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Contributing to a broader understanding of climate-related disaster risk through information management, the case of sand and dust storms in Asia and the Pacific

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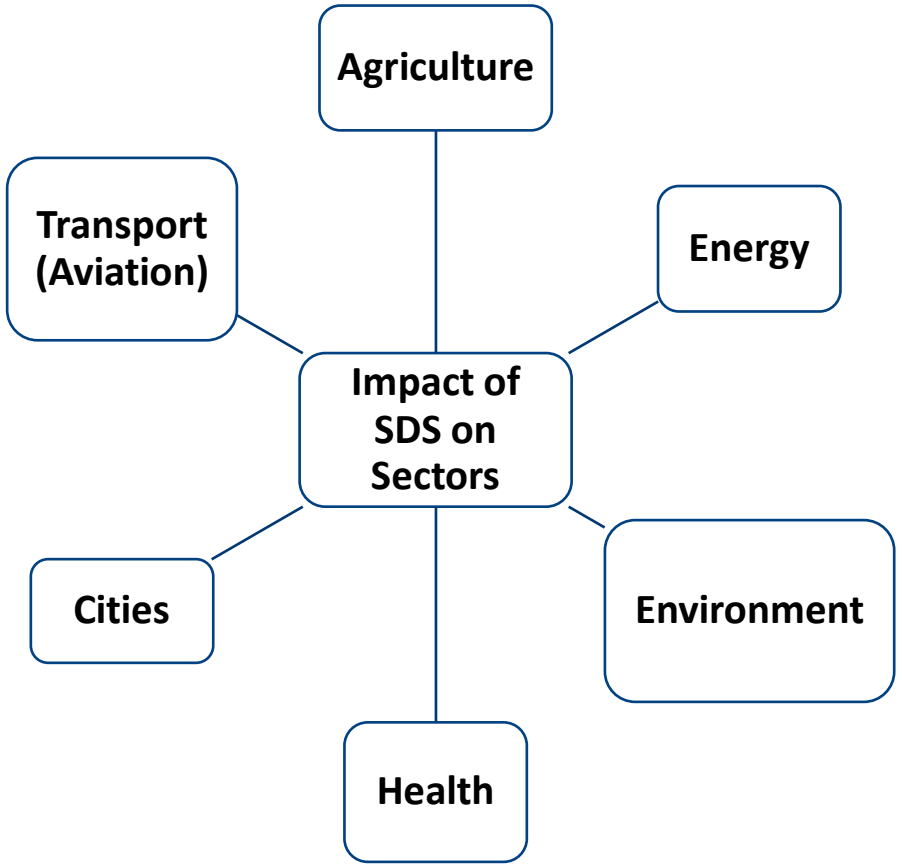
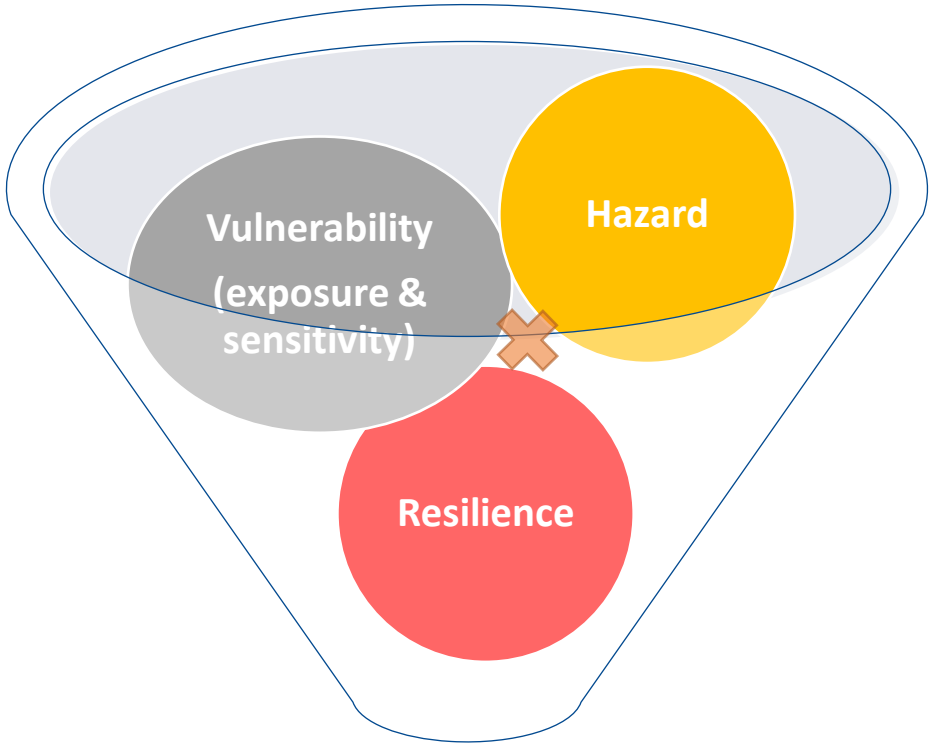
Photo: ©Robert Klarich, iSee iHear

Methodology

Sectors Covered in the Risk Assessment



Concept of Risk in the Assessment



SDS Risk

Data Sources

Hazard

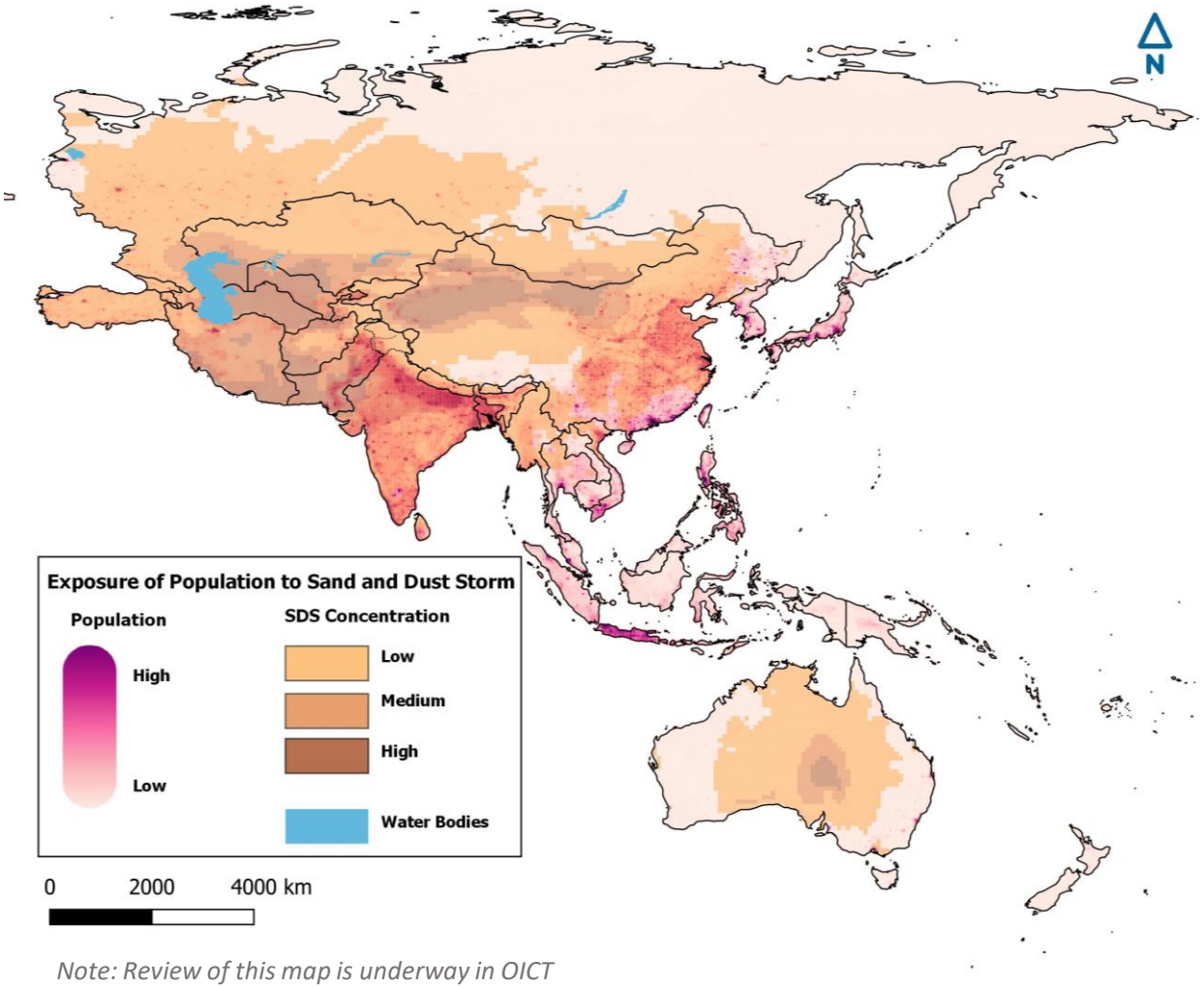
- MERRA-2
- Resolution of 0.625°×0.5°
- From 1980-2019

Sectors

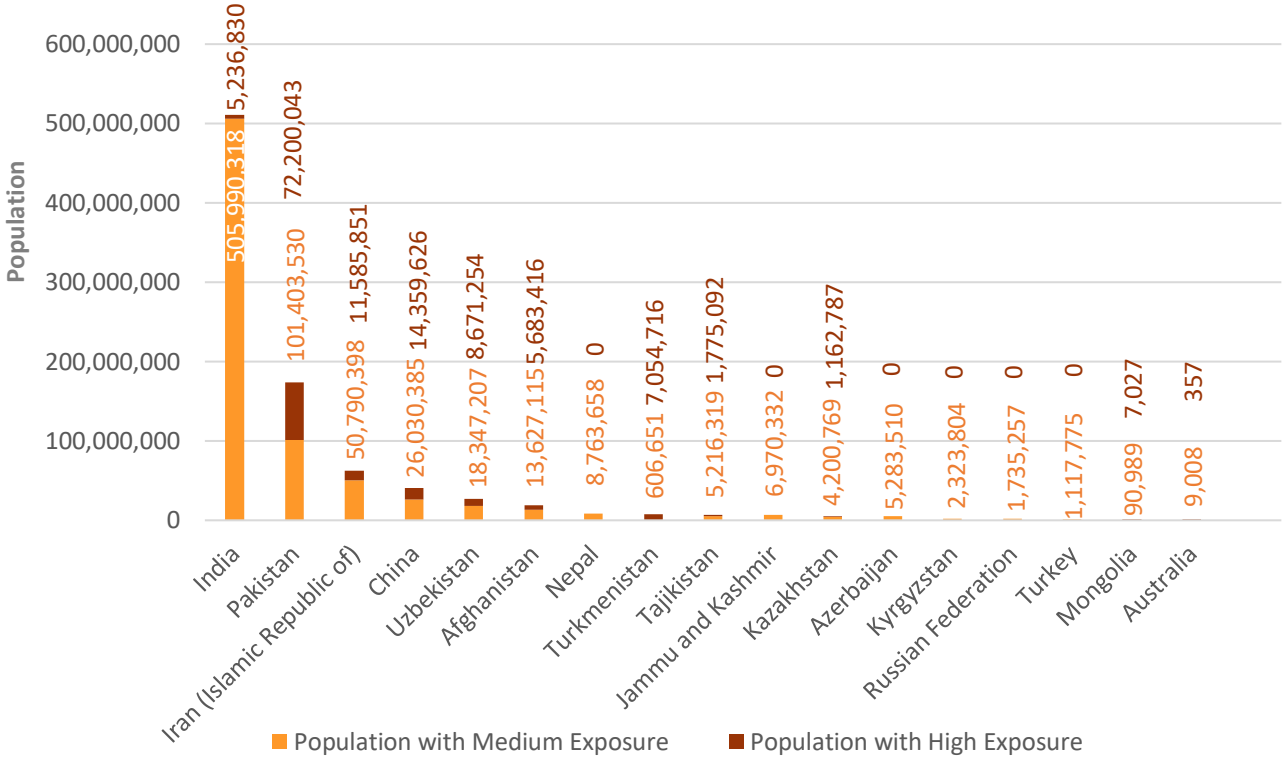
(exposure, sensitivity, resilience)

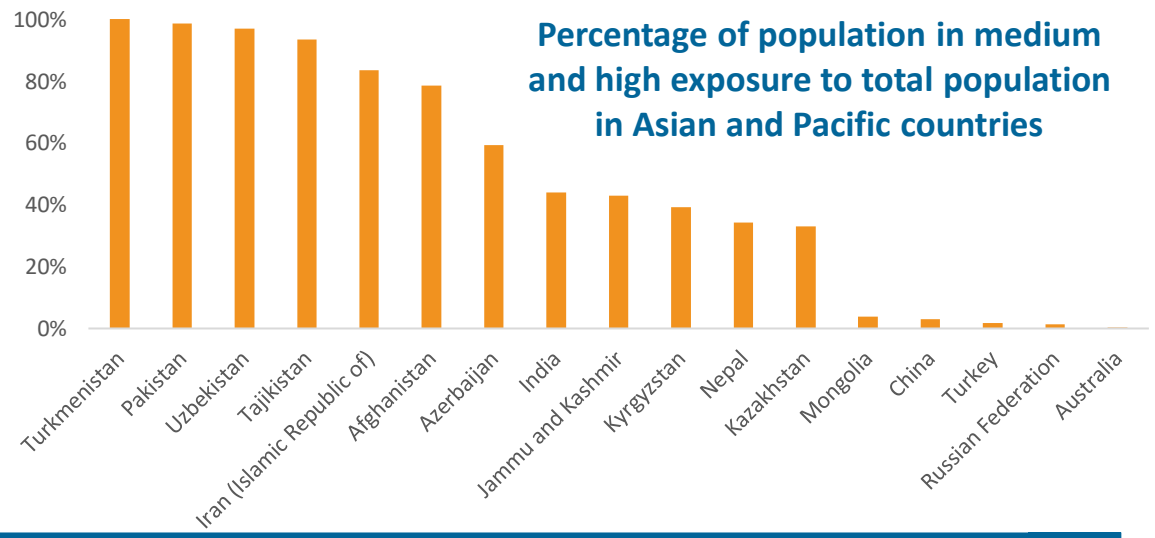
- **Agriculture** and **Environment**: Landcover map (GLCNMO-V3, MODIS-2013), Resolution of 15 arcseconds
- **Energy**, Solar powerplant database (location, capacity, etc), ESCAP, DustClim
- **Transport**, *Aviation*: FMI, IATA, DustClim
  Road: Asian Highway, ESCAP
- **Health**, WHO, SEDAC, UNDP, WB.
- **Cities**, UNDESA, 2020

Population at Risk



Note: Review of this map is underway in OICT





Percentage of population in medium and high exposure to total population in Asian and Pacific countries

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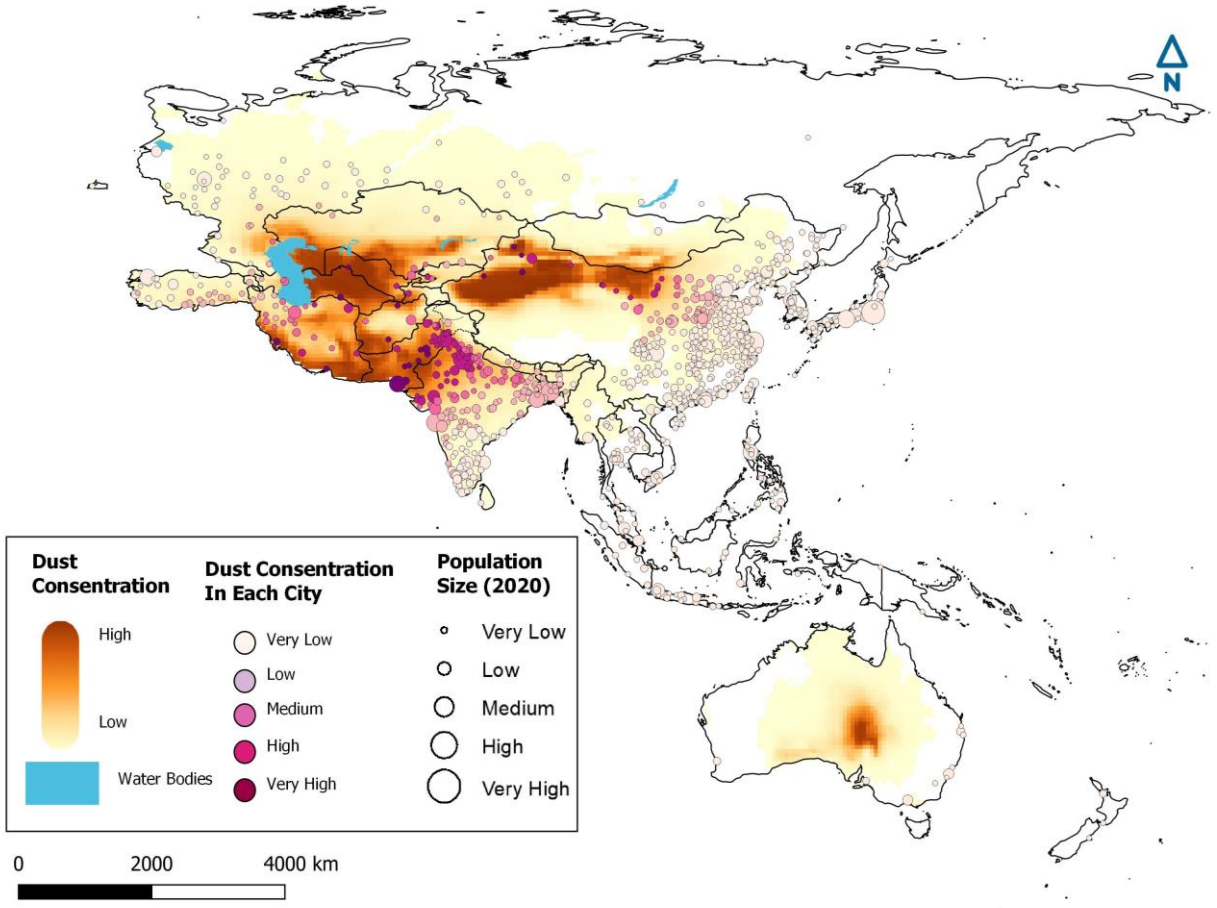
Dust exposure in cities with population higher than 300,000



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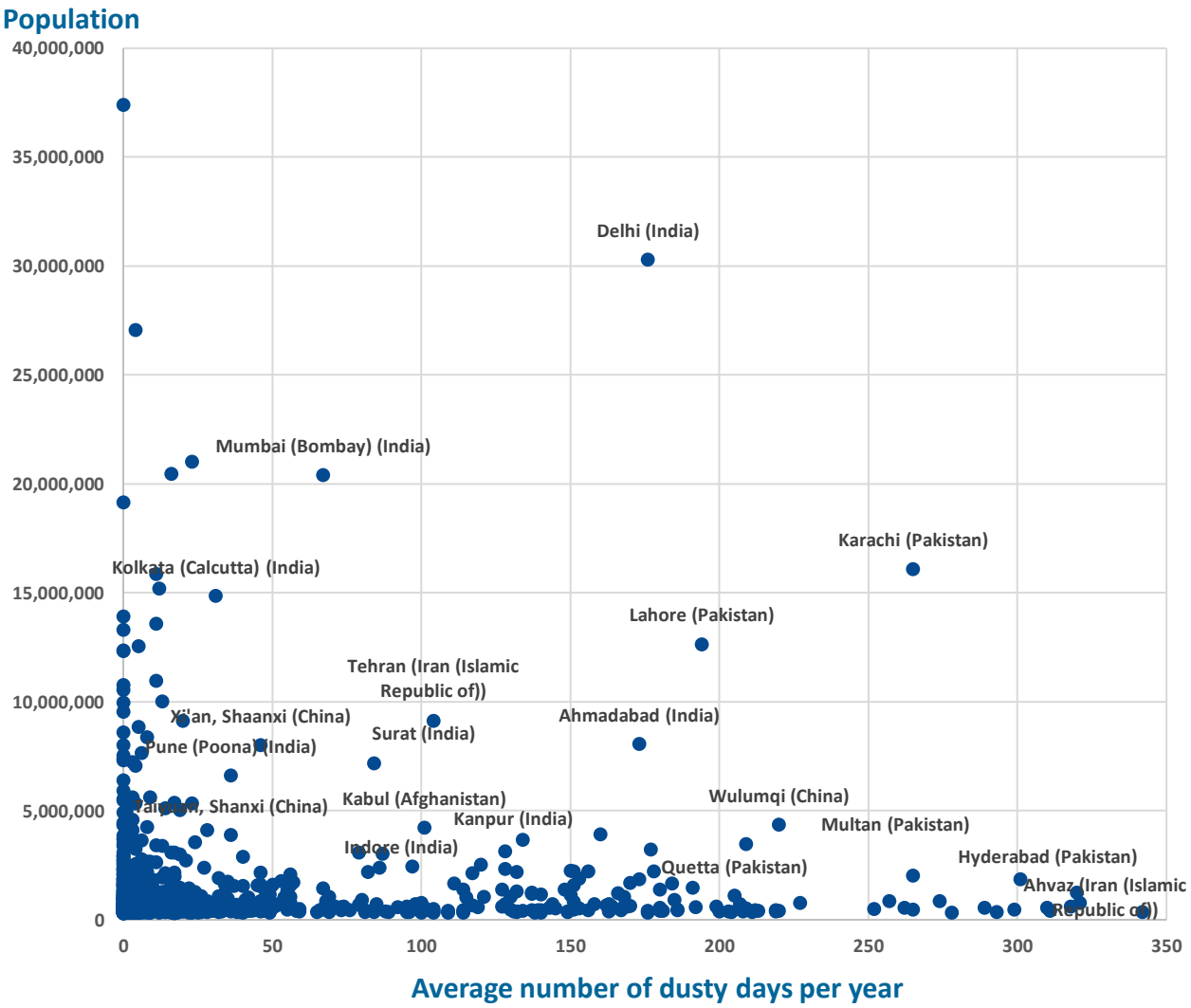
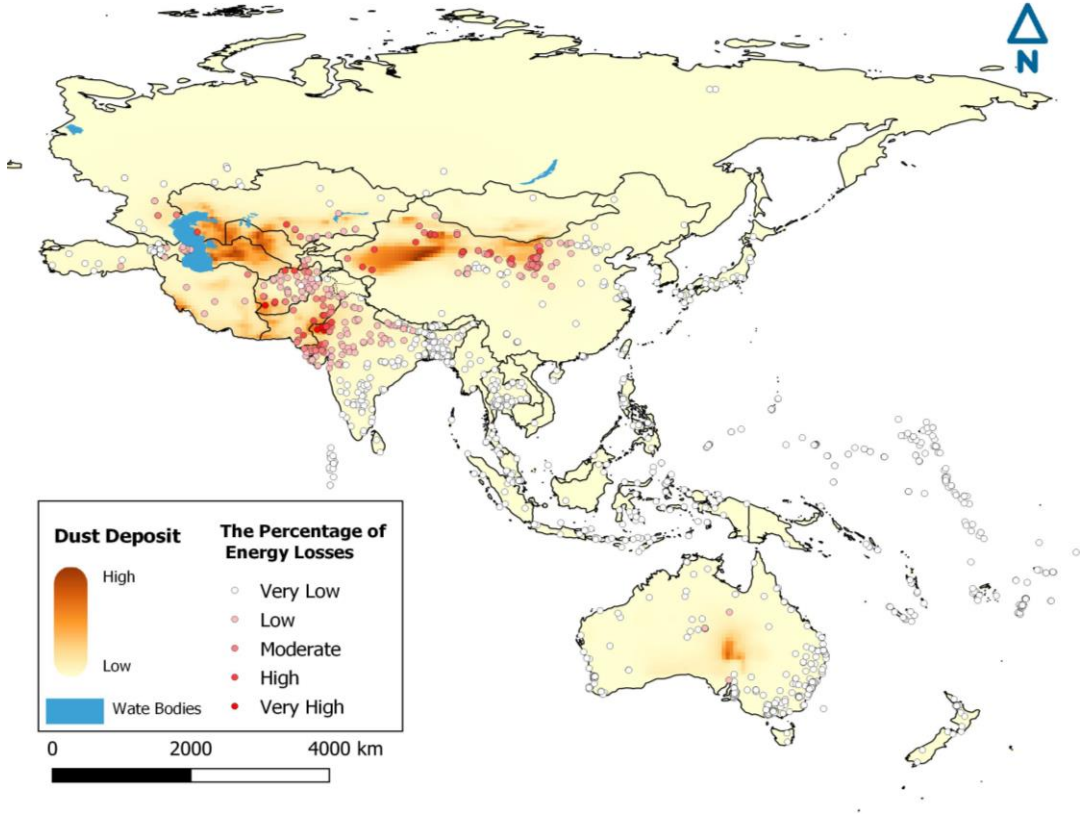
***days with dust concentration more than 50 µg/m3**



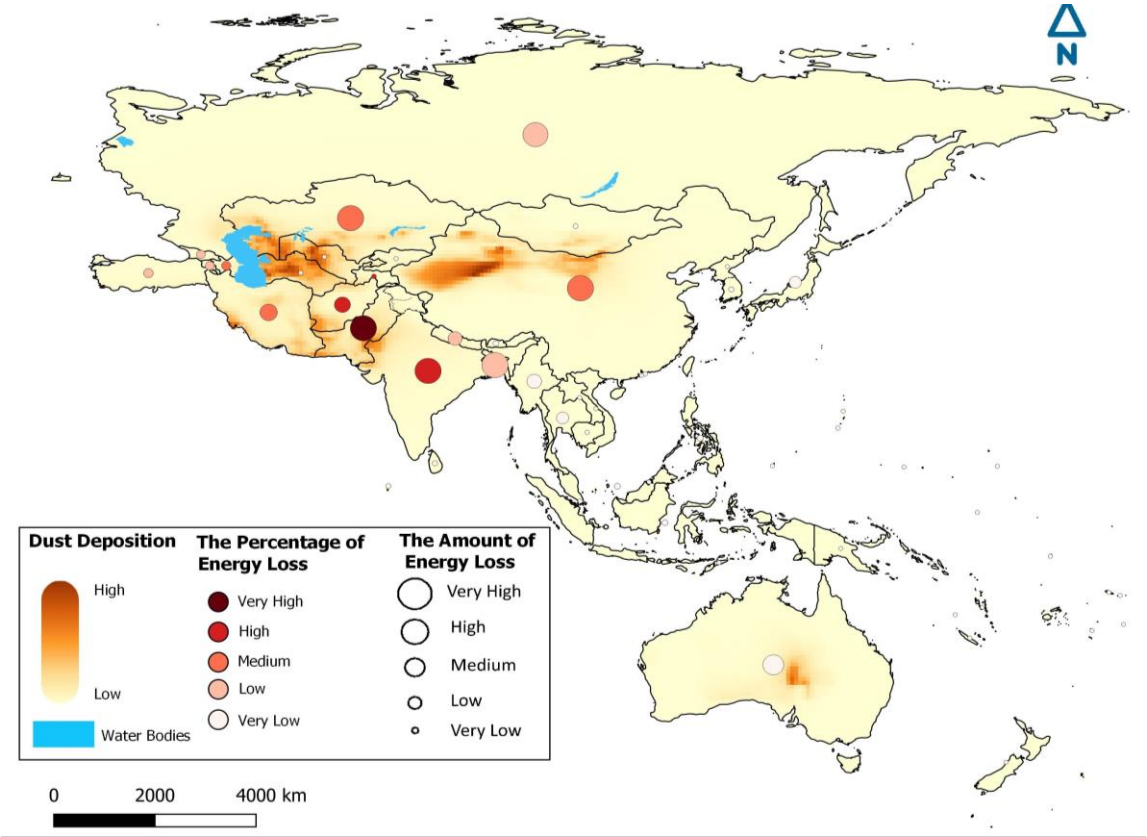
Exposure and Impact of SDS on Energy Sector (Solar)

Exposure of solar powerplants (circles on map) to dust (average deposited) and percentage of average energy loss due to dust deposition

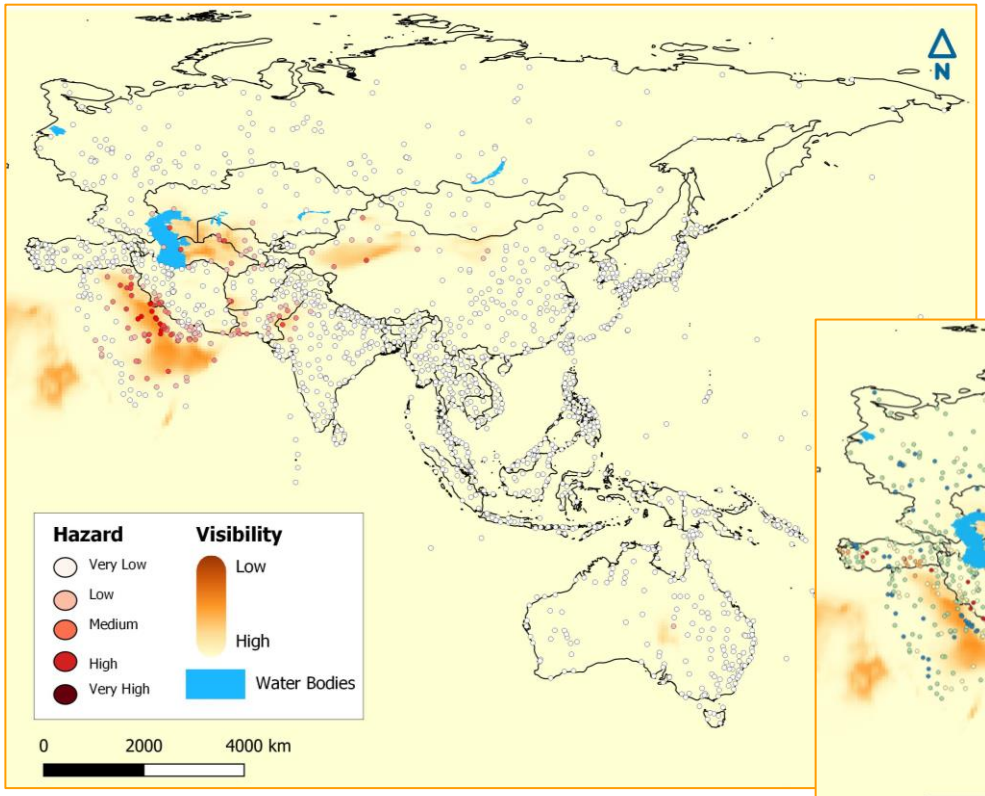


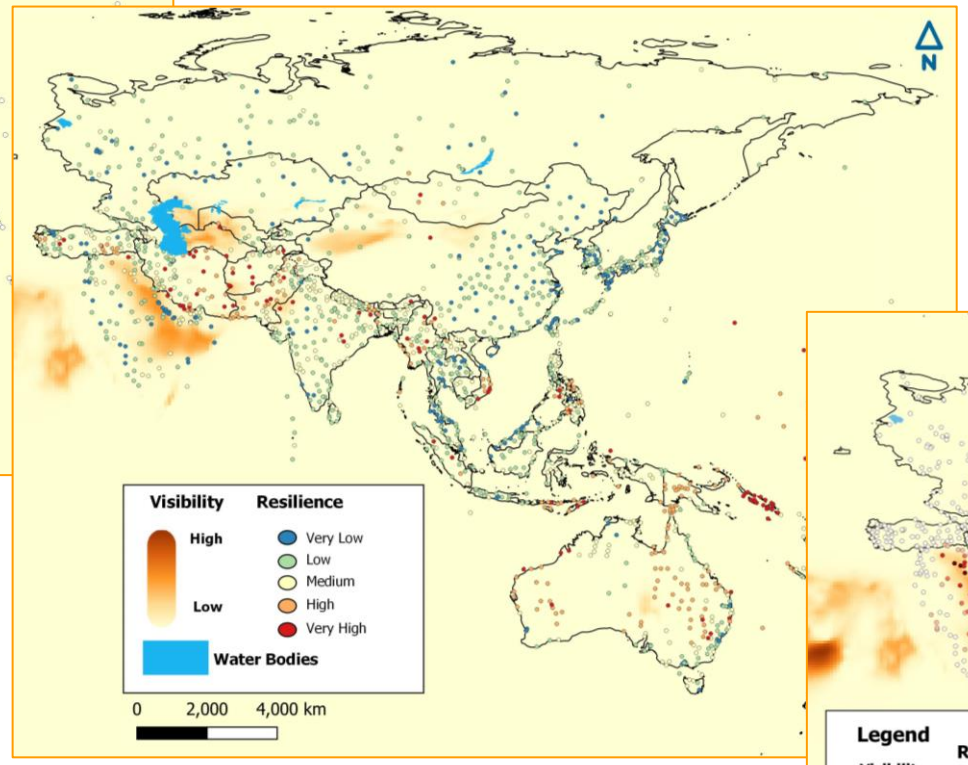
Note: Review of this map is underway in OICT

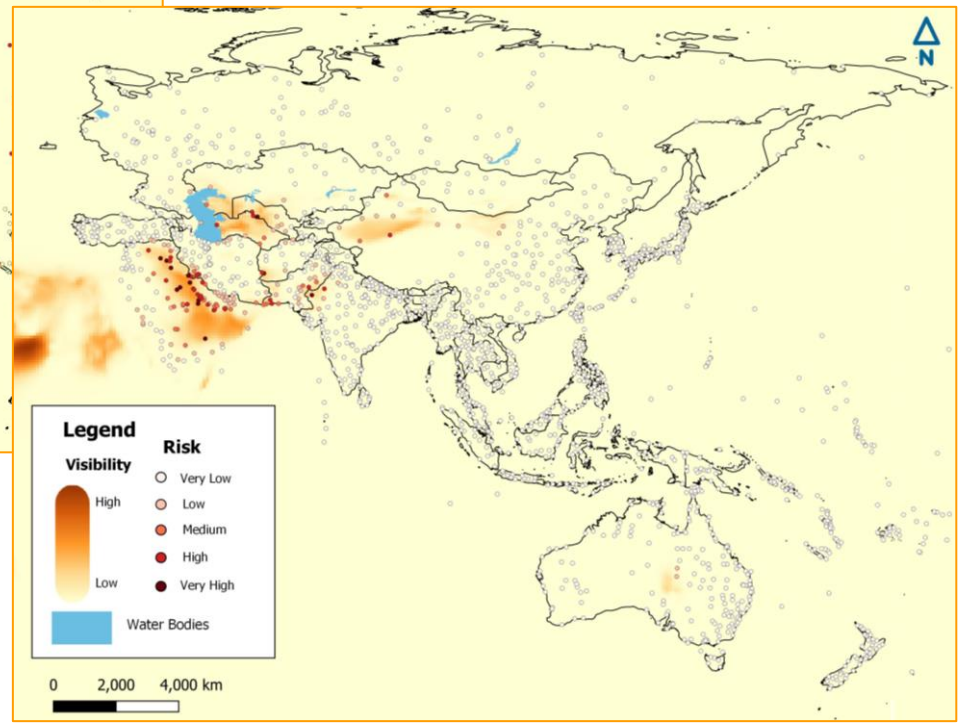
Amount of energy loss and percentage of energy loss in energy production of solar powerplants in Asia-Pacific countries



Risk in Aviation Sector Due to Lack of Visibility







The risk of flight delay and cancellation due to low visibility due to dust, considering dust concentration, exposure, and resilience.

Note: Review of this map is underway in OICT

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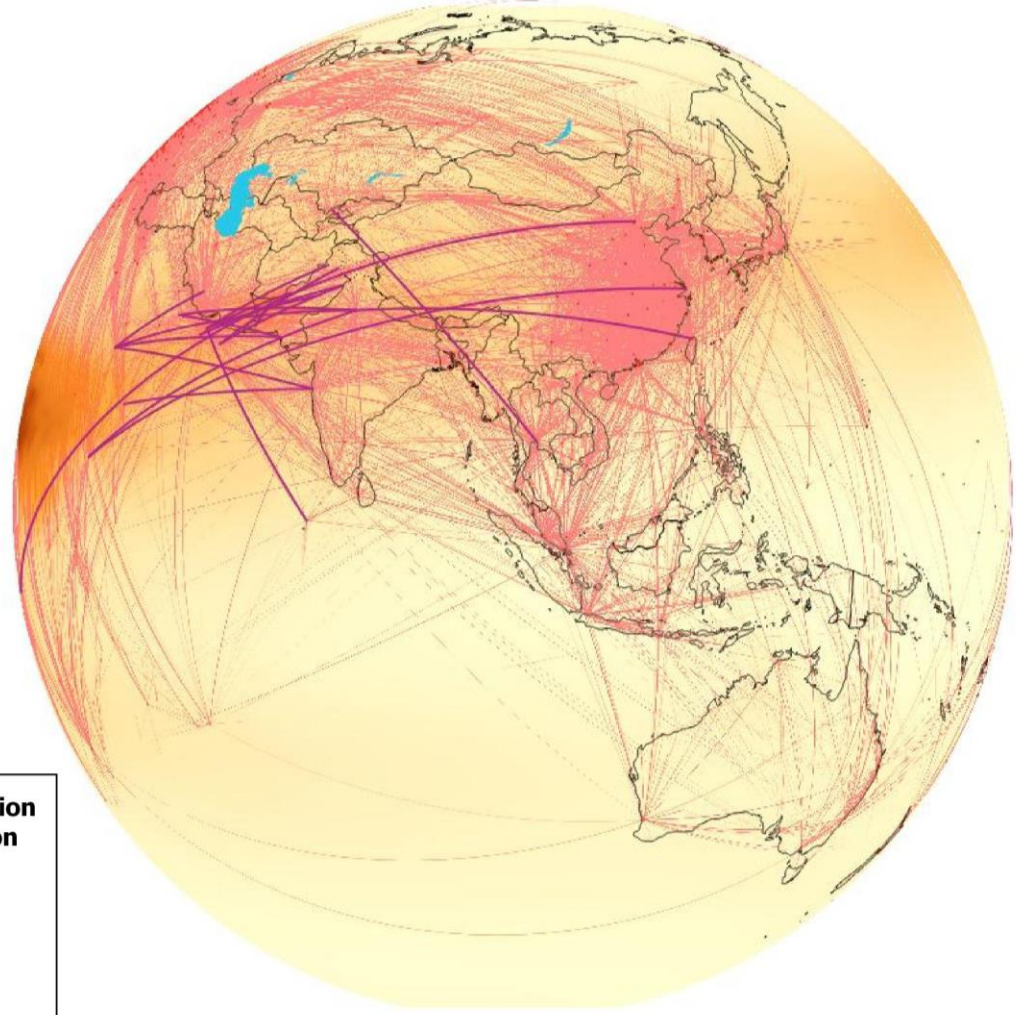
The flight paths with the high risk of erosion in aircraft engines due to dust concentration in the cruise elevation



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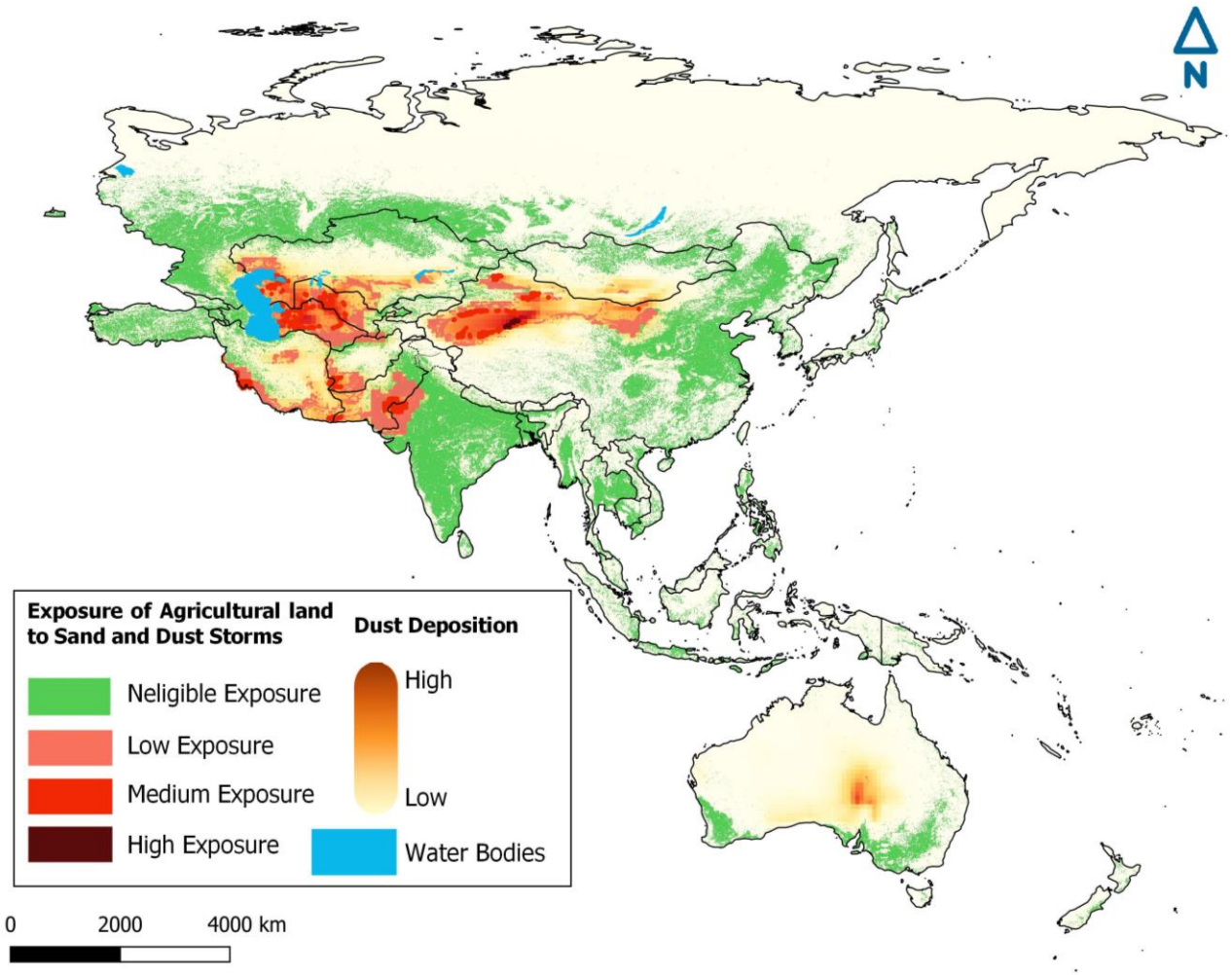
The exposure of agricultural land to average dust deposition (2019)



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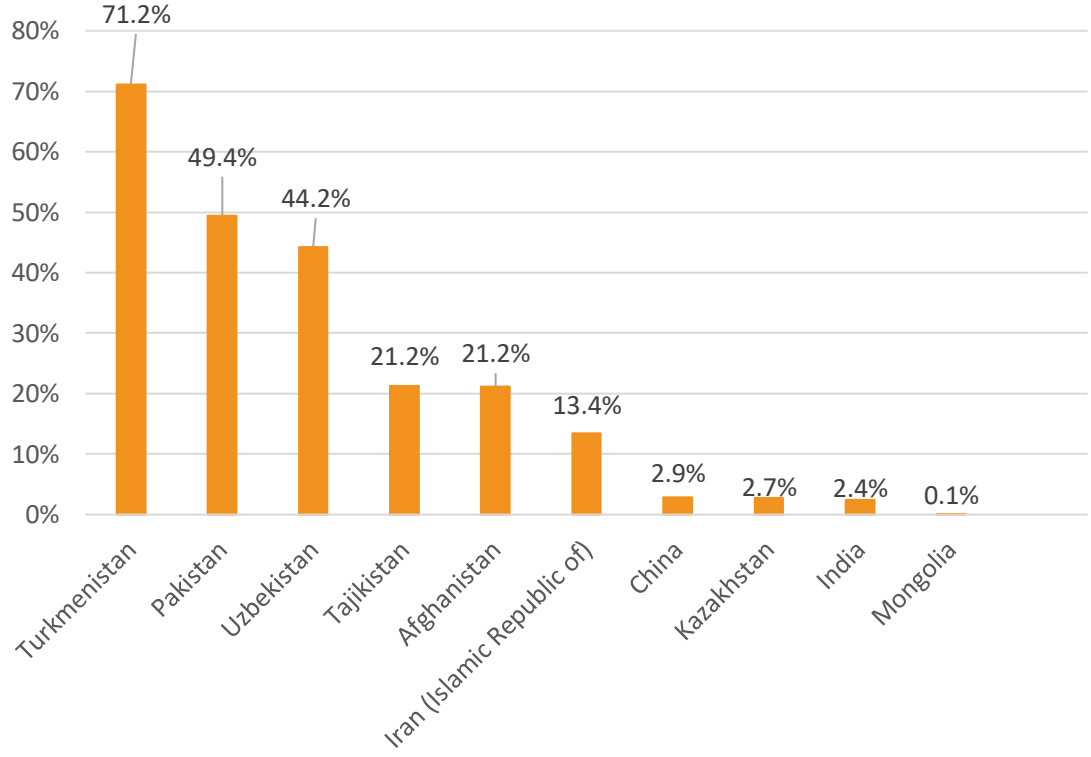
Percentage of Agricultural land exposed to sand and dust storms



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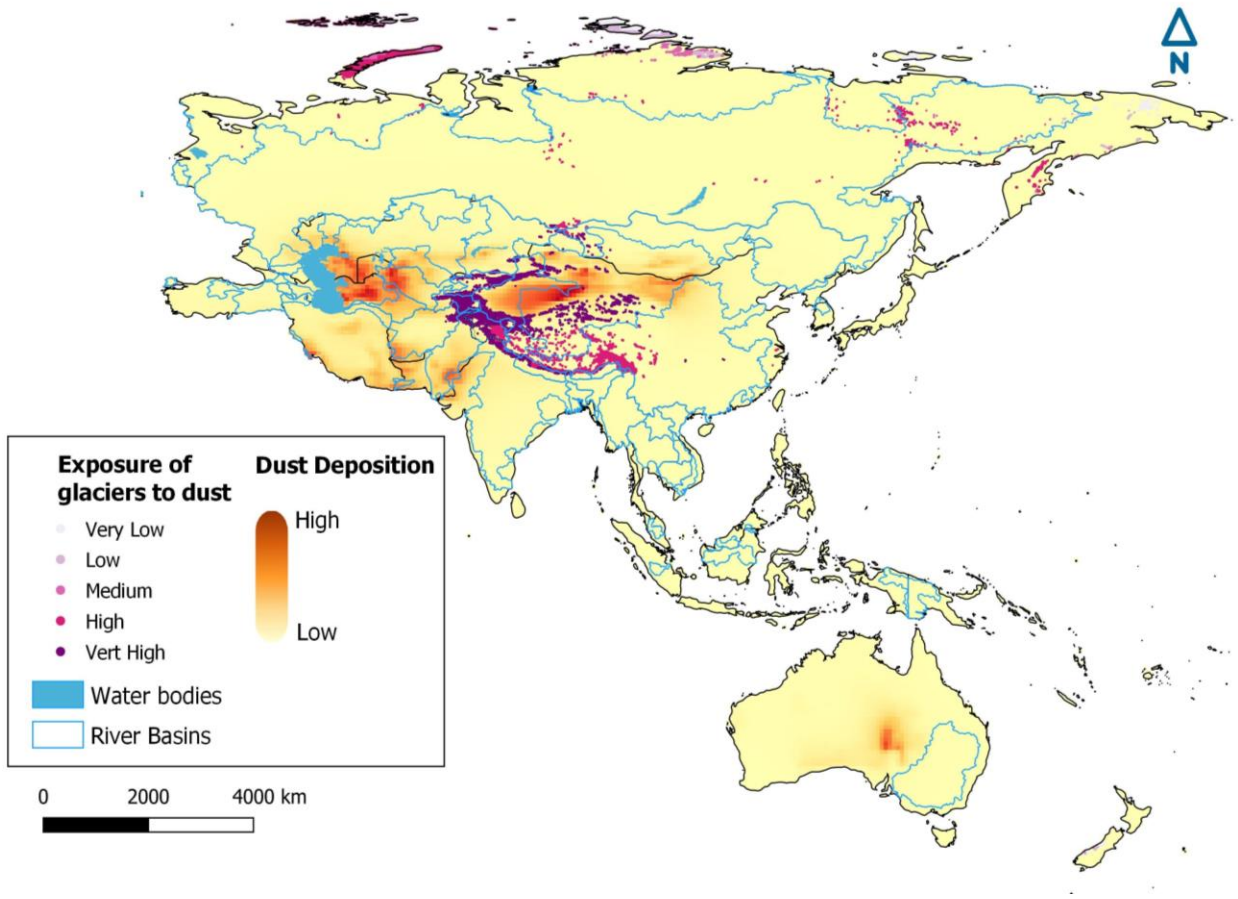
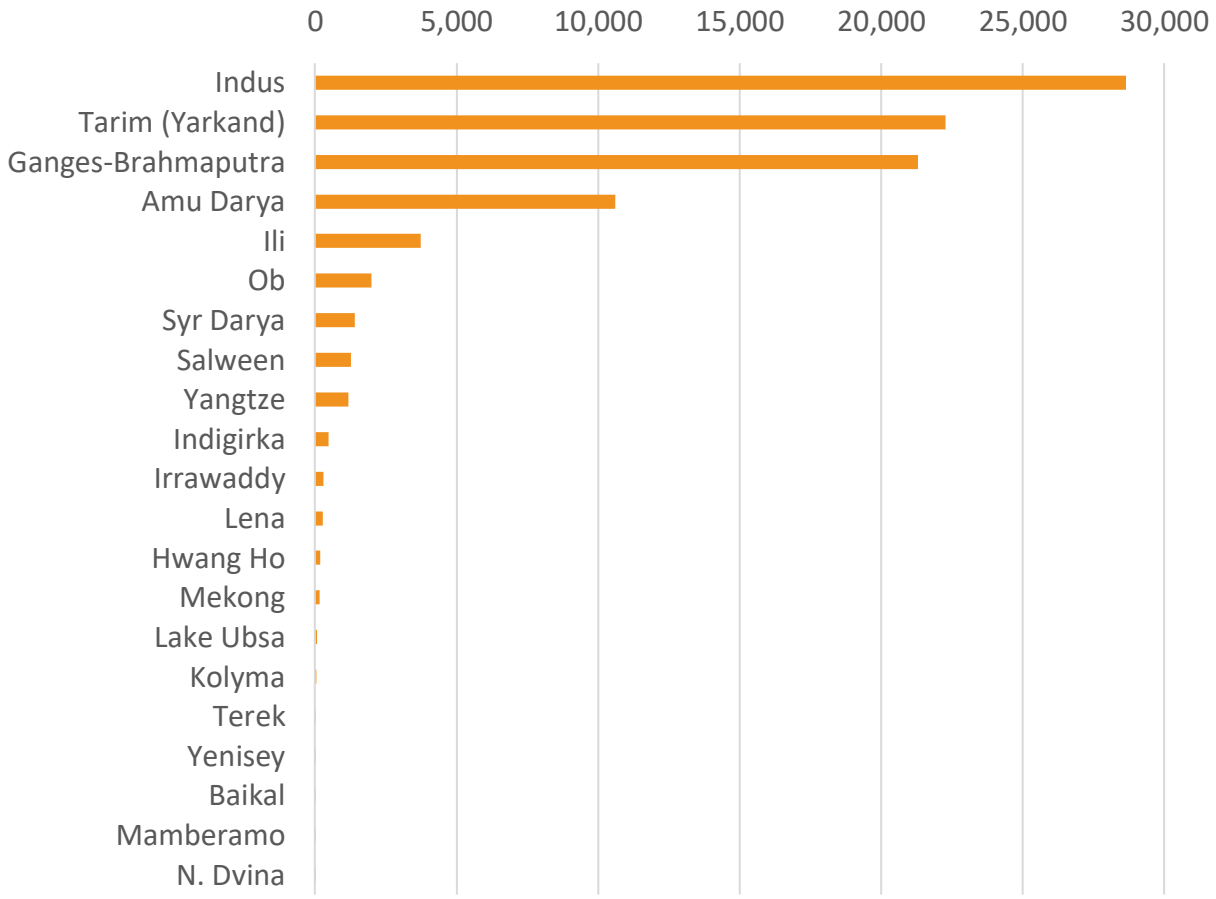
The exposure of glaciers to average dust deposition (2019)





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Findings on Current Impact

- More than **80 per cent** of the entire populations of the Islamic Republic of Iran, Pakistan, Tajikistan, Turkmenistan, and Uzbekistan are exposed to medium or high levels of poor air quality
- Cities in southwestern Asia have the highest exposure to sand and dust storms, where nearly **60 million** people experienced **more than 170 dusty days** in 2019
- Large areas of farmland are affected by dust deposition
- Considerable impact on the generation of electricity by solar power plants
- Exposure of aircraft engines to dust particles is a considerable risk on flightpaths traversing southwestern and central parts of Asia and flights to and from airports on the Arabian Peninsula, Pakistan, India and China are most affected
- Risk of flight delay and cancellation due to low visibility is greatest at airports in Central Asia, southern parts of the Islamic Republic of Iran, the border area between Pakistan and India, and northern parts of China.

Findings on Long-term Impact

- High dust deposition occurs in the Himalaya-Hindu Kush mountain range and the Tibetan Plateau, the so-called Third Pole which provides fresh water to more than 1.3 billion people in Asia

- Risk of impacts of SDS is projected to **increase in the 2030s** due to more extreme drought conditions in parts Western Australia, south-eastern Turkey, Iran and Afghanistan

Partners in the SDS Risk Assessment

- ESCAP Divisions (Statistic, IDD, Transport, Energy)
- World Meteorological Organization (WMO)
- United Nations Convention to Combat Desertification (UNCCD)
- Food and Agriculture Organization of the United Nations (FAO)
- World Health Organization office in Iran (WHO)
- Tohoku University
- Barcelona Supercomputing Center (BSC)
- United Nations Environment Management Group
- Finnish Meteorological Institute
- Japan Meteorological Agency (JMA)
- Environment Department of Environment of the Islamic Republic of Iran (DOE)
- European Institute on Economics
- Spanish Council of Scientific Research in Barcelona
- Risk Nexus Initiative

Sand and Dust Storms Risk Assessment in Asia and Pacific

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Thank You