Shades of climate risk

Categorizing climate risk for investors

Physical risks in Asia

°CICERO Climate Finance

Top risks[1,2]		Key message	Observed Impacts	Projected Impacts towards 2050 (for a range of scenarios between 2°C and Business-as-Usual)[3]	Examples of Impacted Sectors	Shade of Risk
Extreme weather events 	Cyclones (tropical hurricanes)	Can be deadly, especially in combination with sea level rise.	Increased deadliness of cyclones (medium confidence)	Across all scenarios: Low confidence in region-specific projections of frequency and intensity. Fewer tropical hurricanes expected, but stronger.[4] Damaging cyclones are "low risk, high impact", with increases in strength expected over the next decade.	Industry (supply disruption, power outages, workers unavailable), Transport (disruption)	South and South East Asia
Flooding[5] 		Increased river and urban flooding. Likely more extreme precipitation near centers of tropical cyclones. Future increases in precipitation extremes related to the monsoon are very likely in South and South East Asia.	Spatially varying trends and partially lack of evidence (low to medium confidence). (see Observed Example of Thailand flooding)	Across all scenarios: Increases seen in some regions (such as North Asia and greater Himalayan region[6], high confidence), while inconsistent signal for other areas (low to medium confidence)[7]	Industry, transport, infrastructure	North Asia[8] South & South East Asia[9]

Drought 	Drying can lead to water scarcity (medium confidence) in combination with increased water demand and lack of good management. Drought will lead to water and food shortage (high confidence)	Varying and inconsistent trends (low confidence). Tending towards increased dryness in East Asia (medium confidence)	Across all scenarios: Mostly inconsistent signal of change (low confidence). [10] The monsoon may arrive later in southeast Asia.[11]	Agriculture (although irrigation mitigation drought to some degree)	Middle East South Asia (India) and South China
Sea level rise 	Threat to low-lying areas and deltas, especially in combination with hurricanes. Asia is a region with fast-rising sea levels in combination with sinking land in some areas (e.g. Singapore)	Coastal erosion (medium evidence, high agreement). Coastal flooding (medium confidence)	+22 cm (16 to 32 cm) sea level rise globally in 2050 compared to 1986-2005 almost regardless of emission scenario (medium confidence). Sea level rise up to 20% higher in equator and subtropical regions.	Human settlements, industry, infrastructure, fisheries, tourism (coral reefs)	South East Asia Rest of Asia
Heat stress[12] 	Increased risk when combined with other risks, such as extreme weather	Insufficient evidence and spatially varying trends, but increased heat waves such as in China and India (low to medium confidence). Likely to very likely increase in hot days in most regions (mostly high confidence)	Across all scenarios: Likely more frequent and longer heat waves in most regions (high confidence). [13] Likely increase in hot days (high confidence)[14]	Agriculture (reduced food production) [15] , health and labour productivity	Middle East & South Asia (India), East Asia (China) & South East Asia North Asia

Legend:

Immediate attention required: impacts are already observed with a significant probability to increase

Some attention is required: impacts are expected in the next few years

Caution: impacts could manifest towards mid-century

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[1] Hijioka, Y., et al. (2014). Asia. In V. R. Barros, et al. (Eds.), Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part B: Regional Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (pp. 1327-1370). Cambridge, United Kingdom and New York, NY, USA: Cambridge University Press.

[2] Hewitson, B. C., et al. (2014). Regional context. In V. R. Barros, et al. (Eds.), Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part B: Regional Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (pp. 1133-1197). Cambridge, United Kingdom and New York, NY, USA: Cambridge University Press.

[3] Based primarily on RCP2.6 and RCP8.5. If 2050 impacts were not available (based on 2046-2065), based on interpretation of 2071-2100 model results

[4] Knutson et al. (2015) Global Projections of Intense Tropical Cyclone Activity for the Late Twenty-First Century from Dynamical Downscaling of CMIP5/RCP4.5 Scenarios

[5] Extreme precipitation definition used is frequency of 'very wet days,' defined here as the 90th percentile of daily precipitation on wet days

[6] Shrestha, A.B. et al. (2015) The Himalayan Climate and Water Atlas: Impact of climate change on water resources in five of Asia's major river basins. ICIMOD, GRID-Arendal and CICERO. Accessible via http://www.icimod.org/?q=20533

[7] Based on projections for 2071-2100

[8] North Asia is above the Himalayas

[9] South Asia includes India

[10] Based on projections for 2071-2100

[11] Loo et al., 2015. Effects of climate change on seasonal monsoon in Asia and its impact on the variability of monsoon rainfall in Southeast Asia.

[12] Extreme heat events definition used is frequency of 'warm days,' defined here as the 90th percentile daily maximum temperature

[13] Climate change and labour: impacts of heat in the workplace. UNDP (2016)

[14] Based on projections for 2071-2100

[15] Kumar, A. (2014). Climatic Effects on Food Grain Productivity in India. Journal of Studies in Dynamics and Change, 1(1), 38–48. AND Pradhan, N. S. et al. (2015). Farmers' responses to climate change impact on water availability: insights from the Indrawati Basin in Nepal. International Journal of Water Resources Development, 31(2), 269–283. http://doi.org/10.1080/07900627.2015.1033514