19 June 2023

Brief- Climate Change and Desertification, Land Degradation and Drought in North-East Asia

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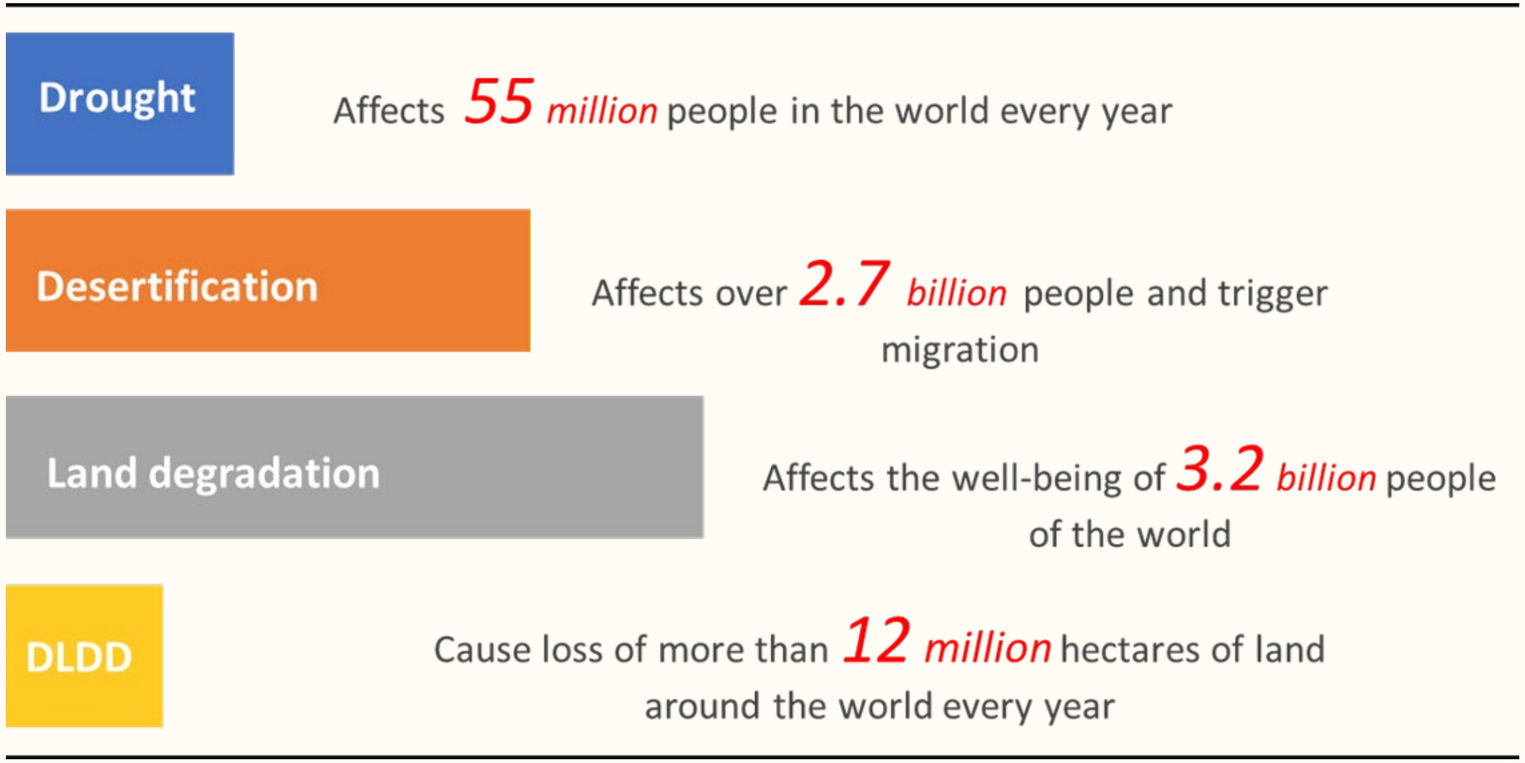
Table of Content

Overview of the Risk in North-East Asia

Global impacts of desertification, land degradation and drought events



Desertification, land degradation and drought events affect many people, and thus it is essential to address these hazards to achieve the 2030 Agenda for Sustainable Development.

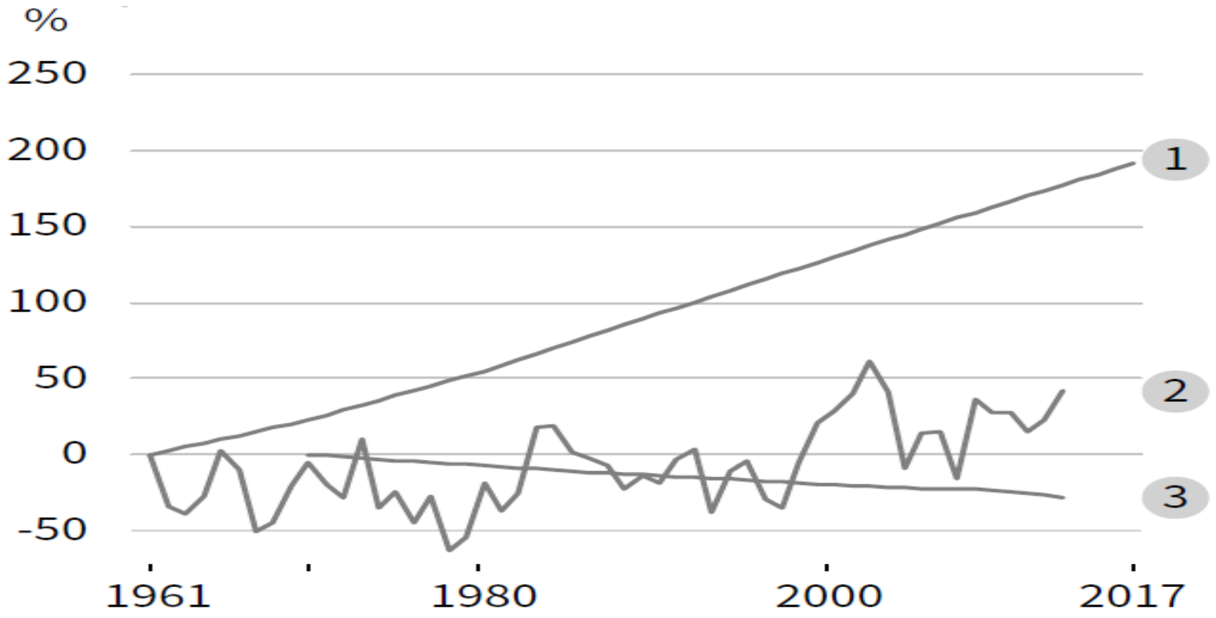
Desertification, land degradation, and drought are severe problems in North-East Asia.

77.8 per cent of Mongolia's land area, 34.6 per cent of China's land area, 7 per cent of the Russian Federation's land area are dryland and prone to desertification and land degradation.

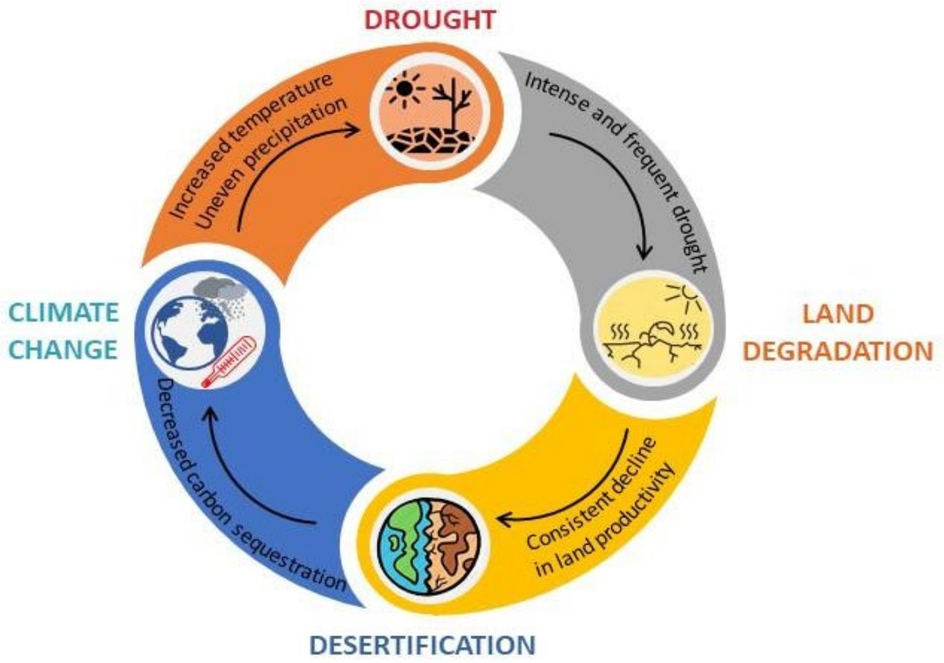
Soil erosion in arable or intensively grazed lands can be 100 to 1,000 times higher than natural erosion.

- In DPRK, it is estimated that around 40-60 tonnes/ha of soil is lost through erosion every year.
- In the Russian Federation, around 50% of land is prone to degradation.
- In Japan, 30% of agricultural land is already degraded.

Globally, dryland has increased by 0.35% from 1951-1980 to 1981-2010, mainly in the semi-arid areas.



- Increase of the global population exposure to desertification by 200% since 1961 (1)
- Dryland areas in drought (2)
- A decreasing trend in the extent of inland wetland (3)



Climate change and its implications for DLDD

Global surface air temperature is on the rise.

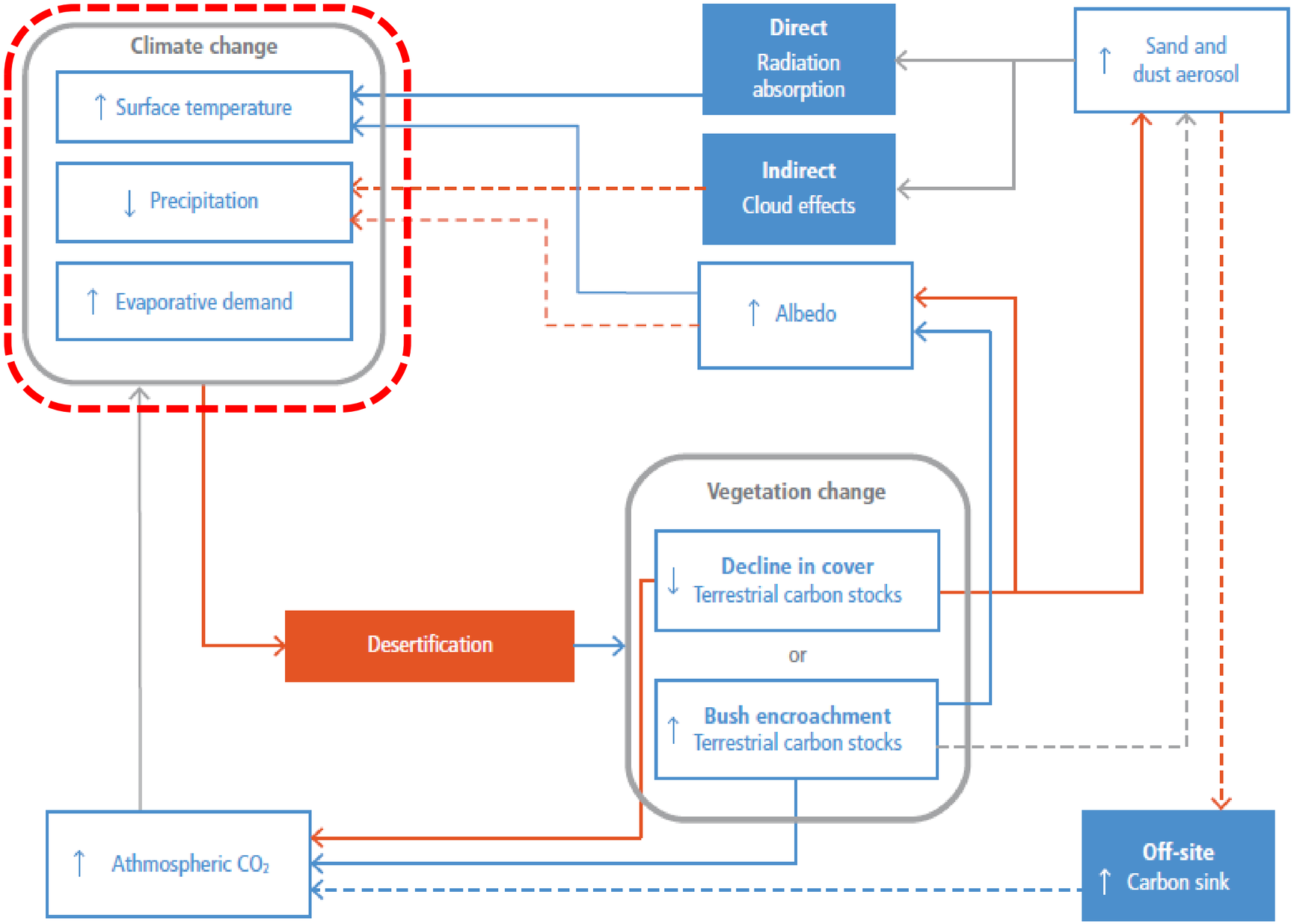
- Northern China experienced the warming with a 0.3 to 0.4°C increase in temperature per decade.
- In Tokyo, the annual mean temperature has increased by 3°C per century between 1901 and 2015.
- In the Republic of Korea, the temperature has increased by 1.9°C from 1912 to 2014.
- Mongolia has also experienced rapid warming with a rise in average temperature by 2.24°C between 1940 and 2015.

→ *Likely to continue across all emission scenarios*

Precipitation trends have significant regional differences in North-East Asia.

Shifting 'Riskscape' in North-East Asia

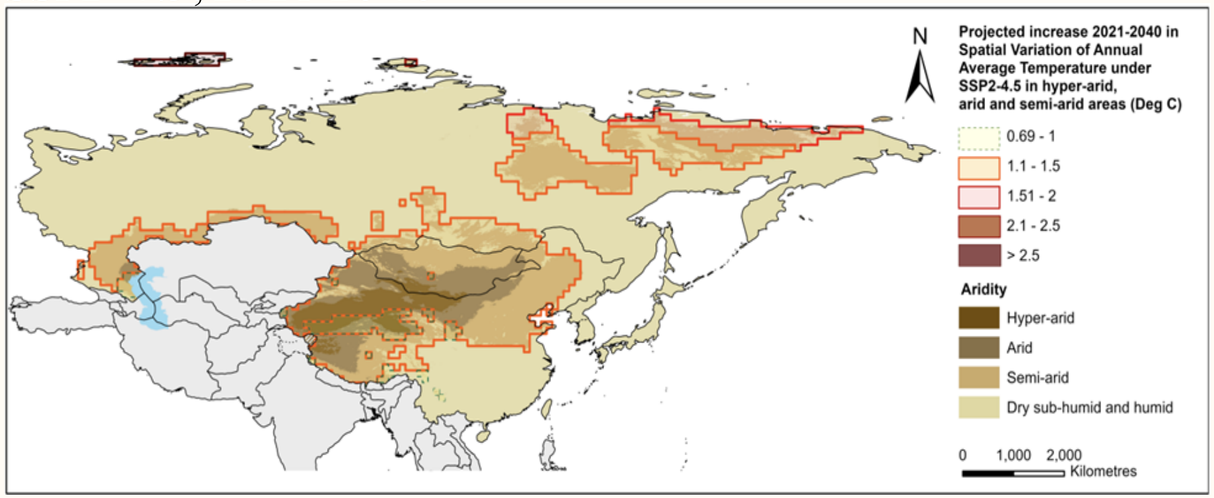
According to IPCC, climate change will exacerbate desertification processes.



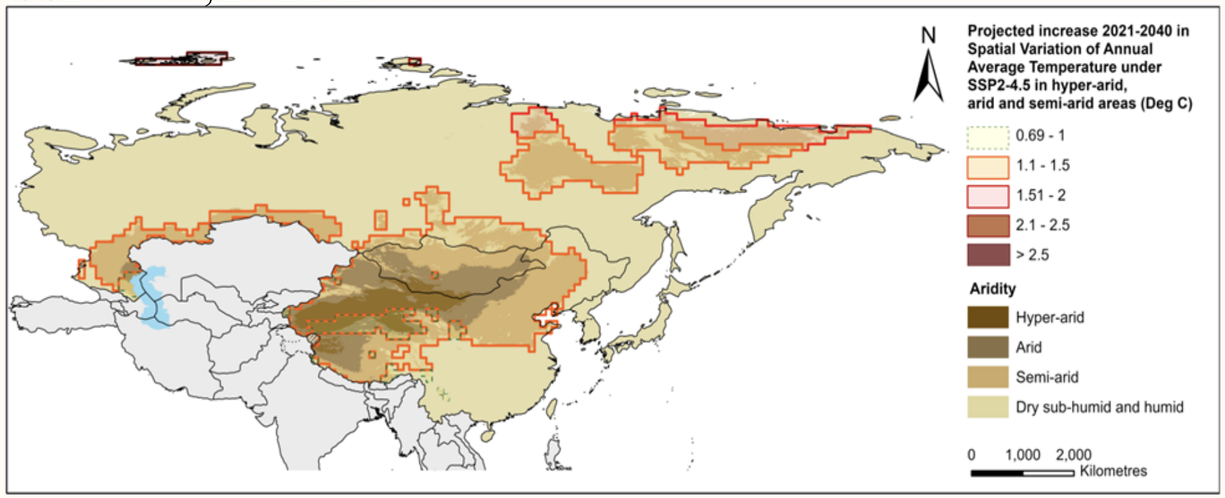
IPCC(2019) Special report on climate change, desertification, land degradation, sustainable land management, food security and greenhouse gas fluxes in terrestrial ecosystems. Figure 3.8

Projected increase of annual average temperature in hyper-arid, arid and semi-arid areas

SSP2-4.5, 2021-2040



SSP5-8.5, 2021-2040

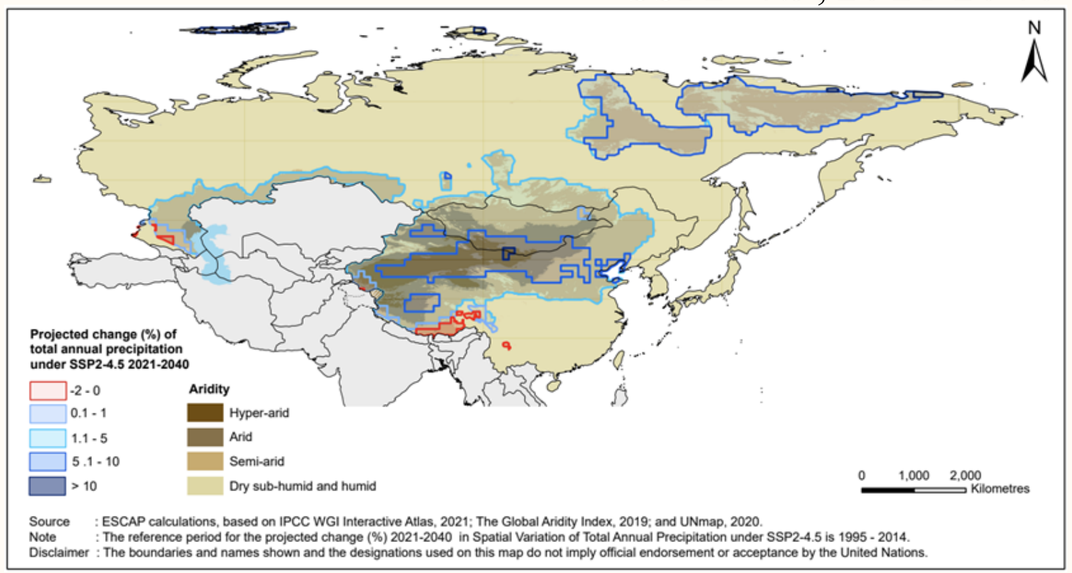


By 2040, the annual average temperature is expected to increase more than 1°C across most of the hyper-arid, arid and semi-arid areas

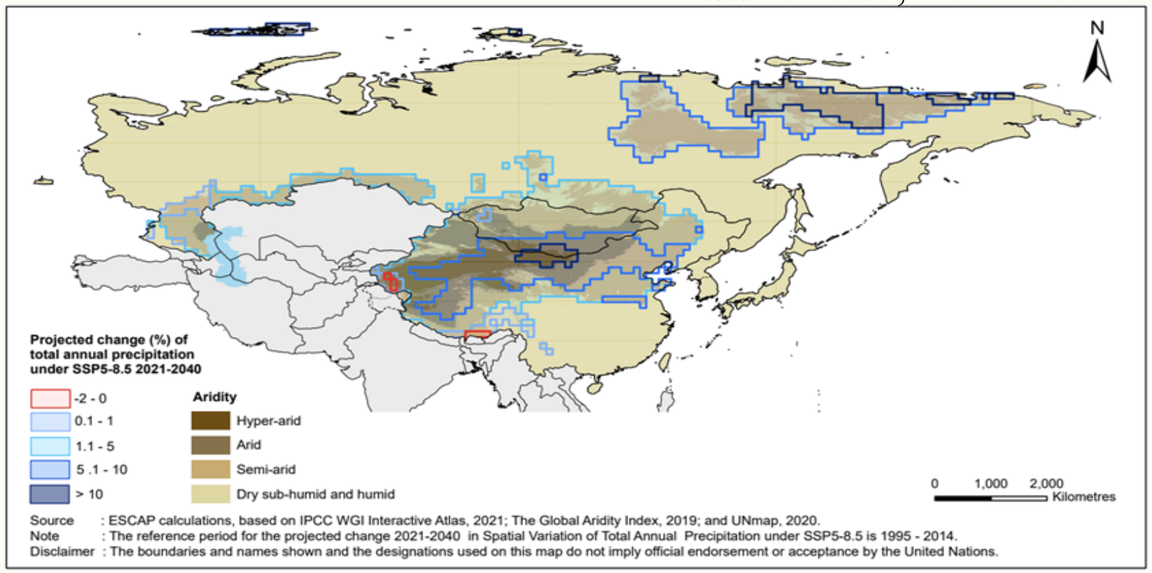
An increase in temperature leads to an increase in evaporative demand of the atmosphere and increases soil moisture loss due to evapotranspiration, thus increasing aridity.

Projected change of total annual precipitation in hyper-arid, arid and semi-arid areas

SSP2-4.5, 2021-2040



SSP5-8.5, 2021-2040

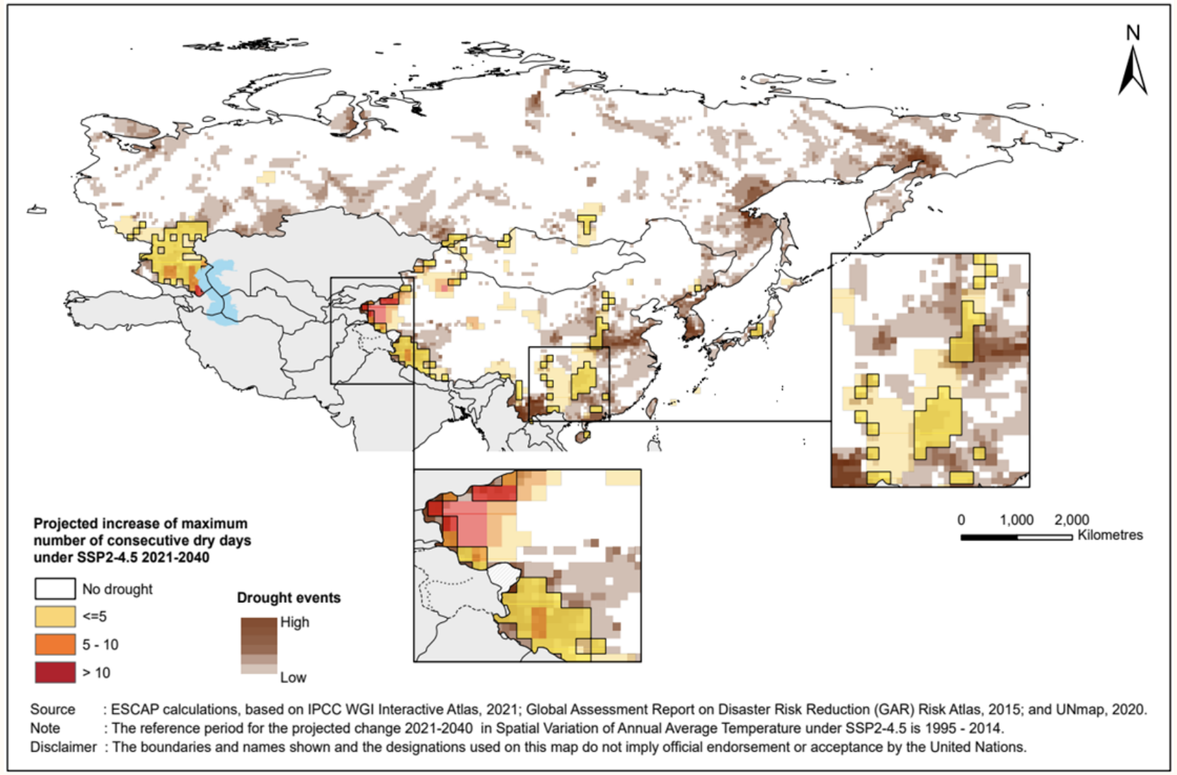


It is observed that most of the hyper-arid, arid and semi-arid areas in North-East Asia are expected to receive slightly more precipitation than the long-term average under climate change conditions.

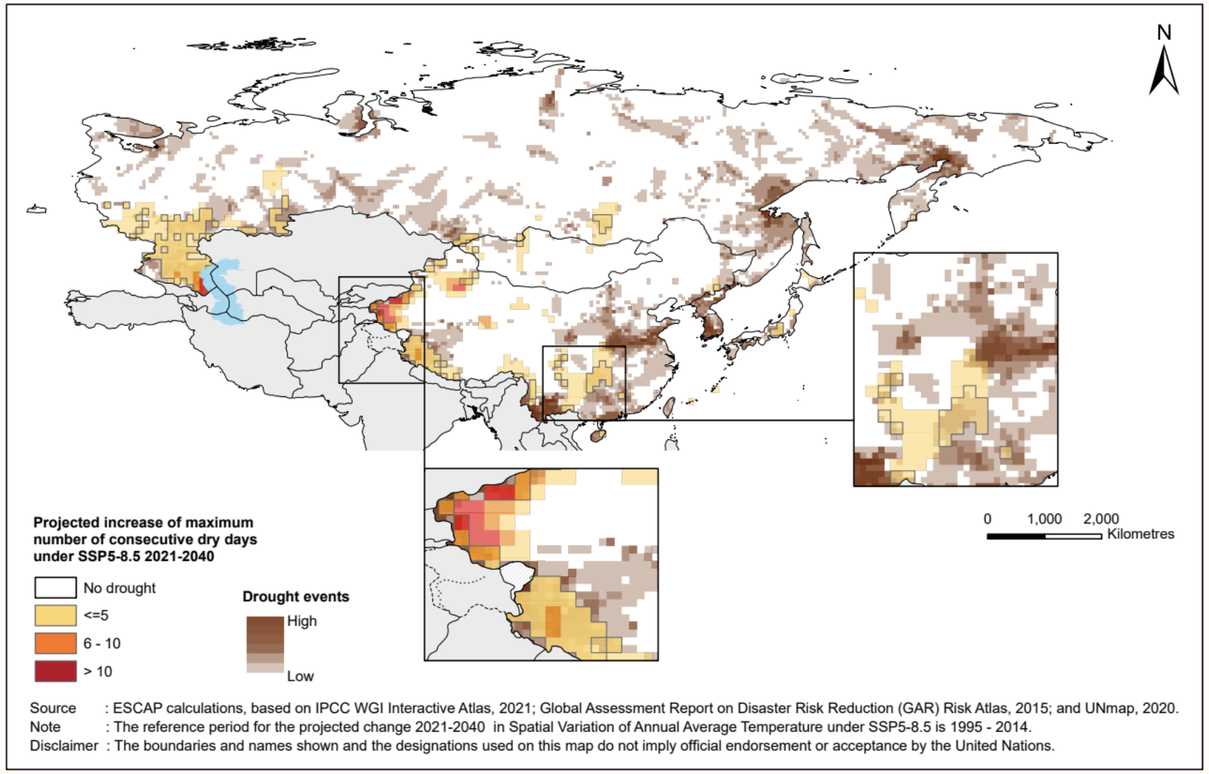
However, 5-10 % increase in total annual precipitation is only around 2.5 mm-20 mm and is thus unlikely to make significant changes in prevailing dry conditions.

Projected increase of the maximum number of consecutive dry days

SSP2-4.5, 2021-2040



SSP5-8.5, 2021-2040



Many of the currently drought-prone regions are likely to experience increasing numbers of CDD.

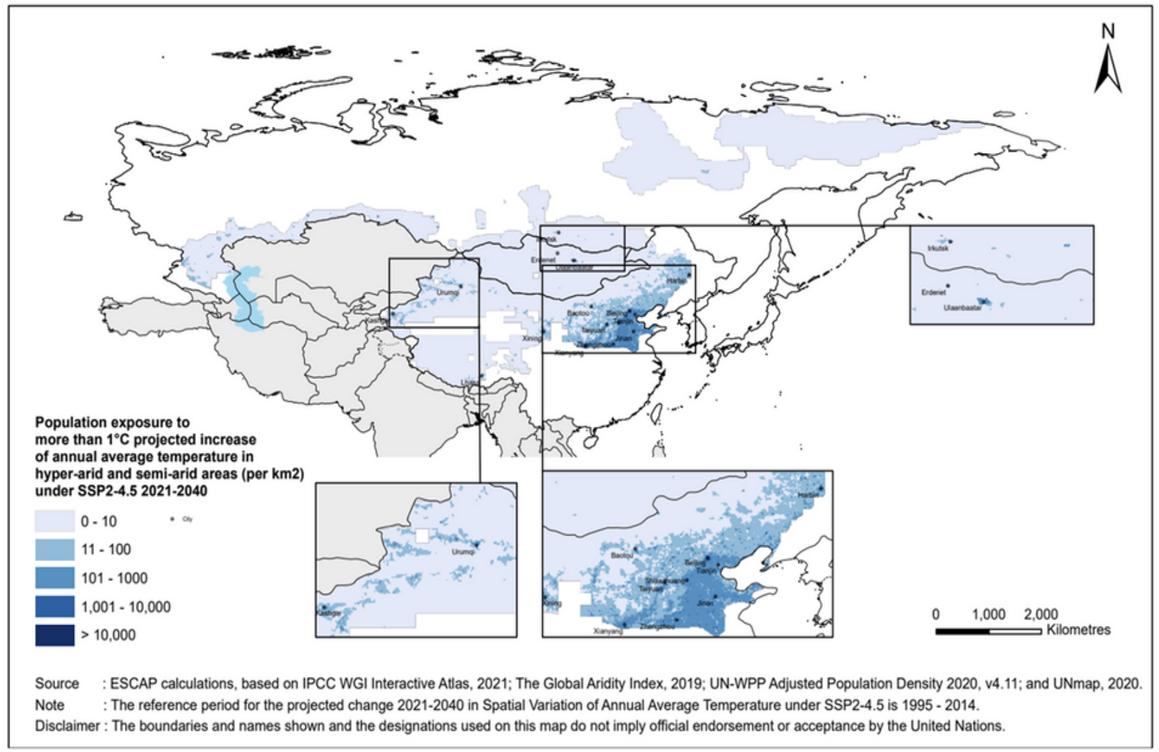
The annual average temperature is also very likely to increase across the drought-prone areas.

Potential impacts of Intensifying Risks in North-East Asia

Population exposed to intensifying desertification risk

- Risks from desertification are projected to increase due to climate change.
- Globally, under SSP2 at 1.5°C, 2°C and 3°C of global warming, the number of dryland population exposed to various impacts related to water, energy and land sectors is projected to reach 951 million, 1.15 billion and 1.28 billion, respectively. (IPCC, 2019, SRCCL)

SSP2-4.5, 2021-2040

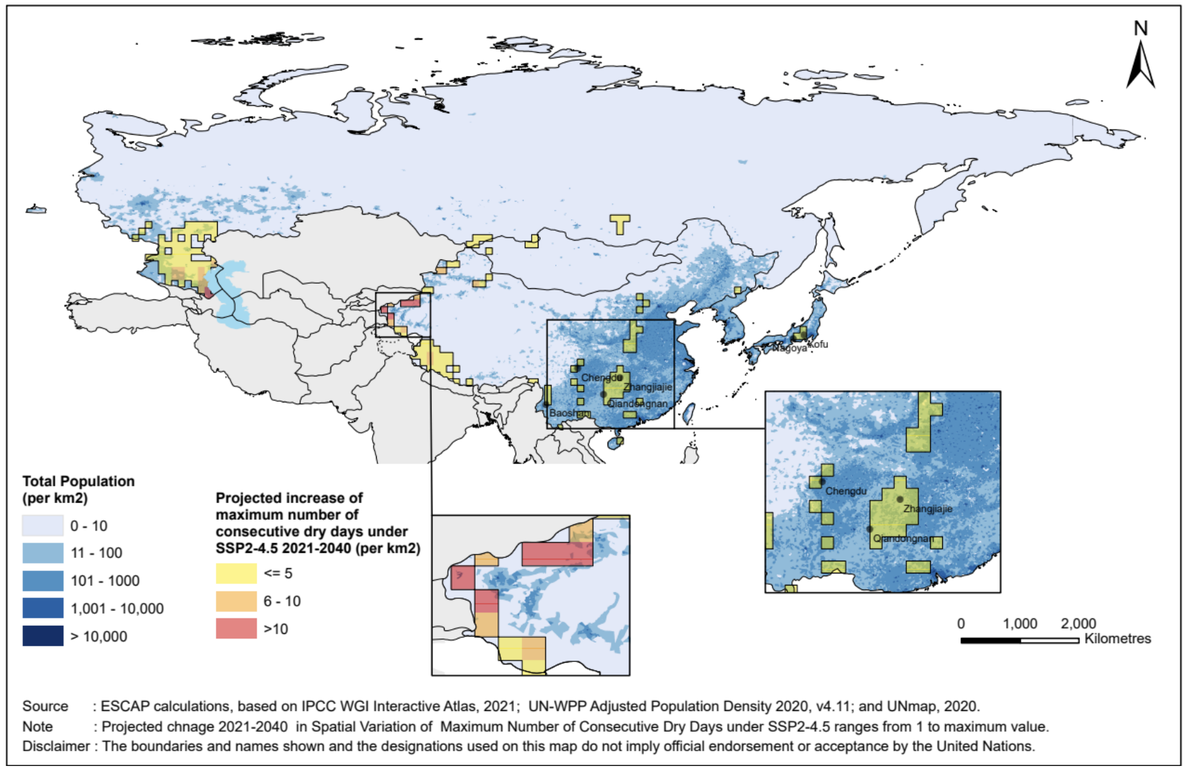


Country	% of the total population	
	SSP2-4.5	SSP5-8.5
China	18.24	15.70
Mongolia	58.13	49.24
Russian Federation	11.83	11.74

- The eastern provinces of China located in the semi-arid region have the most population exposed to intensifying desertification risk.
- Mongolia has the highest per cent of people exposed, followed by China and the Russian Federation under both climate scenarios.

Population exposed to intensifying drought risk

SSP2-4.5, 2021-2040



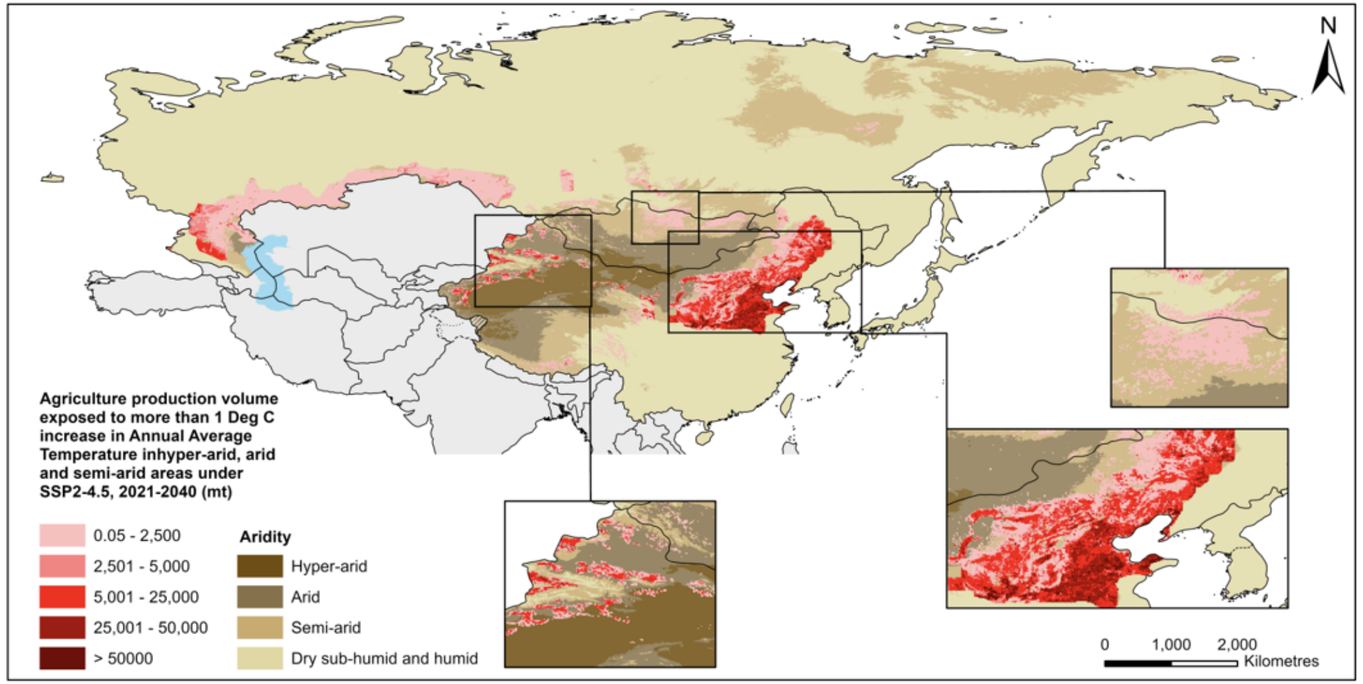
Country	Number of people (% of the total population)			
	SSP2-4.5		SSP5-8.5	
Japan	699,715	(0.58%)	719,717	(0.60%)
China	14,465,304	(1.00%)	6,979,442	(0.48%)
Mongolia	5,373	(0.17%)	3,721	(0.12%)
Russian Federation	5,337,157	(3.80%)	5,691,665	(4.06%)

The proportion of the population likely to be exposed to intensifying drought risk is highest in the Russian Federation, followed by China, Japan and Mongolia.

Agriculture exposed to intensifying desertification risk, 2021-2040

Desertification has already reduced agricultural productivity and incomes in some dryland regions. (IPCC, 2019, SRCCL)

Agricultural production volume exposed to intensifying desertification risk, under SSP2-4.5



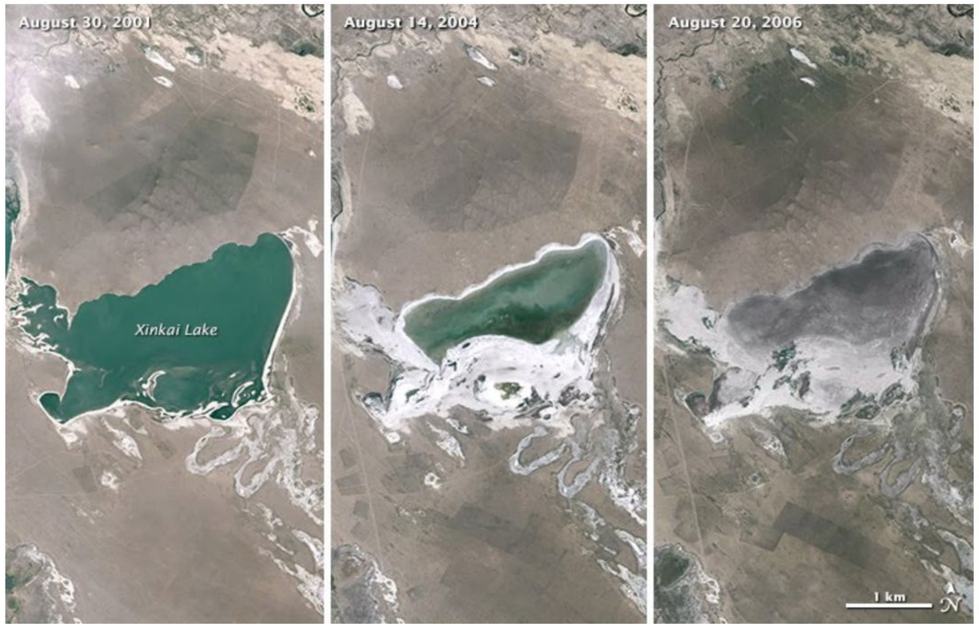
Source : ESCAP calculations, based on IPCC WGI Interactive Atlas, 2021; The Global Aridity Index, 2019; Global Spatially-Disaggregated Crop Production Statistics Data (MapSPAM) V2r0 2020; and UNmaps, 2020.

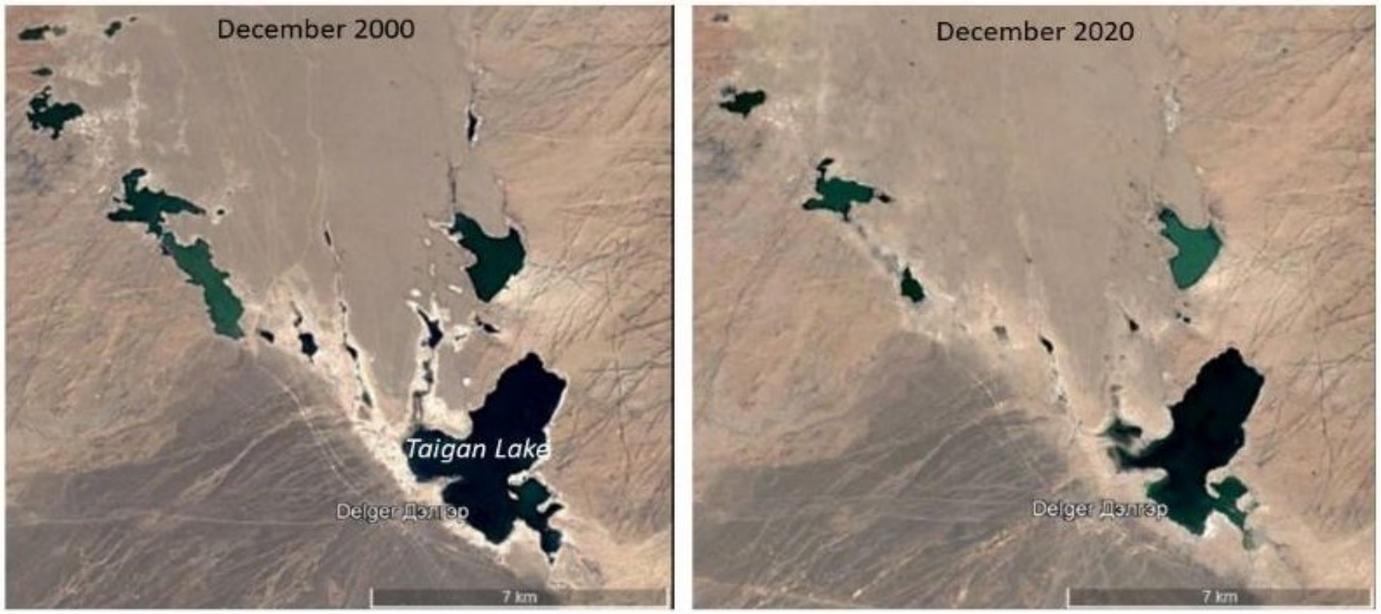
Disclaimer : The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations.

Country	Agriculture production volume (% of total)		Agriculture production value (% of total)	
	SSP2-4.5	SSP5-8.5	SSP2-4.5	SSP5-8.5
China	17.92	15.42	19.54	16.72
Mongolia	58.29	49.28	58.23	49.27
Russian Federation	18.72	16.75	20.72	18.79

More than half of Mongolia's agricultural product volume in arid areas are likely exposed to increasing temperature

Satellite imagery of Xinkai Lake in 2001, 2004 and 2006, and Taigan Lake in 2000 and 2020





Inland water resources (such as rivers, springs and lakes) could mitigate the impacts of anticipated increasing temperature. Mongolia has around 4,000 lakes and water bodies, of which 70% are confined in 30% of land areas.

About 450 lakes and 8000 perennial rivers dried out in the last two decades.

Recommendations

Understanding Climate Risks for Adaptation

- It is necessary to learn and understand the nature, extent, and magnitude of the risk and vulnerability of the society, the environment, and the economy from these risks

- Risk-informed decision process is required to build resilience against evolving complex ‘riskscape’

- Long-term proactive measures should be taken to address intensifying risks of desertification, land degradation and drought, reflecting climate projections

Thank You

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