Global Assessment of Sand and Dust Storms

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International Workshop on
Meteorology, Sand and Dust Storms, Combating Desertification and Erosion
4-7 October 2016, Istanbul, Republic of Turkey

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Global calls for action

2007: 14th WMO Congress endorsed Sand and Dust Storm Warning Advisory and Assessment System (SDS-WAS)

2013: G77 and China Ministerial Declaration (A/68/595)

2015: UNGA Resolution (A/RES/70/195)

2016: UNEA-2 Resolution (2/21)

Impacts

Health

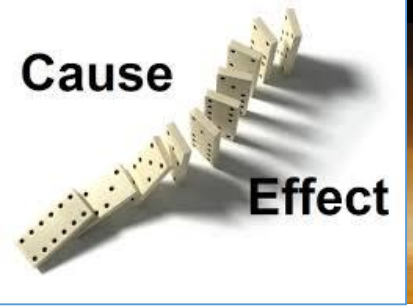
Agriculture

Infrastructure

Transport

Objectives

1. Synthesise and highlight the environmental and socio-economic causes and impacts of SDS, as well as available technical measures for their mitigation, at the local, regional and global levels.
2. Show how the mitigation of SDS can yield multiple sustainable development benefits.
3. Synthesize information on current policy responses for mitigating SDS.
4. Present options for an improved strategy for mitigating SDS at the local, regional and global levels, building on existing institutions and agreements.



Drivers

- About 75% of current global dust emissions come from natural sources and 25% from anthropogenic sources.
- Natural sources are topographic depressions in arid regions; dry ancient lake beds with little vegetation cover.
- Anthropogenic sources mainly (85%) from hydrologic sources (ephemeral water bodies).
- The dominance of natural sources, coupled with a growing risk of increased anthropogenic contributions, has important implications for SDS mitigation strategies.

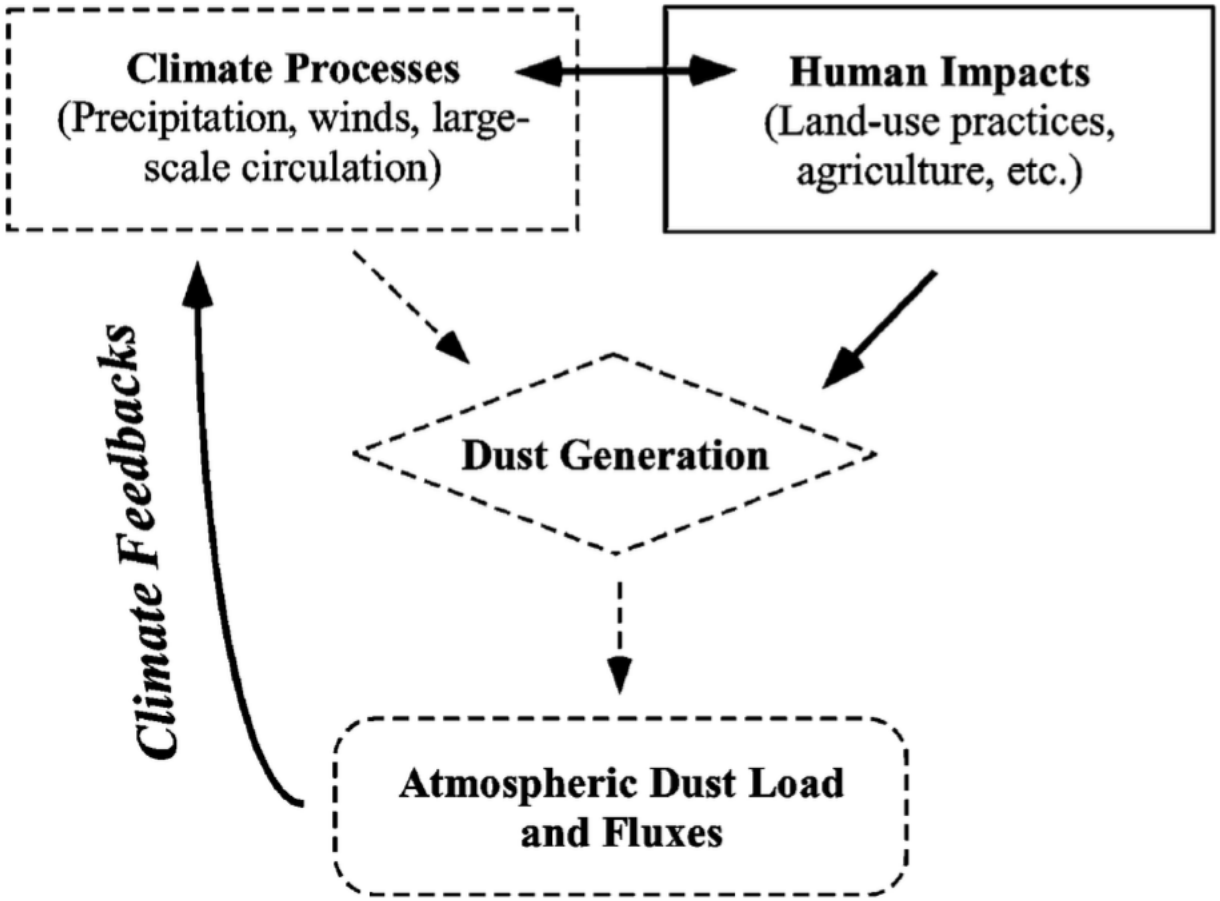
Natural ecosystems

- Most major dust sources inland drainage basins in arid areas.
- SDS risks increased by removal of vegetation, loss of biodiversity, and disturbance of the sediment or soil surface (e.g., through destruction of biological crusts by vehicles)

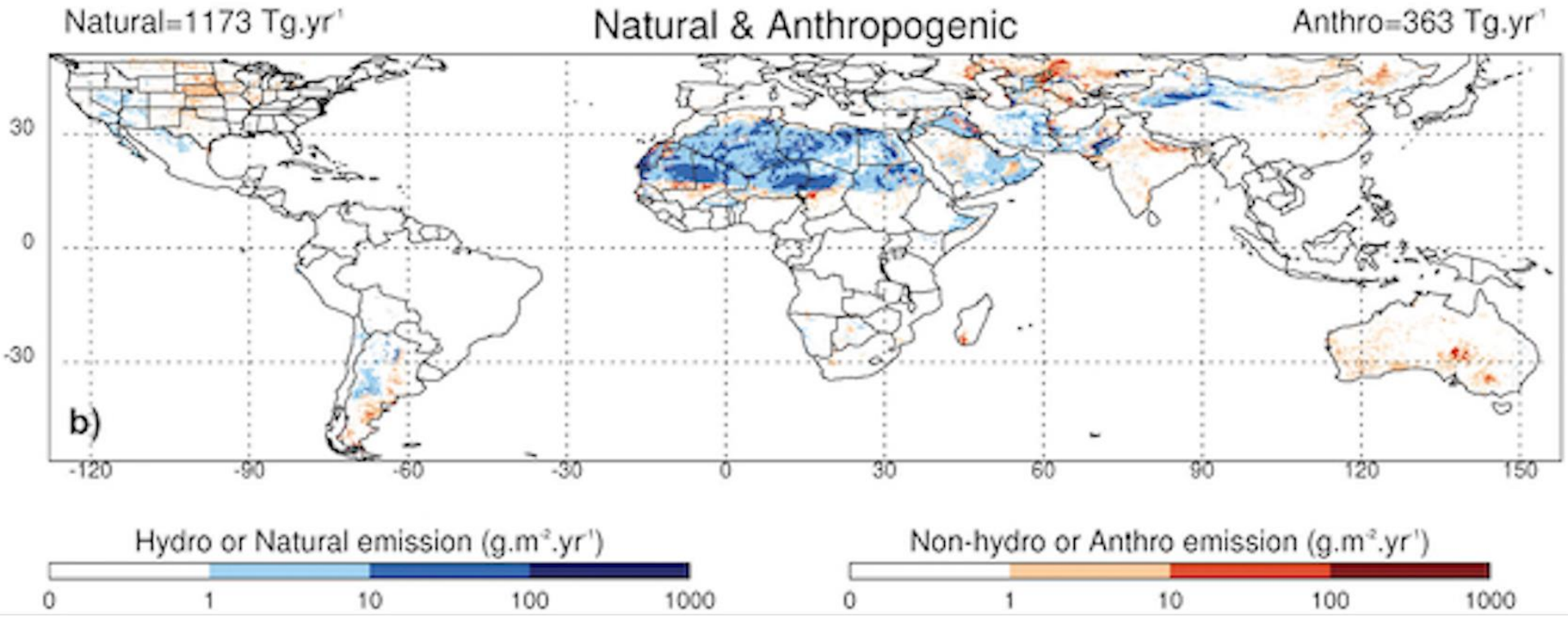
Human-dominated ecosystems

- Hydrological changes to ephemeral lakes (playas), driven by demand for water
- Unsustainable land use in semi-arid agricultural areas
- Dust bowls when combine with prolonged drought periods

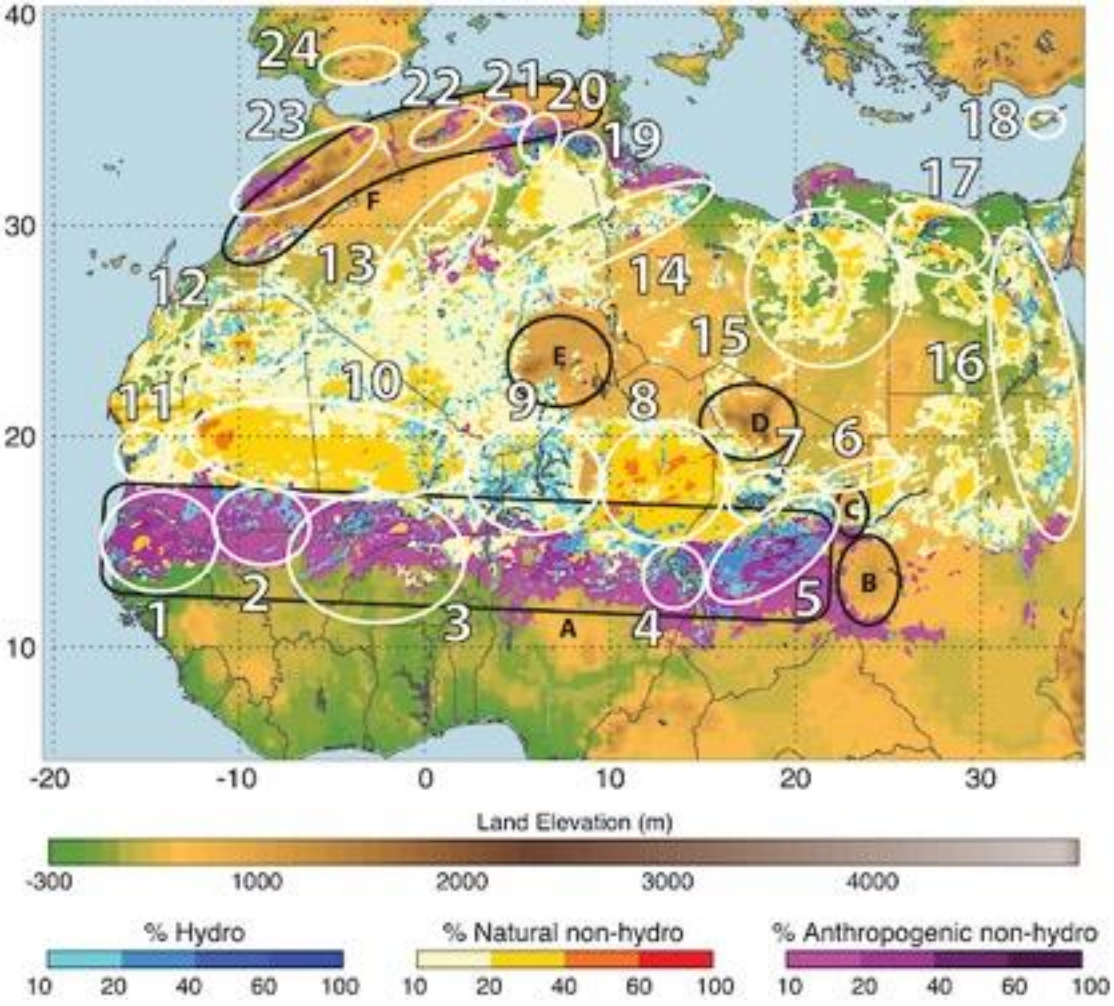
Climate change



State



Ginoux *et al.* (2012).



West & North Africa

Ginoux *et al.* (2012).

Trends

- Global annual dust emissions increased by 25% - 50% over the last century
- No changes over North Africa, the Middle East and South America over last three decades
- Major changes in US high plains, central Asia and Australia
- Dusty regions likely to be drier: Mediterranean areas of Europe and Africa, northern Sahara, central and west Asia, southwest USA, and southern Australia
- Dusty regions likely to be wetter: eastern Africa and east Asia

Environmental impacts

Dust has both positive and negative environmental impacts:

- Effects radiative balance and climate – can intensify droughts
- Can also enhance precipitation by aiding rain droplets
- Provides nutrients to terrestrial ecosystems and oceans, boosting primary productivity and affects the carbon cycle
- Saharan dust fertilizes the Amazon rainforest; Central Asia dust fertilizes Hawaiian rain forests
- Africa and Asia dust may have harmful effects on coral reefs in the Americas.

Health impacts

Dust causes numerous human health problems globally:

- Causes or aggravates asthma, bronchitis, lung damage
- Chronic exposure cause of premature death: cardio-vascular and respiratory disease, lung cancer, and acute lower respiratory infections.
- Fine dust carries a range of pollutants, spores, bacteria, fungi, and potential allergens.
- Causes eye infections, skin irritations, Valley fever; injuries and mortality from transport accidents.
- In Sahel strong correlation with meningitis outbreaks.

Economic impacts

Wide ranging economic impacts, both immediate and long-term:

Short-term costs:

- Crop damage, livestock mortality, infrastructure damage, transport and communications disruption, costs of clearing sand and dust.

Longer-term costs:

- Soil erosion and reduced soil quality, soil pollution through deposition of pollutants, and disruption of global climate regulation.
- Economic losses from a single event can be in the order of hundreds of million dollars, but benefits rarely quantified.

Framework for policy action

1. Reduce anthropogenic emissions

- Sustainable land, water & landscape management
- Climate change mitigation and adaptation

Conservation farming

Windbreaks in crop land - agroforestry

Protect watersheds


2. Physical protection of assets

- Windbreaks around urban areas, along roads and other infrastructure
- Sand dune fixation with vegetation or chemical substances
- Alignment of roads, removal of obstacles to wind and land shaping

Sand dune stabilisation

Vegetation establishment

Spraying emulsion

Desert green economy – Kubuqi, China

UNEP, 2015

3. Monitoring, prediction and warning systems

- Monitoring of SDS through ground networks of meteorological and air quality monitoring stations, and combined use of satellite data
- SDS forecasting and early warning systems, including mapping of trends and future scenarios of anthropogenic dust sources

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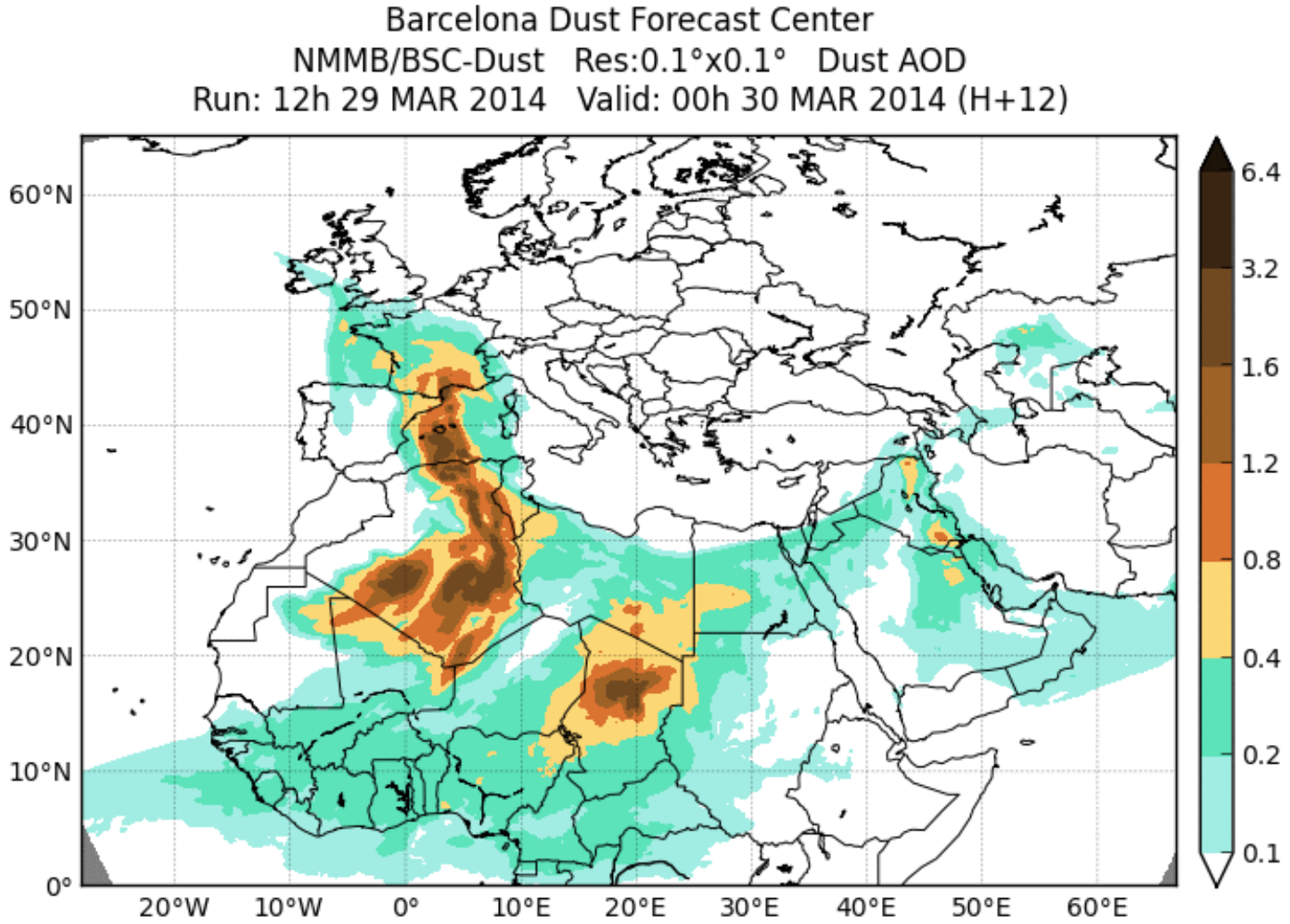


4. Preparedness and emergency response procedures

- Preparedness and emergency procedures for coping with SDS events (e.g., for airport, rail and road closures; hospital emergency services; advisory communications to public services)
- Public awareness of SDS risks (via education, media and social networks and telecommunication) and emergency procedures
- Mainstreaming SDS into disaster risk reduction and emergency response measures

5. Policies, legal frameworks and action plans

- International environmental law (e.g., Rio Conventions; SDG Target 15.3 on Land Degradation Neutrality) and initiatives (e.g., SDS-WAS)
- Regional frameworks, agreements and action plans
- National action plans

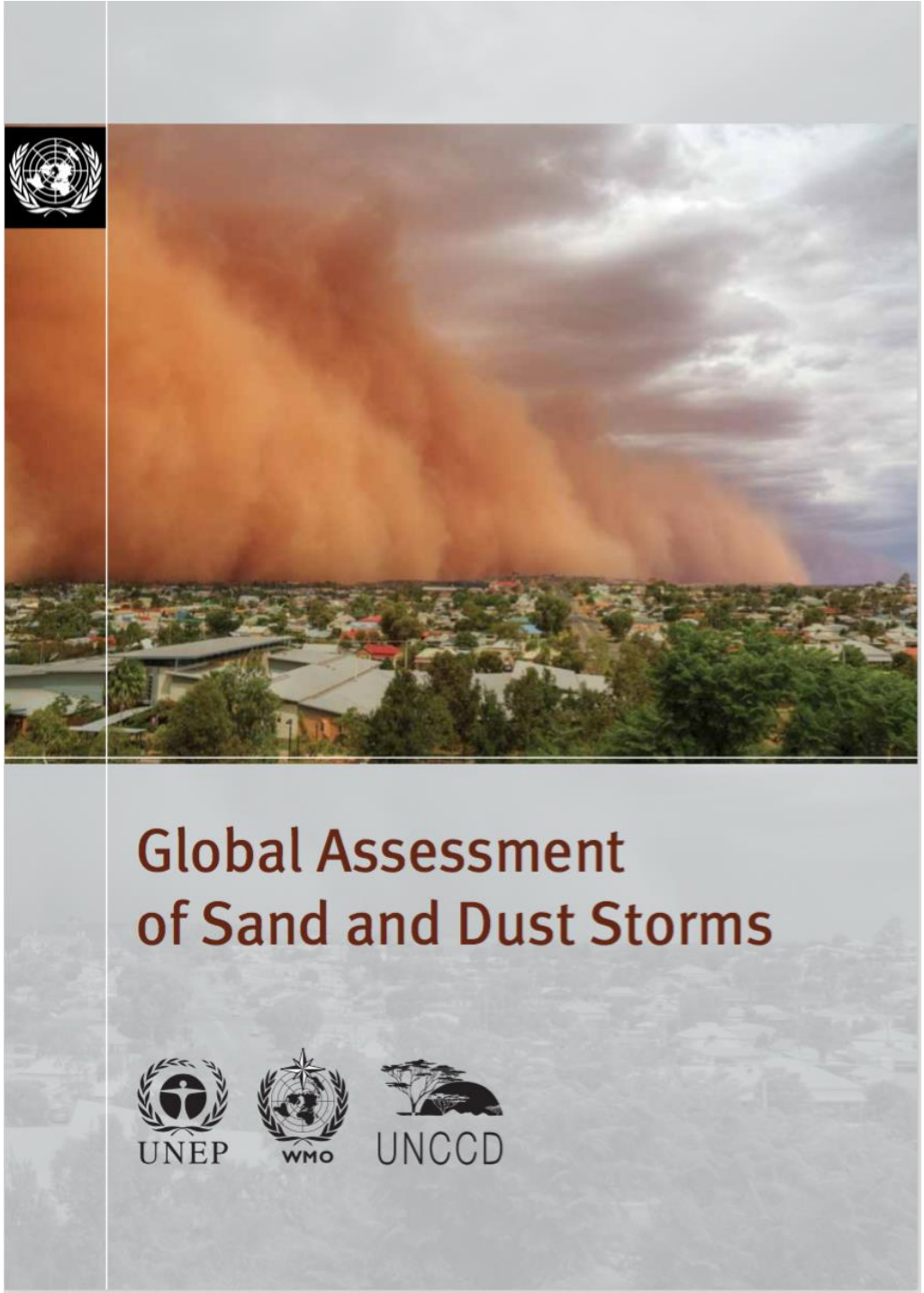
6. Research to reduce critical uncertainties

- Improved knowledge on the interaction of dust with biogeochemical global systems and climate systems
- Improved methods for monitoring, prediction and early warning systems
- Assessing the impacts and costs of SDS at local to global scales

A global policy response

A global SDS virtual centre involving SDS-WAS and other UN Agencies, and interested countries:

- a global scientific initiative
- a platform for early warning and resilience
- a global platform for policy dialogue and coordination



http://uneplive.unep.org

Looking forward to a greener, less dusty future!

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