

ITU WTSA 2024

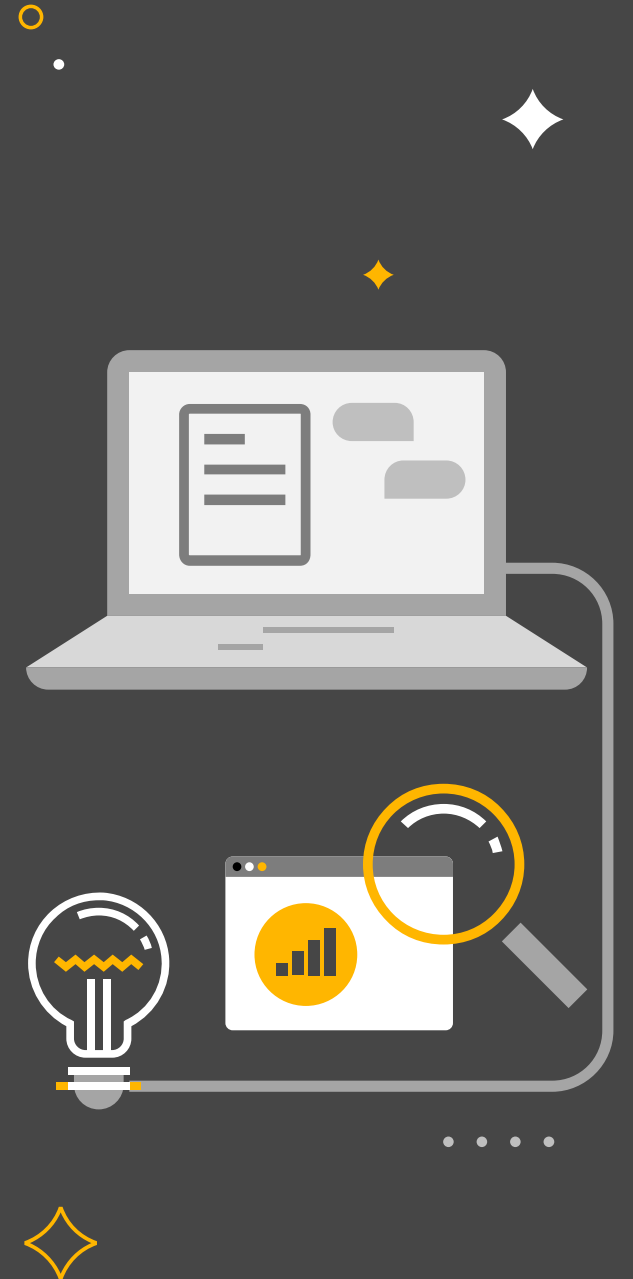
Session 2 - Frontiers in Tech: Battling Drought and Desertification

October 2024



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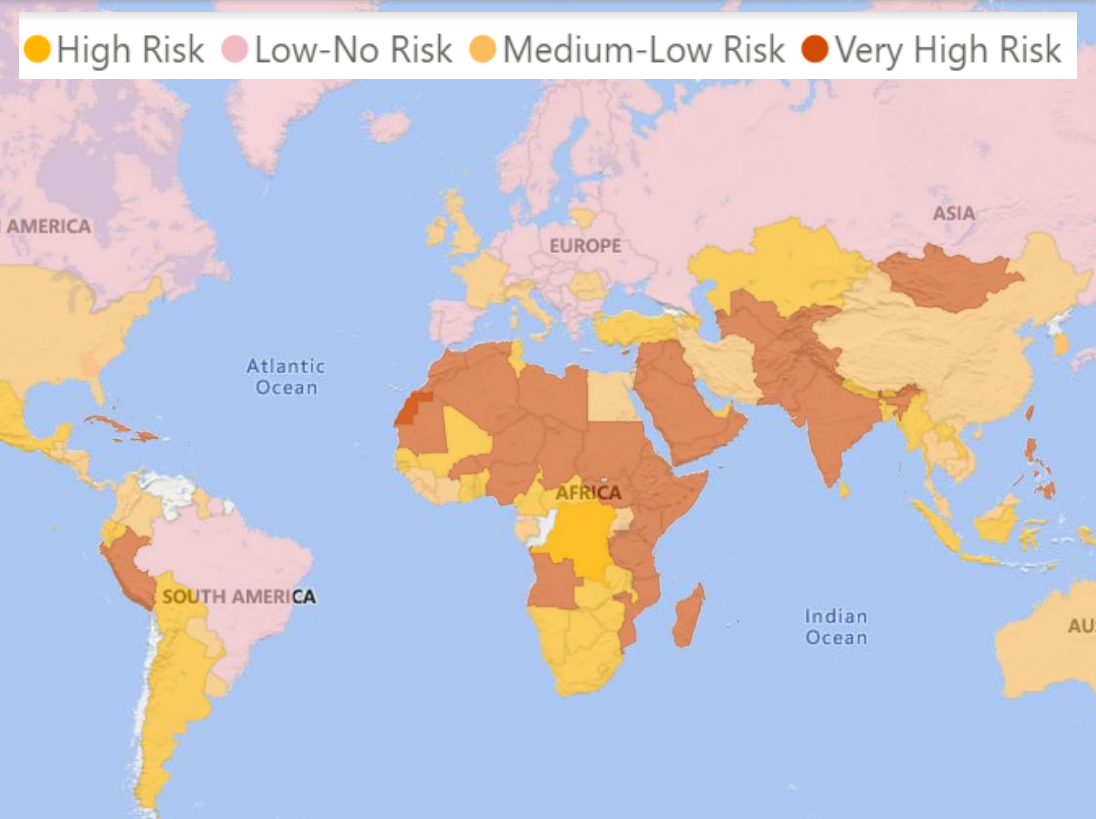
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Overview & impact of
drought and
desertification

Overview & impact of drought and desertification

Drought and desertification impacts are heavily concentrated in **developing countries** in **arid and semi-arid regions** due to **harsher climates** and **limited resources**.

Global per Capita Water Availability and Future Population Growth, 2050



(Source: WB, 2023)



PwC

The number of **extreme droughts** has increased by **233%** in the last 50 years in certain regions.

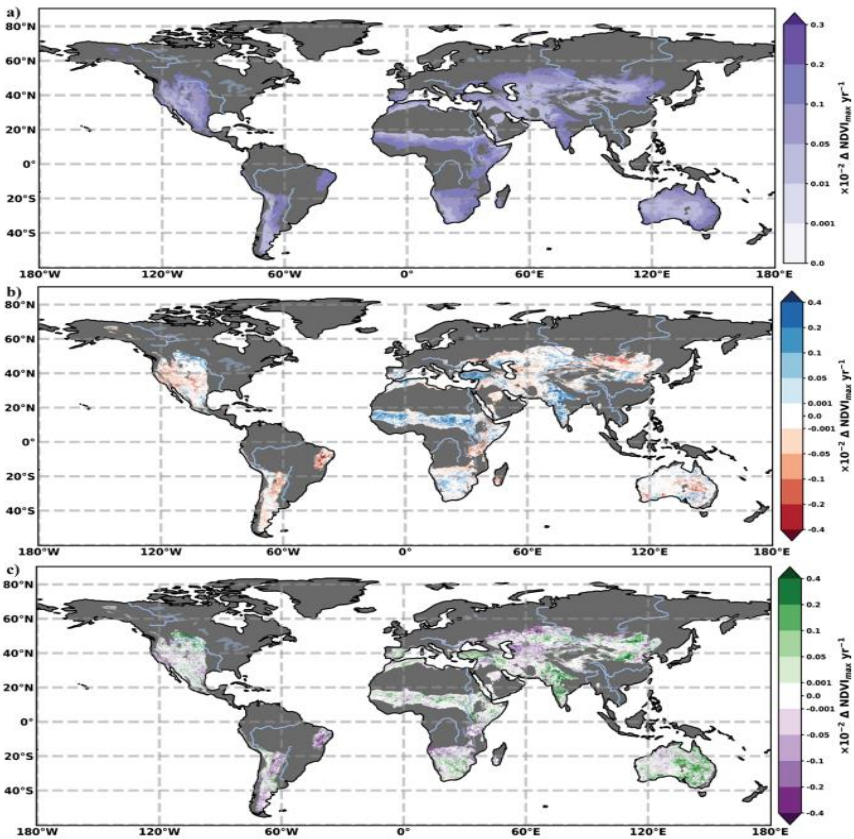


By 2045, **desertification** could displace over **135 million people globally** (UNICEF, 2019)



Dry shock **reduces GDP per capita growth by 0.47 %** on average globally

Global Desertification map

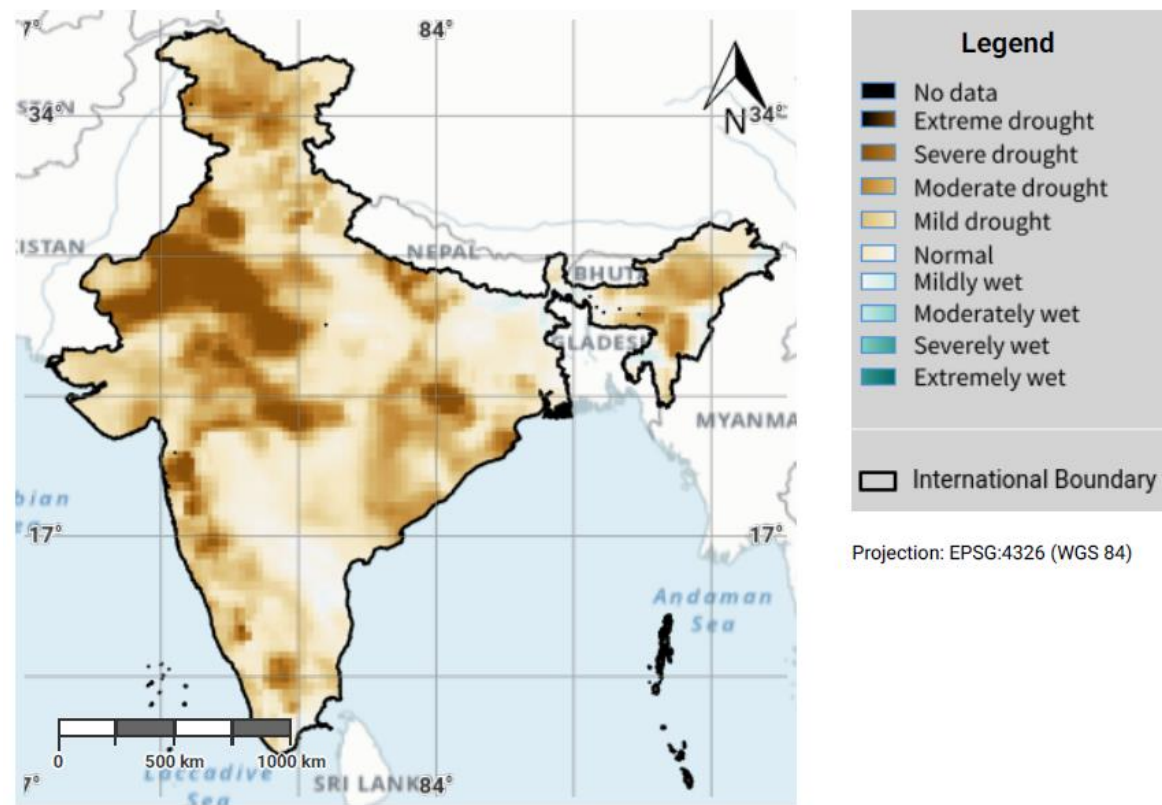


(Source: IPCC, 2019)

Overview & impact of drought and desertification

The annual cost of desertification in India is **Rs. 3177 billion**, which is **2.5% of the GDP** and **15.9%** of the gross value added from **agriculture, forestry, and fishing sectors**.

Drought Hazard Map, India



(Source: UNCCD, 2023)



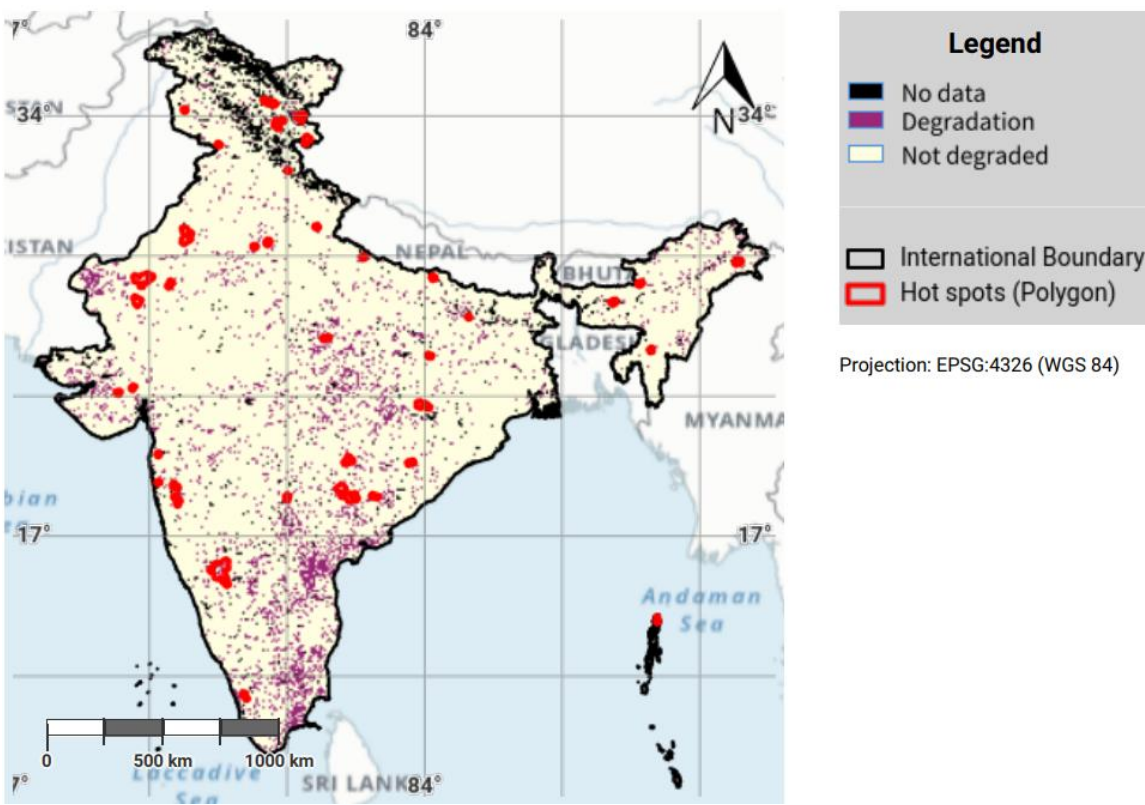
PwC

Jharkhand, Rajasthan, Delhi, Gujarat and Goa have **more than 50% area** under desertification/ land degradation



India witnessed an increase in desertification in **28 of 31 states and Union territories between 2018-19**

Drought Degradation Hotspot Map, India



Projection: EPSG:4326 (WGS 84)



~600 million people in India are presently facing high to extreme water stress


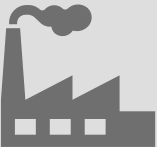
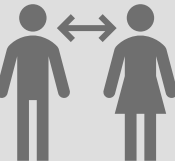

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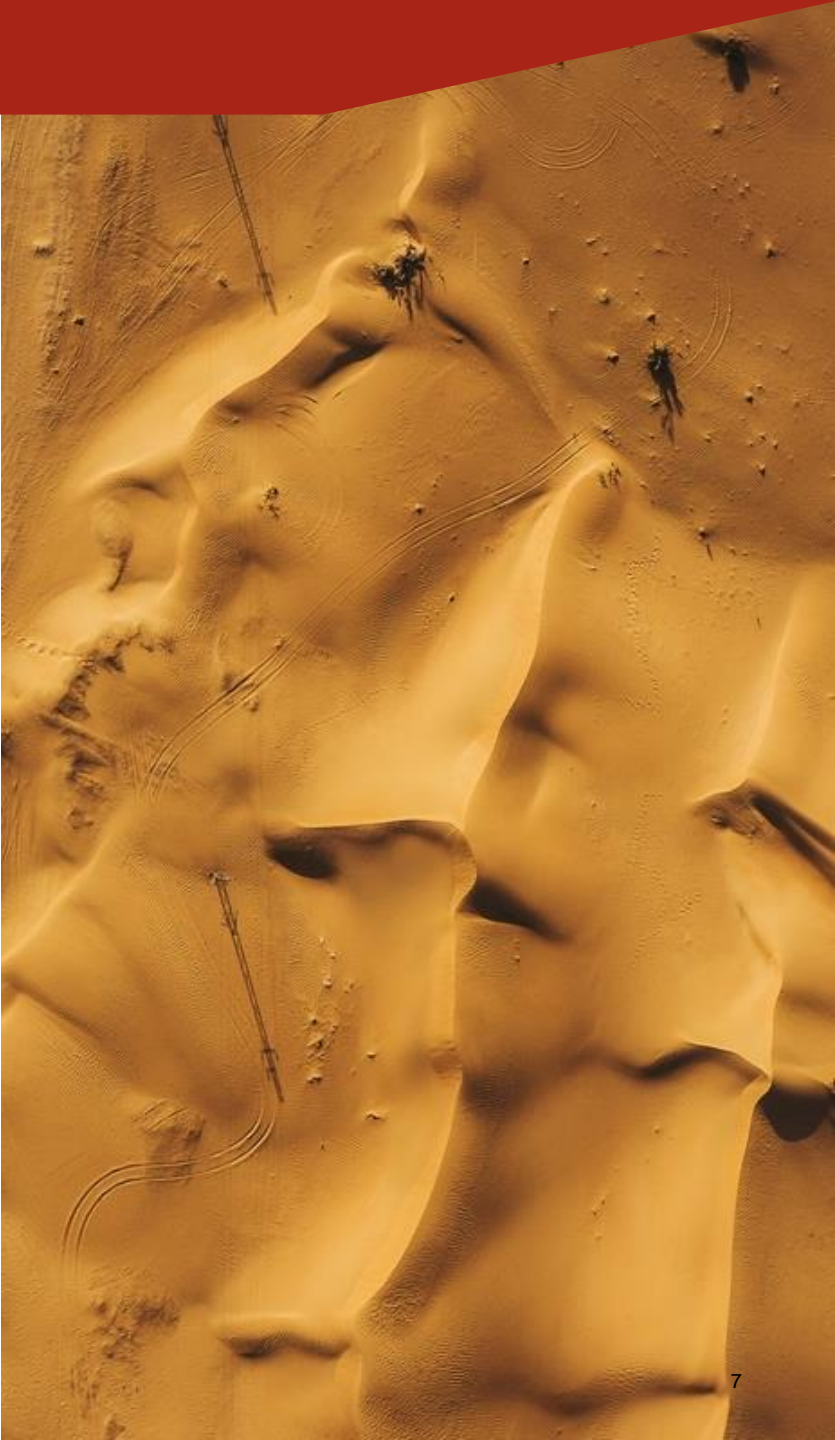
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Sectors impacted by
drought and
desertification

Sectors impacted by drought and desertification

The adverse effects on economic growth due to the dry shock are sharper in **agriculture-dominated areas of developing countries**. Water scarcity and droughts can have significant, long-term impacts on **farms, firms, families, and food security**.

	<p>Drought impacts crop yield, increases crop stress, soil degradation, and degradation of groundwater. Desertification further degrades arable land, making it less productive. 40 percent of the world's population, rely on agriculture as their main source of income.</p>	Agriculture
	<p>Due to harsh climate impacts, water-intensive sectors get more impacted. The potential industries are textiles, chemicals, pharmaceuticals, and food processing, paper, etc.</p>	Manufacturing
	<p>Water scarcity and poor water quality can lead to health issues, including dehydration, malnutrition, and the spread of waterborne diseases, food security, and environmental degradation</p>	Social and Public Health
	<p>Energy (Thermal, Hydro) Production, Tourism, Increased food prices, Fisheries, and Infrastructure sectors like telecom, road, etc.</p>	Other economic sectors





Potential challenges due to desertification on Telecom Sector

Monitoring & Maintenance

Desert environments pose severe challenges for **monitoring & predictive maintenance** of telecom infrastructure system

Dune loads on fiber

Dynamic sand dune loads on Fiber: Fiber optic cables are less susceptible to environmental factors however may get damaged due to significant dune loads

Signal distortion and interference

Dust storms can lead to **signal distortions and interference** during high wind-storm days across both hot & cold desert regions

Overheating & degradation

Extreme heat can cause **equipment overheating and degradation** resulting in equipment failure

Interruption due to power outage

Power outages are frequent in desert regions that may lead to interruption of telecommunication services

Geographic Isolation

Geographic isolation, low market access, & insecure land tenure systems may indirectly impact the telecom business landscape



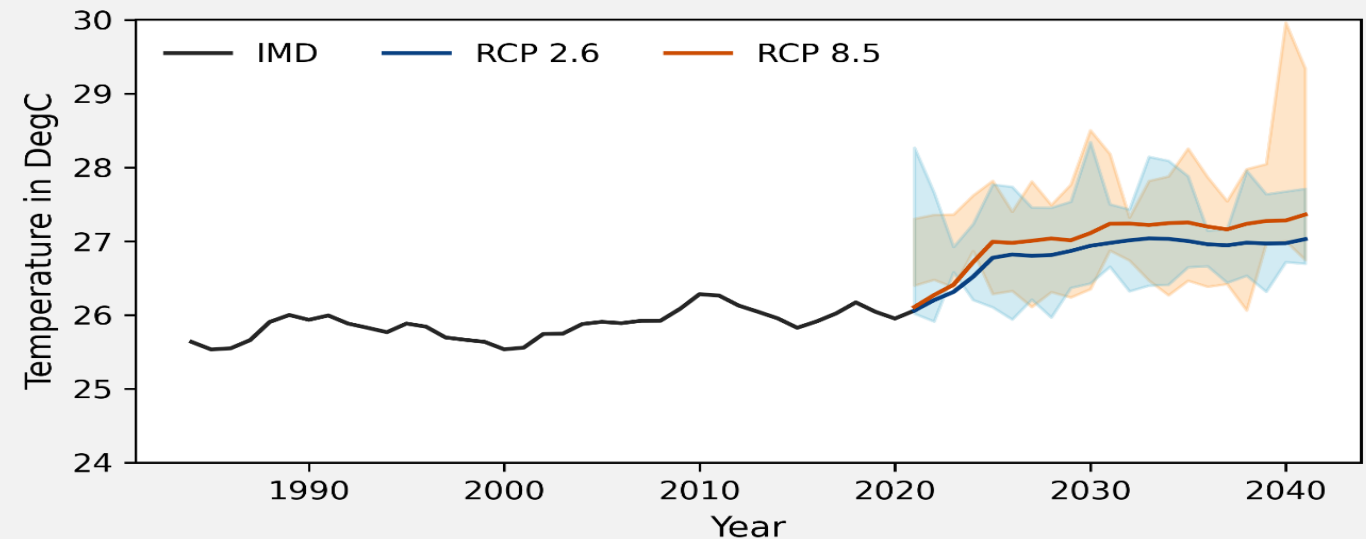
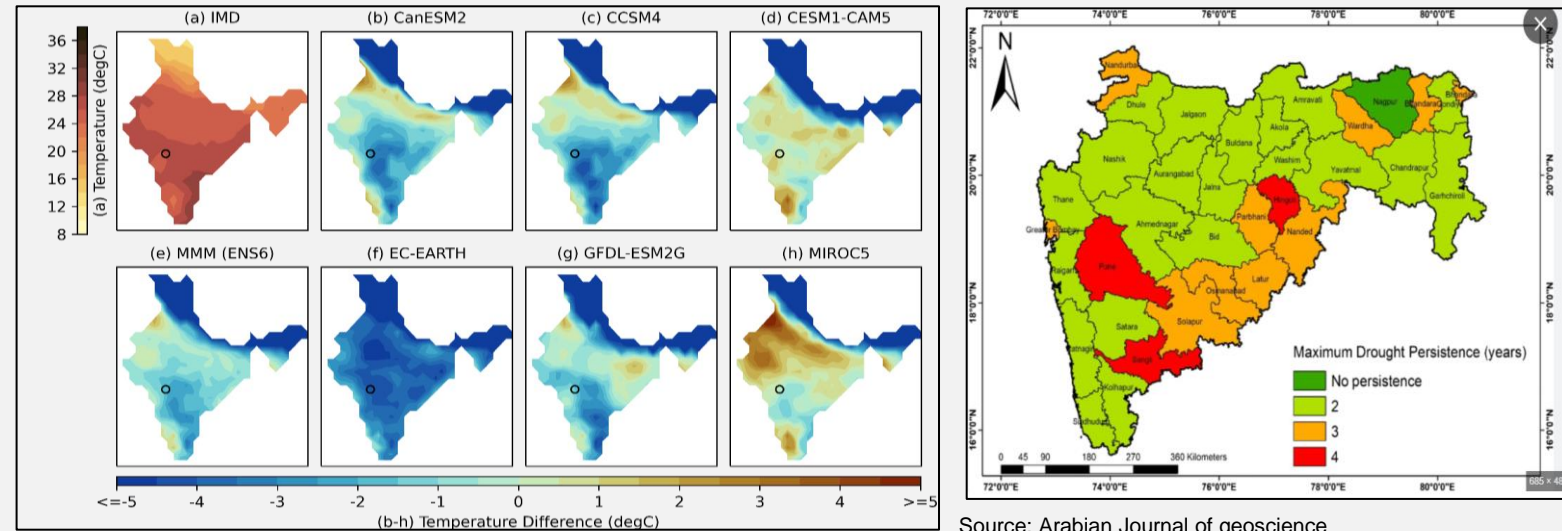
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How PwC is
harnessing
technology to help
clients combat the
impacts

Case study 1: Water risk assessment for business continuity planning

Impact of drought & rising temperature on water availability for a pharma plant in Waluj industrial zone

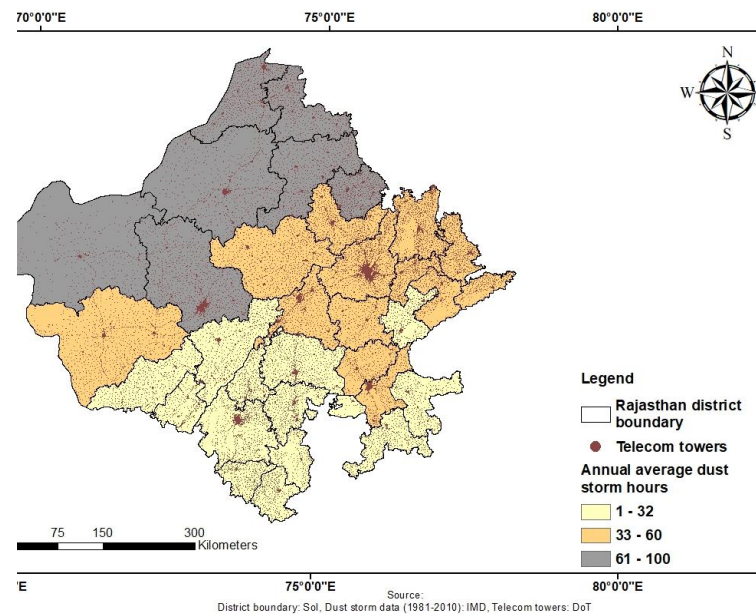
- 15 out of 36 districts in Maharashtra are drought prone (State Agriculture Department, 2023)
- Multi Model Ensemble represents the increase in warming over next two decades by **1.1 °C under RCP2.6** and **1.3 °C under RCP8.5** from the mean observed temperature (1980-2020)
- The west Godavari basin would face water deficit of **321 MCM under RCP2.6** and **785 MCM under RCP8.5** scenarios
- The future water deficit will lead to **more water curtailment** in the **Waluj** industrial zone



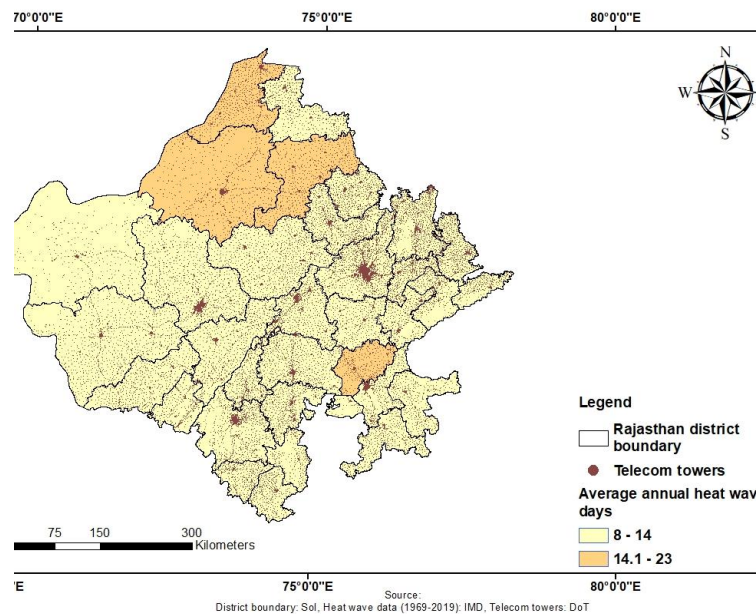
Temperature assessment under different climate scenarios for Maharashtra

Case Study 2: Assessing Telecom Infrastructure with Space Technology in harsh climate, Rajasthan

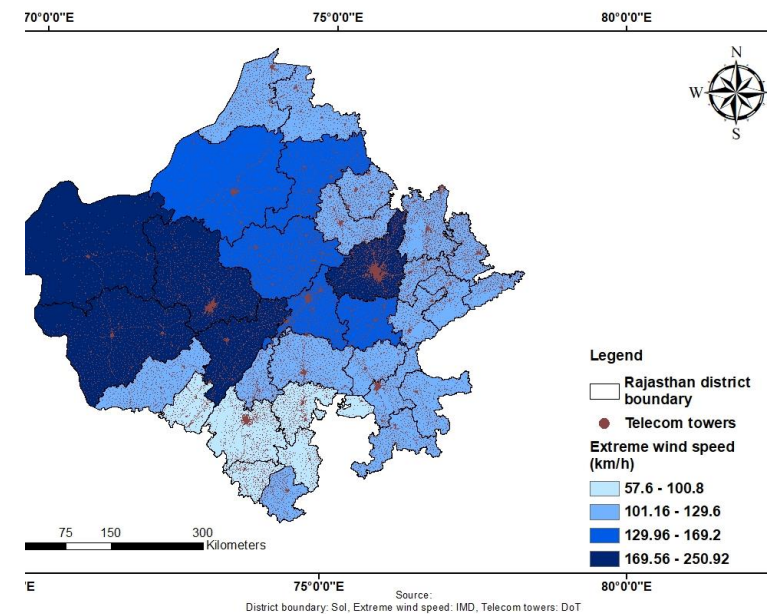
By leveraging space technology, telecom operators can proactively manage risks and maintain robust infrastructure, ensuring reliable communication services



Dust storm (Annual average dust storm hours: 61 – 100)
Exposed districts: Bikaner, Churu, Hanumangarh, Jaisalmer, Jhunjhunu, Jodhpur, Ganganagar
Telecommunication towers exposed:10214 (24%)
Potential impacts: Signal interference and distortion, power supply interruption



Heat wave (Average annual heat wave days: 14 - 23)
Exposed districts: Bikaner, Churu, Bundi, Ganganagar
Telecommunication towers exposed: 4916 (11%)
Potential impacts: Equipment failure due to overheating and performance degradation

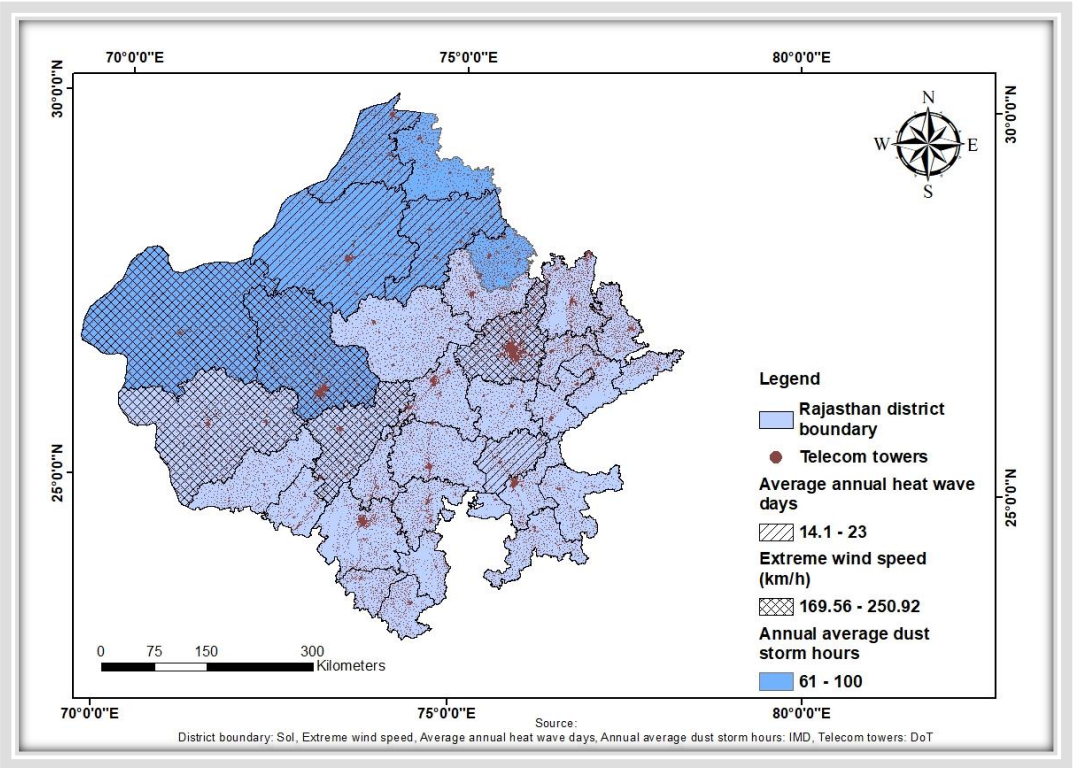


Extreme wind speed (wind speed > 170 kmph)
Exposed districts: Barmer, Jaipur, Jaisalmer, Jodhpur, Pali
Telecommunication towers exposed:12470 (29%)
Potential impacts: Antenna misalignment, asset damage

Case study 2: Assessing Telecom Infrastructure with Space Technology in harsh climate, Rajasthan

By leveraging space technology, telecom operators can proactively manage risks and maintain robust infrastructure, ensuring reliable communication services

Sample outputs – Multi-hazard exposure map



Exposure to multi- hazard	Name of the districts	Telecommunicati on towers exposed	Potential impacts
Extreme high wind speed & high dust storm	Jaisalmer, Jodhpur	3633 (9%)	Antenna misalignment, asset damage, signal interference and distortion, power supply interruption
High dust storm & high heat wave	Bikaner, Churu, Gangana gar	4303 (10%)	Signal interference and distortion, power supply interruption, equipment failure due to overheating and performance degradation
Total telecommunication towers in Rajasthan		42566	

Potential use of space tech for strengthening telecom sector resiliency

01

Probabilistic hazard (advancing of sand dunes and dust storms) modeling for preventive operation & maintenance activity

02

Remote monitoring of telecom asset performance during heatwaves, dust storm & extreme wind condition and management deploying climate control systems

03

Geo-AI based spatio-temporal assessment of acute & chronic hazard impact for telecom infrastructure system for strategic planning

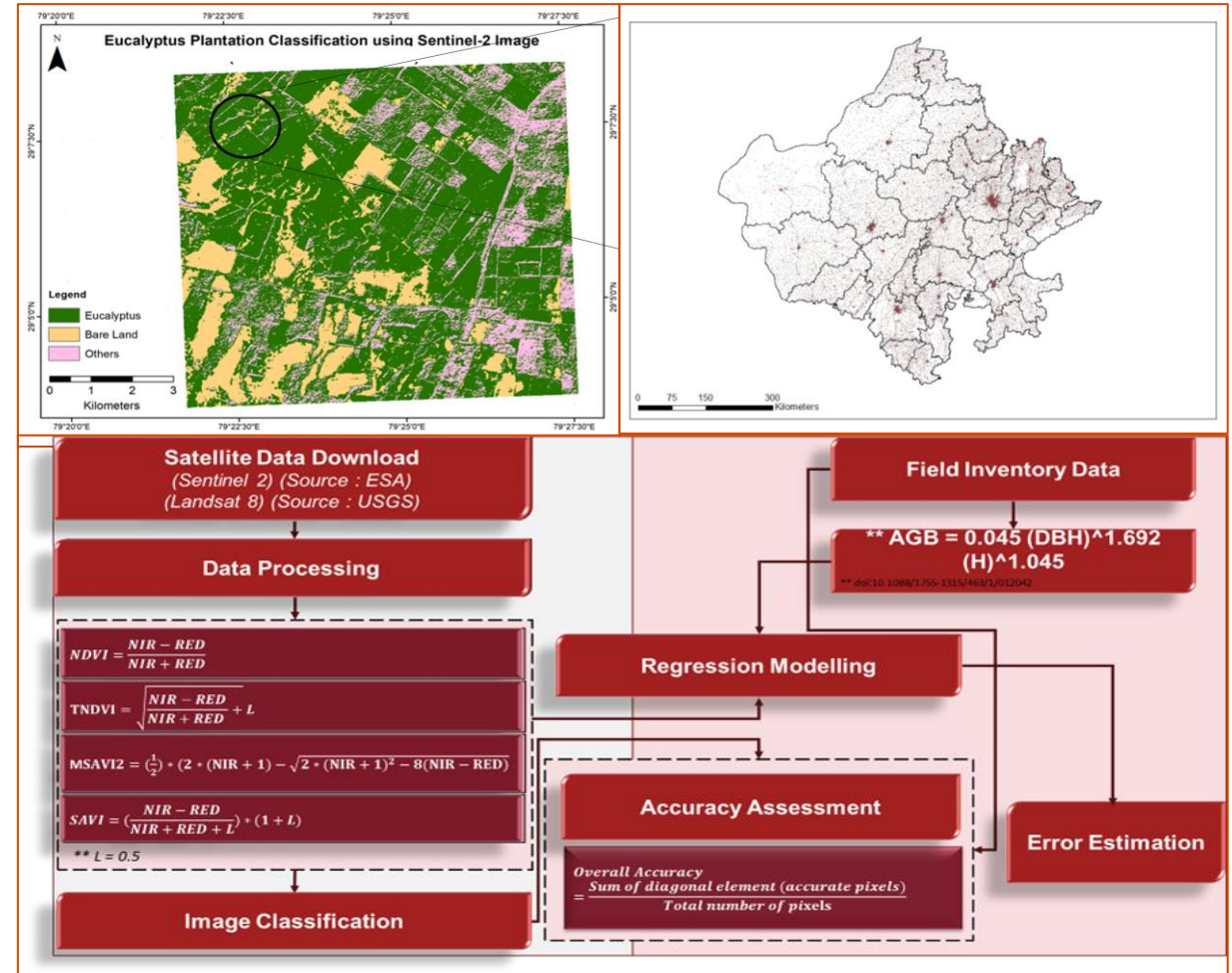
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Remote Sensing & GIS based strategic planning for adding redundancy & network expansion across desert region

05

Remote Sensing & GIS based strategic planning for adding redundancy & network expansion across desert region

Illustrative Geo AI approach for spatio-temporal assessment



Thank you

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