensive implementation map, ensuring strategic execution of environmental protection initiatives in the region.

- **Preparatory work initiated in Semnan and Yazd provinces:** In Semnan and Yazd provinces, pilot site selection is underway, informed by technical assessments, expert consultations, regional relevance, and feasibility, laying the foundation for targeted mitigation efforts.
- **Analysis of options for establishing a sub-regional fund to combat SDS:** The proposal for establishing a regional fund to combat SDS was informed by a feasibility study assessing financial viability, governance, and regional needs. A draft constitution outlining operational frameworks was also developed, providing a basis for future joint financing and coordinated regional action in SDS mitigation and resilience.
- **Public awareness materials produced and outreach initiated:** Public awareness efforts were launched with the development of multimedia tools, including motion graphics and infographics, to enhance understanding of SDS risks and promote community-level engagement. Stakeholder consultations and provincial involvement were initiated to support long-term behavior change and policy adoption.

CPD Outputs:

This initiative supports the following outcome of UNDP Country Programme Document (CPD) in Iran:

CPD 2023-2027: Outcome 3.2: “By 2027, environmental conservation and integrated natural resource management are enhanced, and the capacity to address climate change challenges is strengthened.”