

# **Key risks and adaptation options in Asia** **(An extract of recent global assessments)**

**Rajarshi DASGUPTA, Dr.**

***Senior Policy Researcher***

**Natural Resource and Ecosystem Services Working Group**

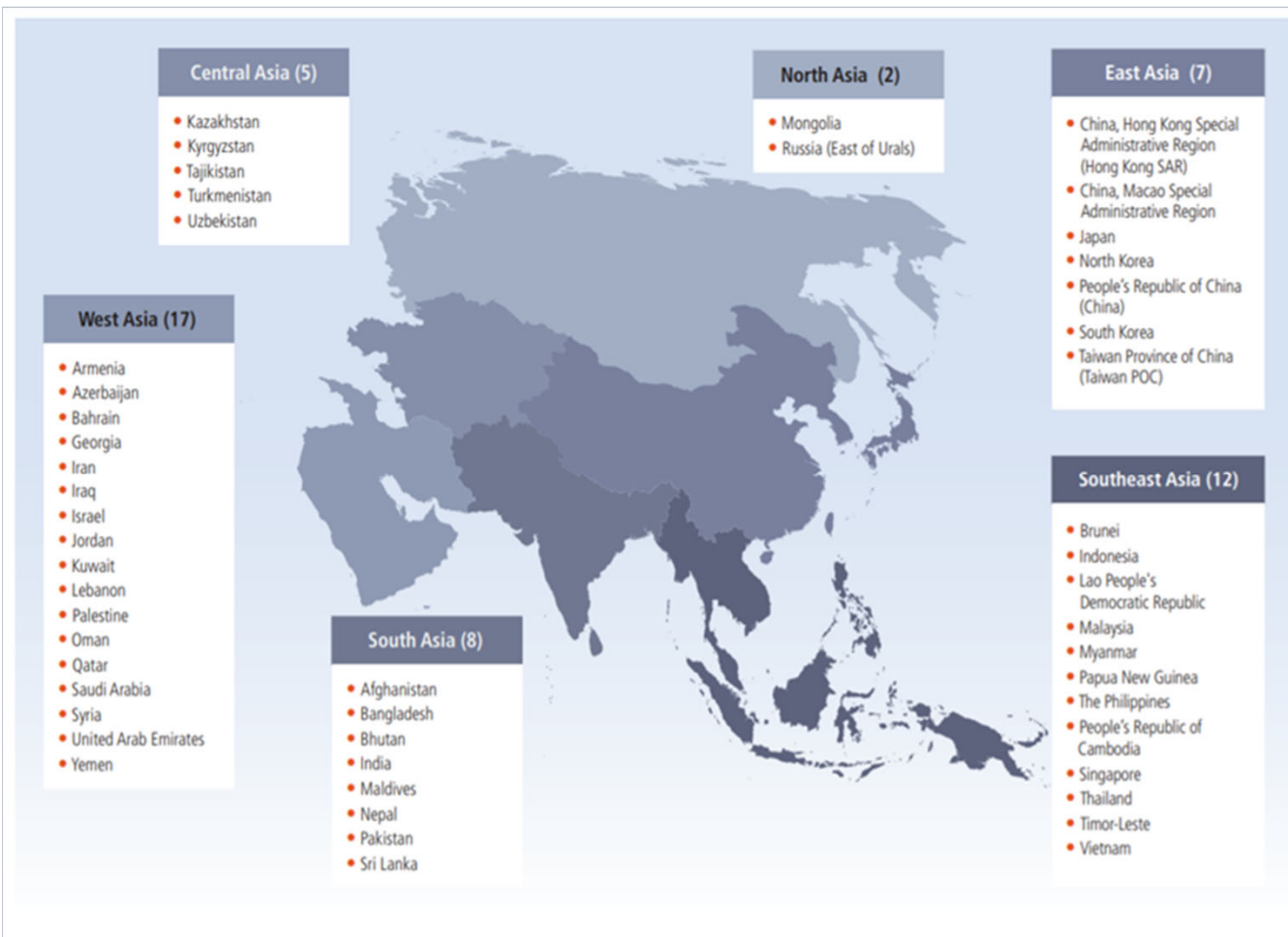
**With inputs from Dr. S.V.P.K. Prabhakar, Dr. Pankaj Kumar, Dr. Brian Alan Johnson, Dr. Bijon K. Mitra**



## Background

- [IPCC Sixth Assessment report](#) is under way, and it is scheduled to be published by [mid 2022](#).
- IGES researchers and fellows are working as experts in IPCC Sixth assessment report, including [CLAs, CS and CAs](#), particularly for the [Asia chapter](#).
- IGES researchers have also contributed [as experts in a number of other relevant global assessments](#), including the recently published [IPBES Asia-Pacific regional assessment report](#).

**The following are the key extracts for Asia.**



Source: IPCC fifth assessment report

- ❑ Asia is the most populated region with diverse climate risk profile.
- ❑ Generally, warming trends and increasing temperature, especially in overcrowded urban areas.
- ❑ Poverty and malnutrition further magnify the complexity of climate change, leading to complex scenarios for food security, loss and damage and human well-being.

# Three major climate risks for Asia

## Freshwater Scarcity

- **Logic /Evidence:** Water demand for irrigation, industry, and households continue to rise and will stabilize to 30–40% increase around 2050 as compared to 2010.
- Water Scarcity and depleting fresh water resources, particularly in arid and semi-arid areas of Asia will lead to fresh water scarcity (**high confidence**).

## Climate induced Disasters

- **Logic /Evidence:** Extreme weather events and disasters are on the rise, almost all parts of Asia.
- Asia has the largest coastal population and coastward hazards are particularly on the rise (**high confidence**).

## Rising urban risks

- **Logic /Evidence** Asia is becoming urban and will continue to be the hub of future urbanization.
- Urban heat islands often amplify the impacts of heatwaves in cities and Asia remain particularly vulnerable (**high confidence**). (IPCC 1.5 degree report)

## Freshwater Scarcity

# Projected impacts of fresh water scarcity

- Over 300 million people will live in water deficit region in Asia in 2050 as temp continue to rise (IPCC 1.5 degree report) (High confidence)
- Water scarcity is expected to be a major challenge for most of the region as a result of increased water demand. This trend worsen in the future. Boretti, A., & Rosa, L. (2019).
- An increase in intensity or frequency of droughts in some regions (medium confidence) (IPCC 1.5 degree report)
- Decreasing trends in river water discharge in South and Southeast Asia (IPCC 5th Assessment, Chapter 3)
- With increased extreme weather conditions, risk of drought-related water and food shortage causing malnutrition will be high. (IPCC 5th Assessment, Chapter 24)

# Main adaptation options for Fresh water

- **Improving capital intensive physical water infrastructure** *For example, Developing water saving technology, changing drought-resilient crops, irrigation management, control of evapotranspiration, drip irrigation and building more water reservoirs.*
- **Behavioral adaptation, i.e. changing water conservation behavior at household and institutional level, like recycling** *Exposure reduction via structural and non-structural measures, effective land-use planning Construction of monitoring and early warning systems; Measures to identify exposed areas, assist vulnerable areas and households, and diversify livelihoods*
- **Nature based Solution (NBS)** *Land use planning, wetland, forest conservation, Rain water harvesting*
- **Enhancing Disaster preparedness** *including early-warning systems and strengthening local coping strategies*
- **Adaptive/integrated water resource management** *Diversification of water sources including water re-use*
- **Exploring Indigenous local knowledge systems** *for traditional resource dependent communities*



# Observed/Projected Impacts in SE Asia

## Climate induced Disasters

- During 1990-2015, seven of top 10 most disaster affected countries due to extreme events were from Asia. Myanmar reported most losses (0.8% of GDP) followed by the Philippines (0.6%).
- There is a growing evidence for anthropogenic climate change behind the increasing frequency and intensity of extreme weather events.

# Observed/Projected Impacts in SE Asia

Country	Observed			Projected		
	Temperature	Precipitation	Observed extreme events	Temperature	Precipitation	Projected extreme events
Vietnam	0.62 °C during 1958-2014	2.6% during 1958 – 2014	Droughts increased, extreme rainfall events increased, super typhoons and typhoon period increased	1.9-2.4°C in the North and 1.7-1.9°C in the South	5-15%	Increase in strong and very strong typhoons, the intensity of droughts, number of hot days
Malaysia	0.19 °C during 1969-2015	Unclear long-term trend	Increase in extreme rainfall events	1.27-1.53 °C	3-6%	Frequent extreme dry spells, extreme rainfall events, extreme floods in specific river basins,
Thailand	1.04 °C during 1970 – 2009	64.8 mm in East-Coast Gulf	Increase in hot days, extreme flood events	1.3 – 2.3 °C	Reduced rainfall by 46 – 229 mm	Increase in hot days, increase in high rainfall events
Indonesia	0.3°C since 1990	-2-3% since 1990	Extreme rainfall events, increase in floods, storms, and droughts	0.2-0.3°C per decade	10-30% in Sumatra, Borneo by 2080	Increase in ENSO episodes, coastal flooding, wildfires
Lao PDR	0.1 to 0.3°C per decade	Declined	An increase in drought and flood events, extreme rainfall events	1.4-4.3°C	10-30% in eastern, southern parts	An increase in extreme flood and drought events
The Philippines	0.62°C during 1958-2014	Increased intense rainfall	An increase in extreme rainfall events, increase in hot days, droughts, forest fires, change in typhoon behavior	1.8-2.2 °C	Increase in intense events	An increase in extreme rainfall events, hot days, change in typhoon behavior, storm surge in coastal areas
Myanmar	0.3-0.8 °C during 1971 to 2000	Increased during March-Nov & decreased in rest	Increasing intensity and landfall of cyclones, droughts, and floods	Increase 0.8-1.4°C by 2050	~228 mm increase by 2100	Increase in extreme hot days and SLR up to 40 (cm) by 2050



## Key climate/disaster risks and Adaptation Constraints

Sub-region	Key extreme weather risks	Reported Adaptation constraints
East Asia	Coastal flooding, Heatwaves, Sea Level Rise	Very high
South East Asia	Coastal flooding, Sea Level Rise	Medium
South Asia	Coastal flooding, Drought, Sea Level Rise , Heatwaves	High
Central Asia	Snowmelt, Heatwaves, Drought	Low
North Asia	Permafrost thaw	Low
West Asia	Heatwaves, Drought	Low

- Overall, [information and policy constraints are abundant](#) in Asia.
- The [EA and SA regions reported diverse adaptation constraints](#) compared to other regions. However, it doesn't mean the region is behind in adaptation. This is largely due to the high number of papers from these regions compared to other regions.

## Overall adaptation options/practices

- Developing robust metrics and capacity of institutions for dealing with hydro-climatic disasters
- Build a **resilient infrastructure** that combines hard and soft components including green infrastructure.
- **Strengthen historical disaster databases** as they form basis for the decision making for immediate future.
- Invest in **technical capacity**, early warning and prediction mechanism.
- **Ecosystems based adaptation** has also been found to buffer the impacts from the extreme weather events
- **Build social resilience** through diversification of livelihoods, early warning systems/impact-based forecasting and warning systems, and community-based adaptation planning, and financial inclusion approaches that can buffer short-term financial shocks and quick recovery.

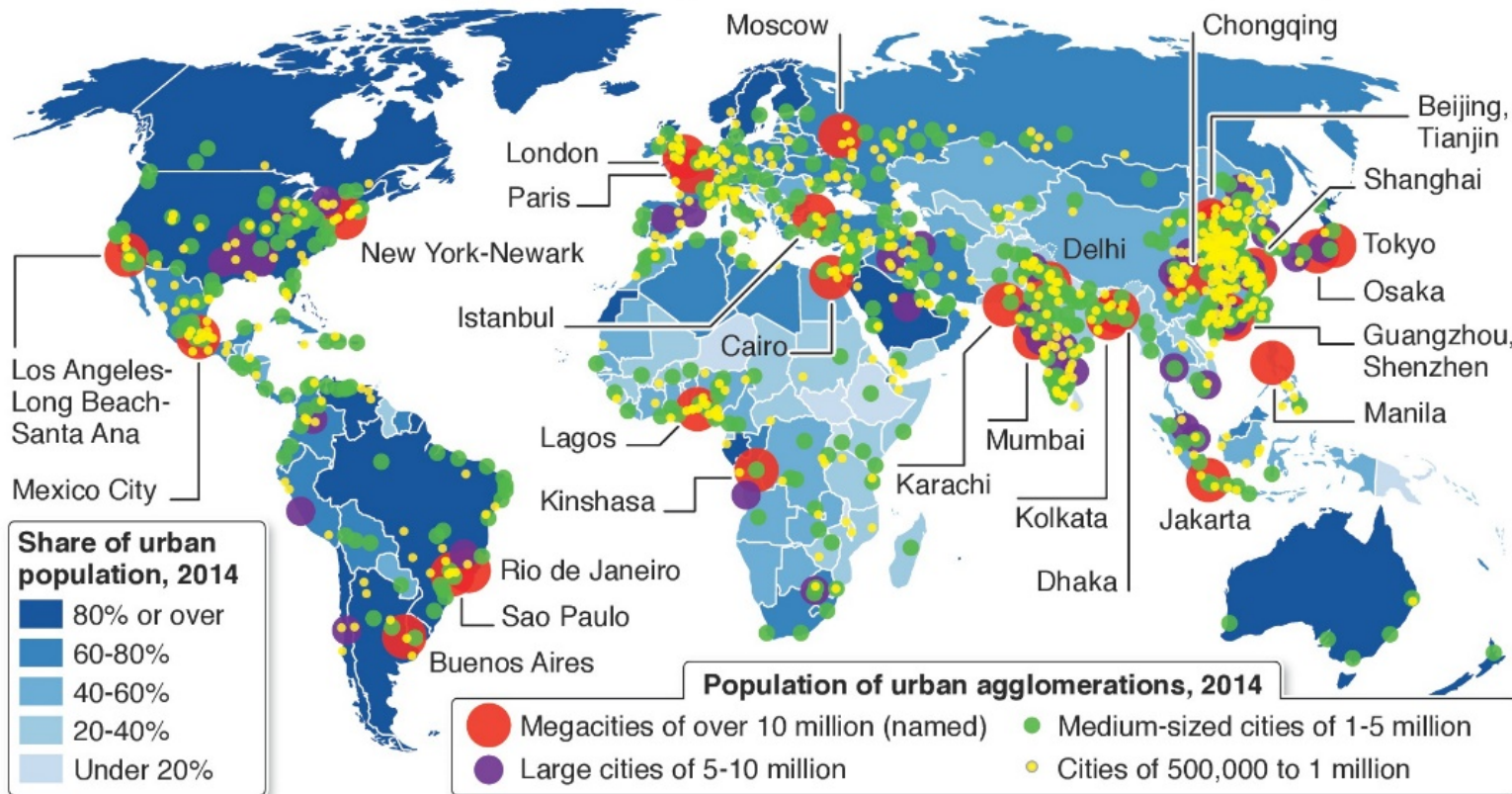
## Observed/Projected Impacts in SE Asia

### Rising urban risks

- The Asia-Pacific region has achieved rapid economic growth, and is undergoing one of the **highest rates of urbanization and agricultural expansion in the world**. This has come at a high environmental cost, causing degradation and loss of biodiversity. (IPBES Asia-Pacific report)
- South and Southwest Asia are the least urbanized but **with highest urban population growth rates** (IPCC 5th Assessment, chapter 24)
- Urban heat islands often amplify the impacts of heatwaves in cities (high confidence). (IPCC 1.5 degree report)

# UN finds more than half of people now live in cities

More than half of the global population currently lives in urban areas, with that proportion projected to reach two-thirds by 2050, according to the UN World Urbanization Prospects report



By 2050, 14 out of 23 Mega-cities with population more than 10 millions around the world will be in Asia.

## Projected Impacts

- For most key climate change associated hazards in urban areas, risk levels increase from the present (with current adaptation) to the near term but high adaptation can reduce these risk levels significantly. (IPCC AR5)
- Heatwaves will continue to rise, particularly in South and southwest Asia (IPCC AR5)
- Increased urban flooding and heat related mortality (IPCC AR5)
- Possibilities of Urban droughts and depletion of ground water (IPCC AR5)



## Main adaptation options

- **Better and resilient urban planning** *Adaptation options that also mitigate emissions can provide synergies effect, such as when land management reduces emissions and disaster risk, or when low-carbon buildings are also designed for efficient urban cooling. (IPCC 1.5 degree report)*
- **Urban-rural integration for resilient growth** *A mix of adaptation and mitigation options to limit global warming to 1.5°C, implemented in a participatory and integrated manner, can enable rapid, systemic transitions in urban and rural areas (high confidence). (IPCC 1.5 degree report)*
- **Ecosystem-based adaptation/Nature-based solution** *is a key contributor to urban resilience (medium confidence, based on medium evidence, high agreement (among practitioners)) For example, urban green spaces for cooling . (IPCC AR5/IPBES APRA)*
- **Scientific evidence based adaptation measures**, *for example, local risk and vulnerability assessments, citizen science (medium confidence, based on medium evidence, high agreement). (IPCC AR5)*



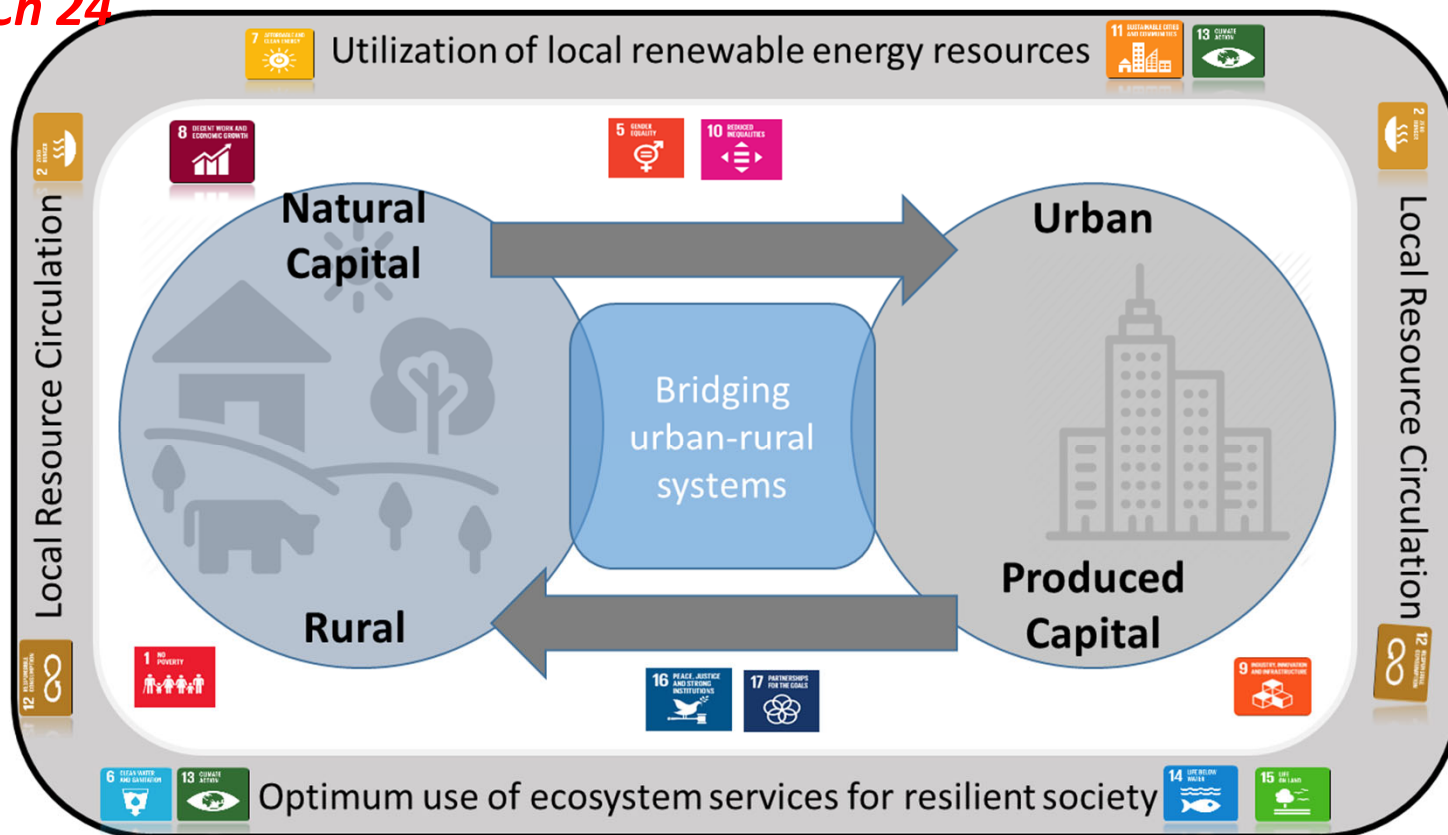
# Regional Circular Ecological Sphere (R-CES)

*“ urban and rural areas deserves particular attention when considering climate change vulnerability ...” IPCC 5<sup>th</sup> Ass. /Ch 24*

The Regional-CES concept is framed based on integration of (a) concepts of **low-carbon society**, (b) **resource circulation**, and (c) **living in harmony with nature**



**Goal: Promote decentralized, self reliant and resilient society**





**Thank you!**  
**[dasgupta@iges.or.jp](mailto:dasgupta@iges.or.jp)**