Data-Driven Solutions in Thailand Water Management and Policy

Addressing Hydrological Challenges for Uncertain Future

Somkiat Prajamwong, Ph.D.

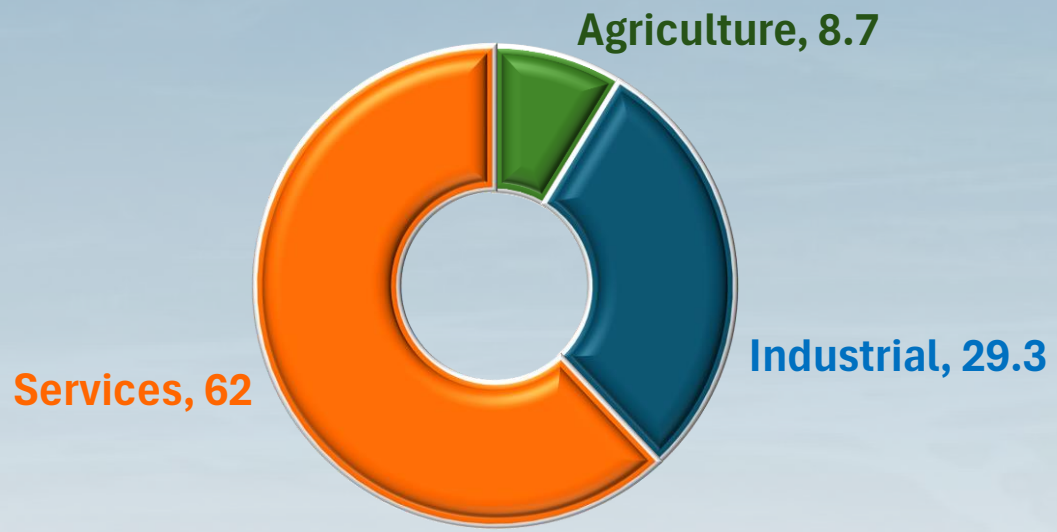
Senior Expert
National Water Resources Committee, THAILAND

Thailand Economy –

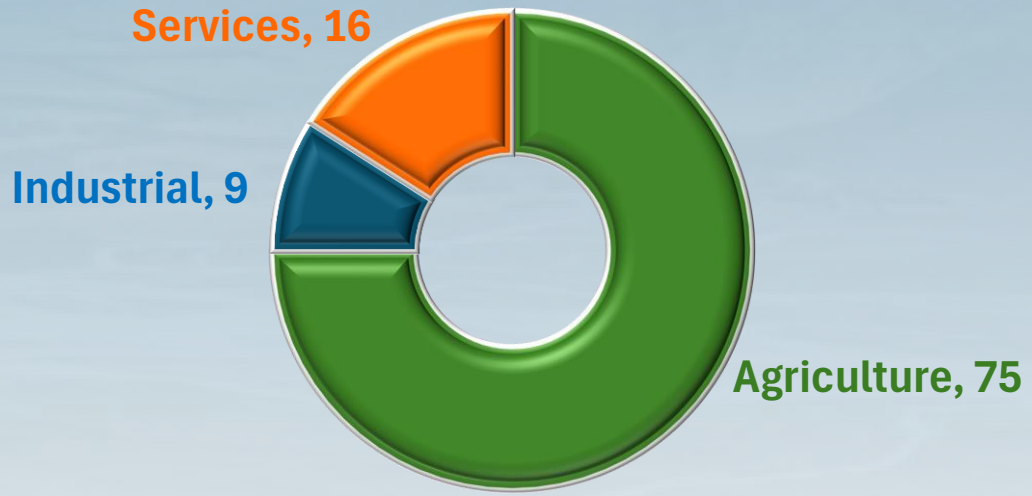
GDP Structure by Sectors Production

NESDB 2021

GDP% - Thailand

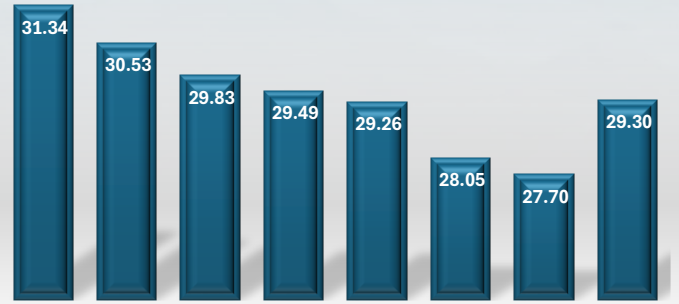


Water Use %



GDP - Agriculture (2014-2021)

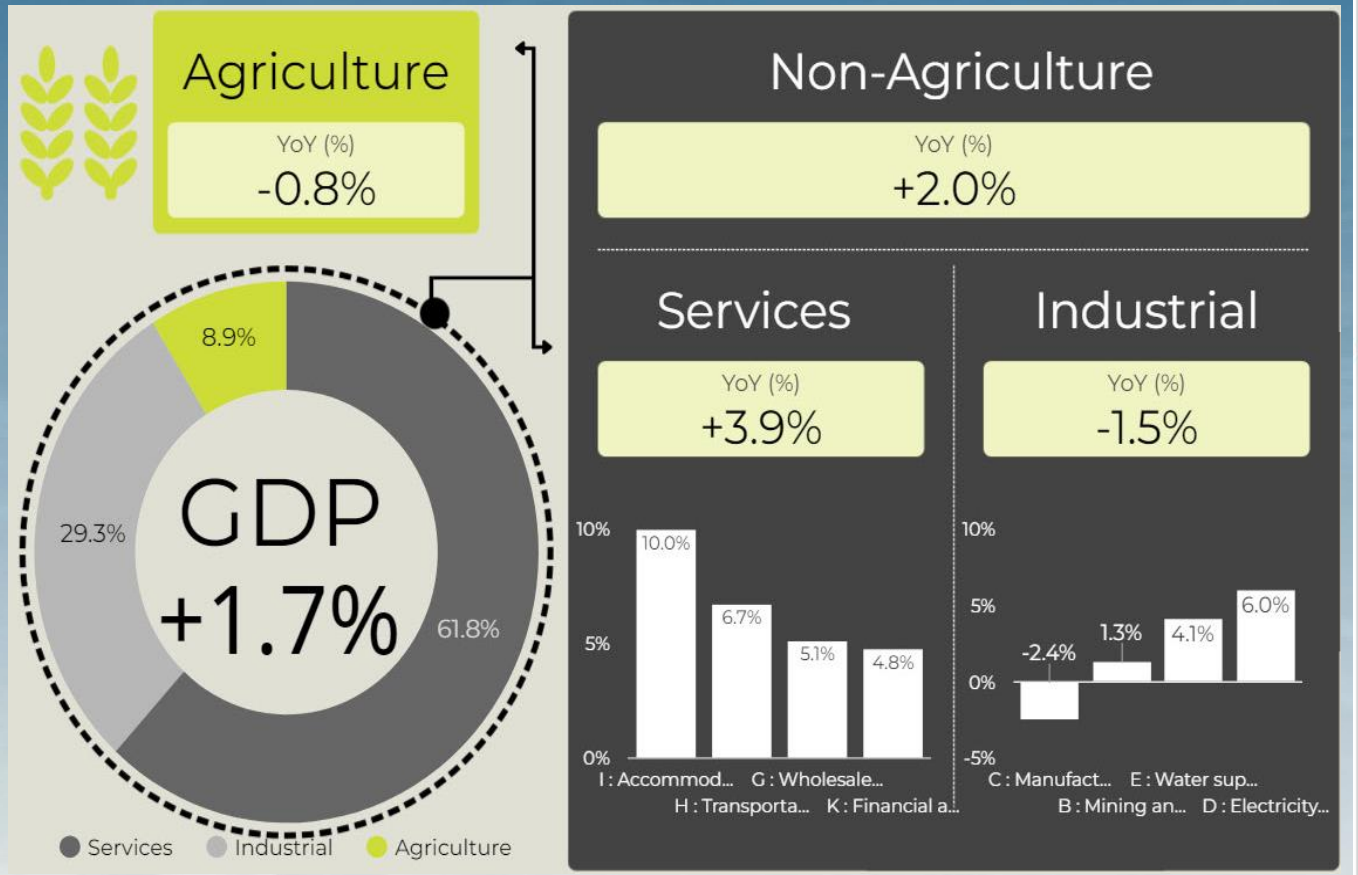
GDP - Industrial (2014-2021)



Thailand Economy –

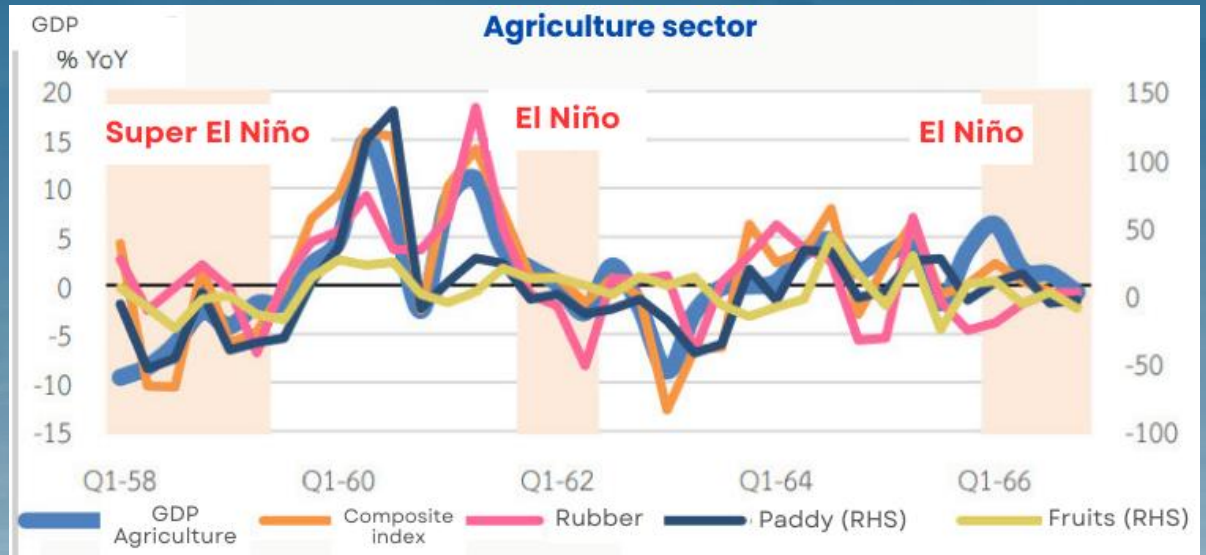
GDP By Production Approach

Year: Q4/2023

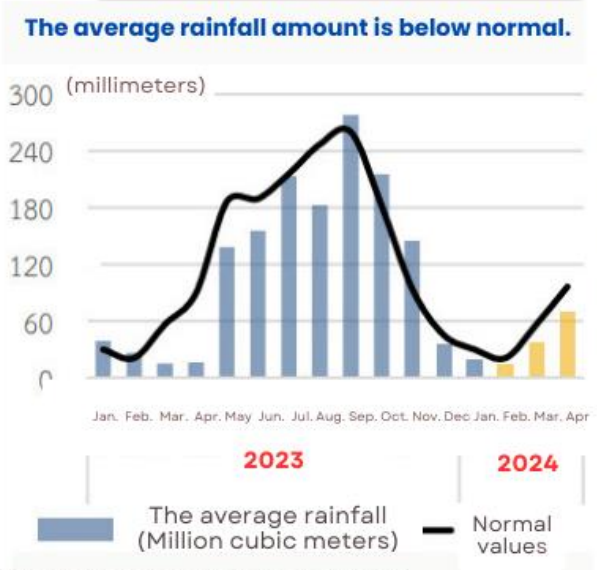


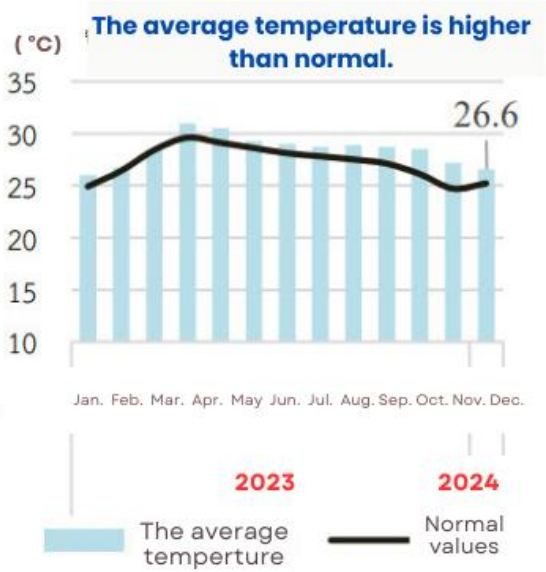
Source: NESDC, 2023

Water for prosperity and peace



Source: Office of Agricultural Economics & NESDC.

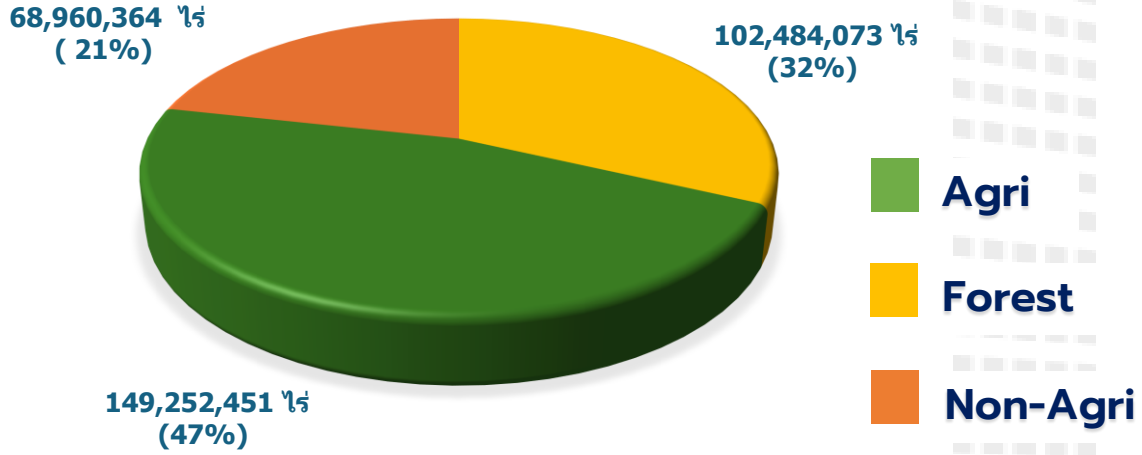




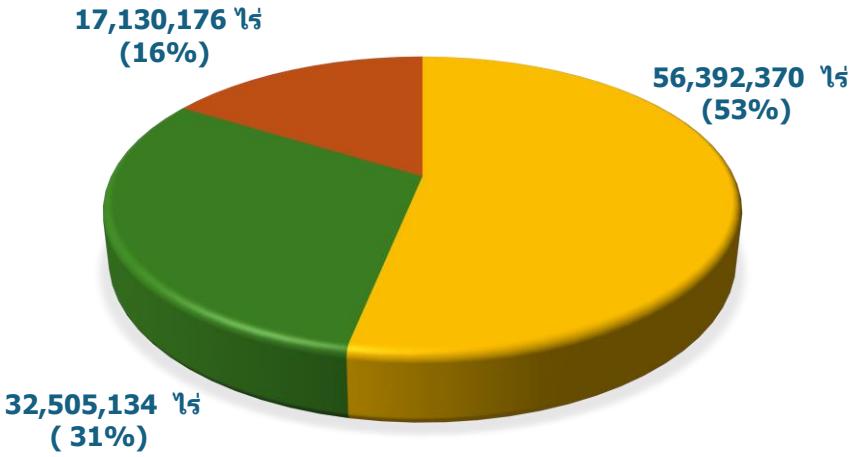
Source: Royal Irrigation Department & NESDC.

National and Regional Land Use

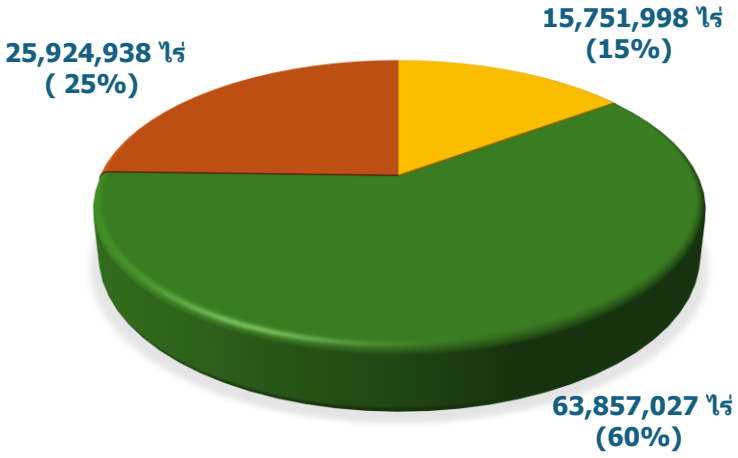
THAILAND



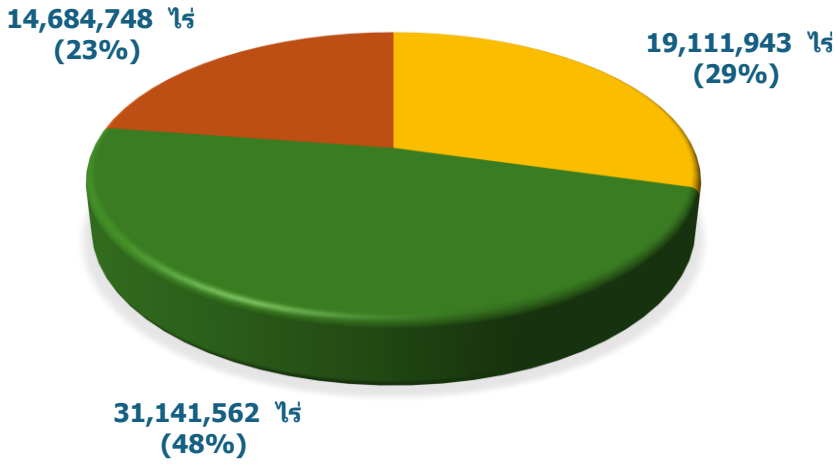
NORTHERN



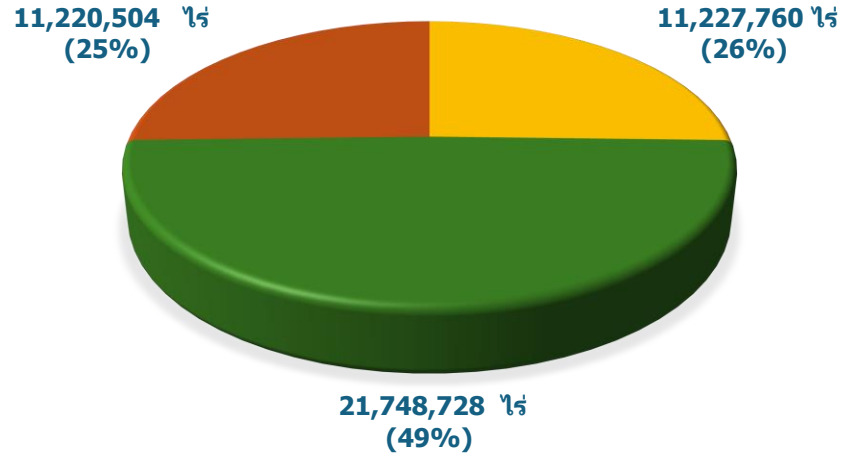
NORTHEASTERN



CENTRAL

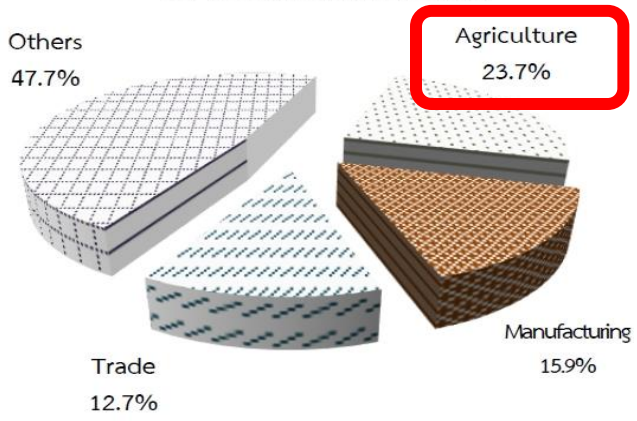


SOUTHERN

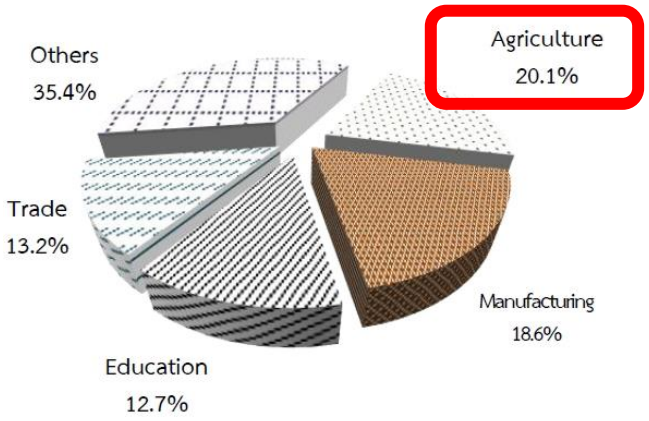


GRP Production Income Structure for 2021

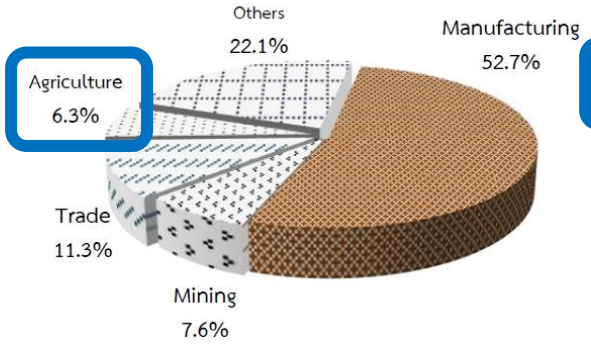
Northern Production Income Structure for 2021 in nominal terms



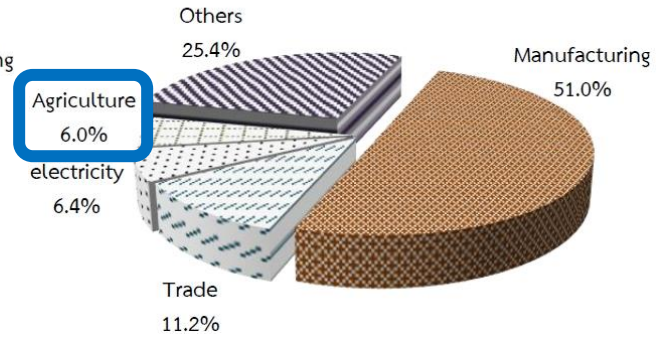
Northeastern Production Income Structure for 2021 in nominal terms



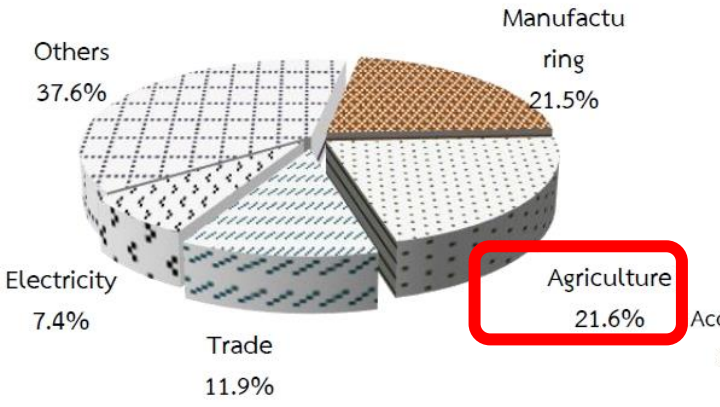
Eastern Production Income Structure for 2021 in nominal terms



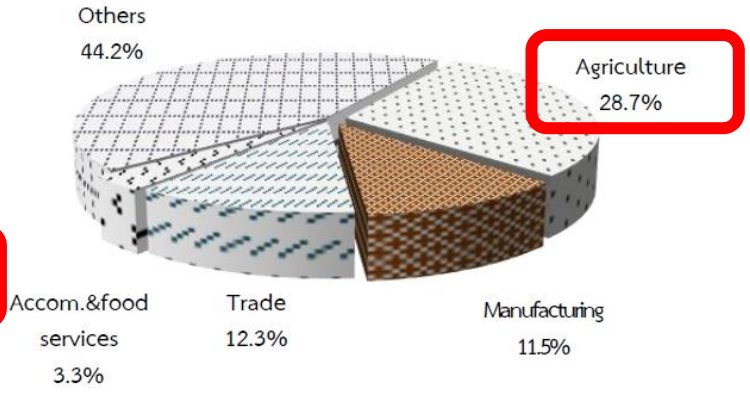
Central Production Income Structure for 2021 in nominal terms



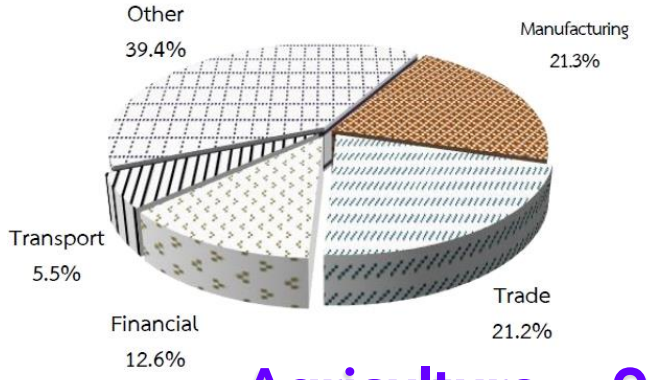
Western Production Income Structure for 2021 in nominal terms



Southern Production Income Structure for 2021 in nominal terms



Bangkok & Vicinities Production Income Structure for 2021 in nominal terms



Agriculture – 0%

Thailand Available Water Statistics 2009-2024

THAILAND

	2009/2010	2010/2011	2011/2012	2012/2013	2013/2014	2014/2015	2015/2016	2016/2017	2017/2018	2018/2019	2019/2020	2020/2021	2021/2022	2022/2023	2023/2024
Available Water (as of 1 Nov 2023)	34,998	31,851	45,328	31,469	33,069	24,526	20,035	28,837	40,356	37,425	26,666	23,543	34,674	40,177	36,762
Dry-Season Rice Field (Planned)	7.50	8.91	10.92	8.44	6.74	6.00	1.13	4.00	8.35	8.03	2.31	1.90	6.41	10.42	5.79
Dry-Season Rice Field (Actual)	9.55	10.26	11.31	9.78	10.32	9.75	3.50	7.68	9.51	8.76	4.21	5.41	8.11	10.39	

CHAO PHRAYA

	2009/2010	2010/2011	2011/2012	2012/2013	2013/2014	2014/2015	2015/2016	2016/2017	2017/2018	2018/2019	2019/2020	2020/2021	2021/2022	2022/2023	2023/2024
Available Water (as of 1 Nov 2023)	9,667	11,340	18,153	10,075	8,153	6,771	4,247	9,704	14,187	12,840	5,371	5,771	7,744	14,074	11,085
Dry-Season Rice Field (Planned)	4.46	5.15	6.80	5.40	2.90	2.03	0.00	2.67	5.17	5.30	0.00	0.00	2.81	6.64	3.03
Dry-Season Rice Field (Actual)	5.87	6.34	5.56	6.33	5.98	6.20	1.99	5.35	5.89	5.86	1.98	2.79	4.41	6.35	

3 TYPES OF DROUGHT

METEOROLOGICAL DROUGHT

Meteorological Droughts are region-specific; they occur when an area receives less rainfall than it normally should.

Below Normal **Rainfall**

HYDROLOGICAL DROUGHT

Hydrological Droughts occur when there is a lack of surface and subsurface water supply.

Below Normal **Surface Water** **Groundwater**

AGRICULTURAL DROUGHT

Agricultural Droughts occur when there is not enough moisture in the soil to sustain the growth of crops.

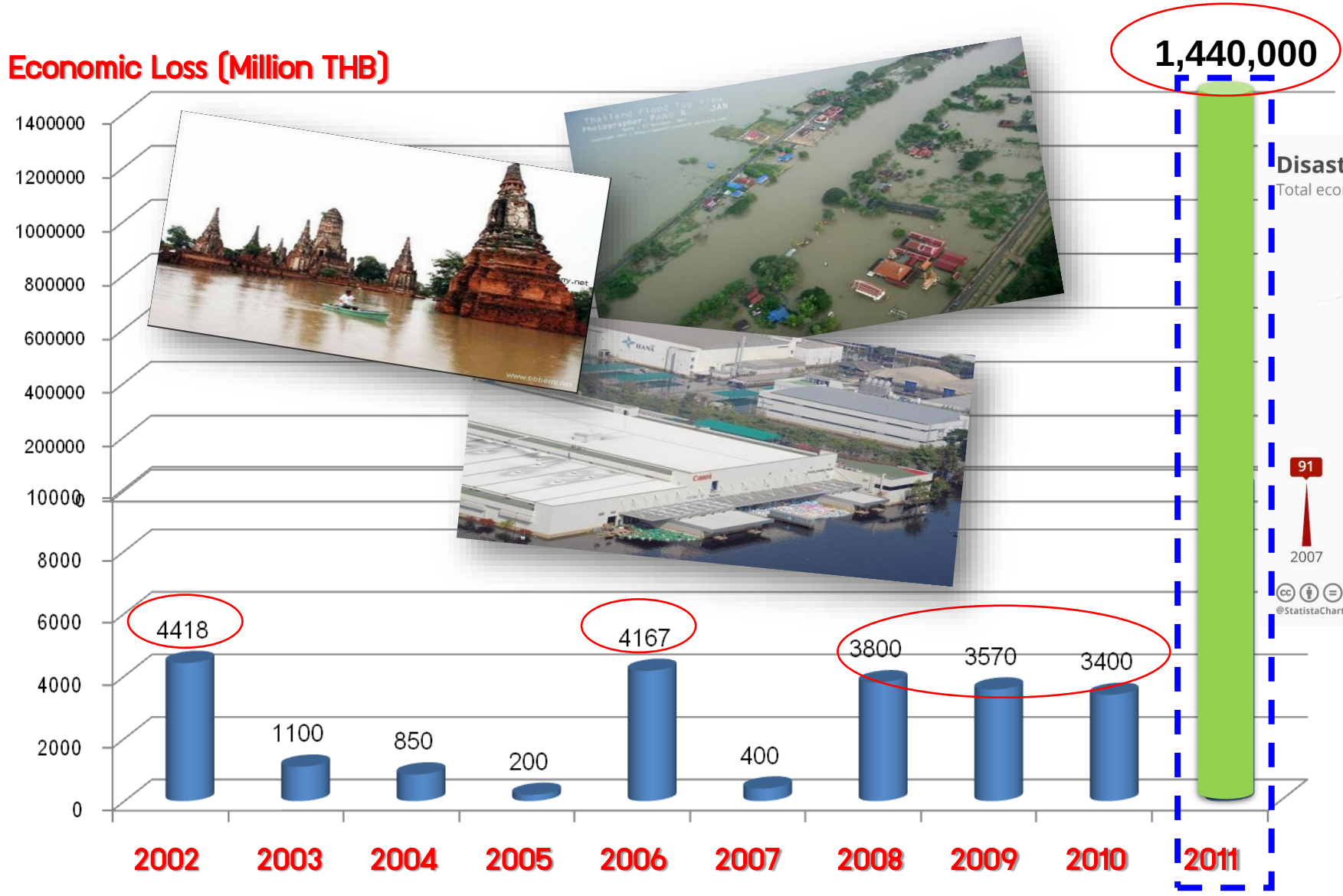
Below Normal **Soil Moisture**

Drought Types & Classification

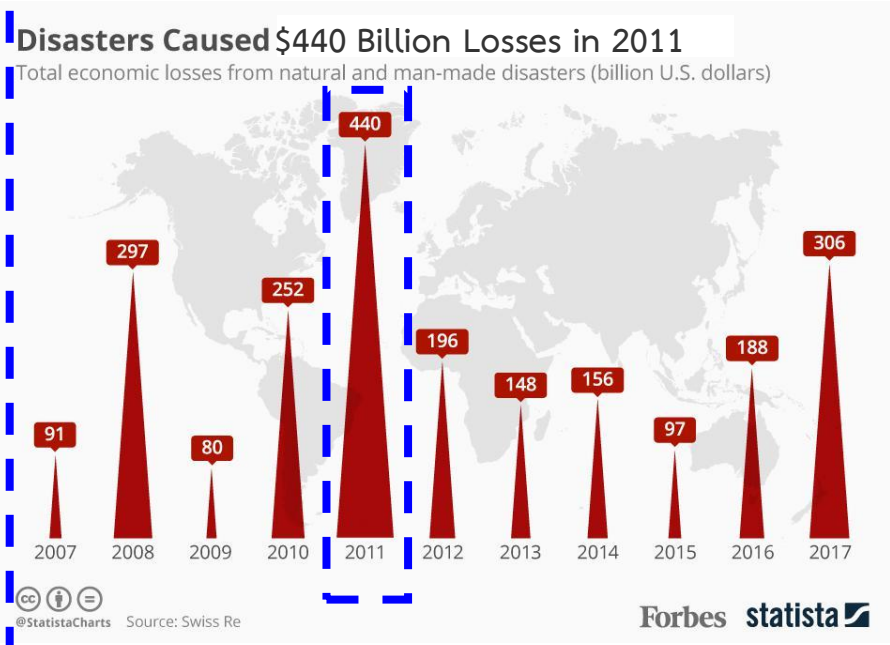
Economic Loss from Flood in Chao Phraya River Basin 2002-2011

& Global Economic Loss from Disasters 2007-2017

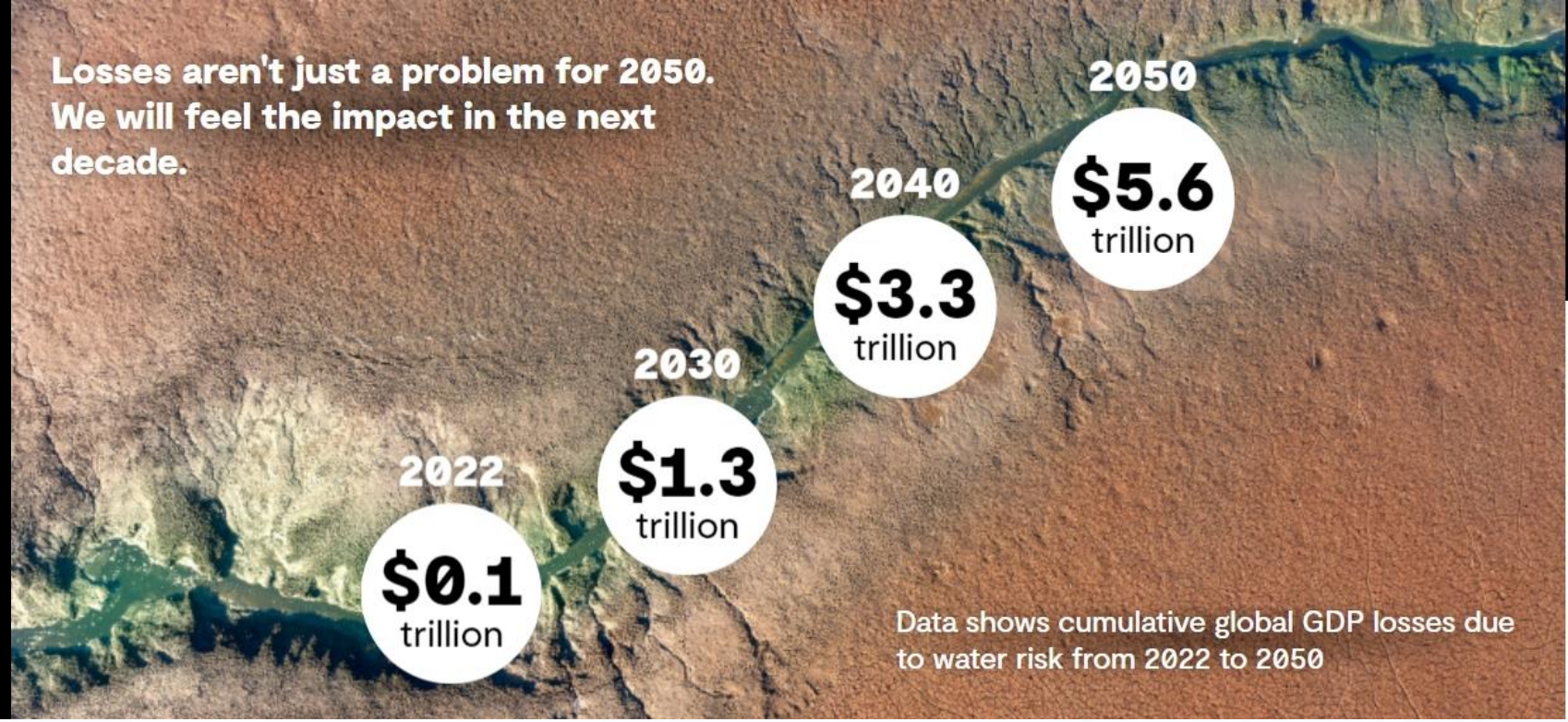
Economic Loss (Million THB)



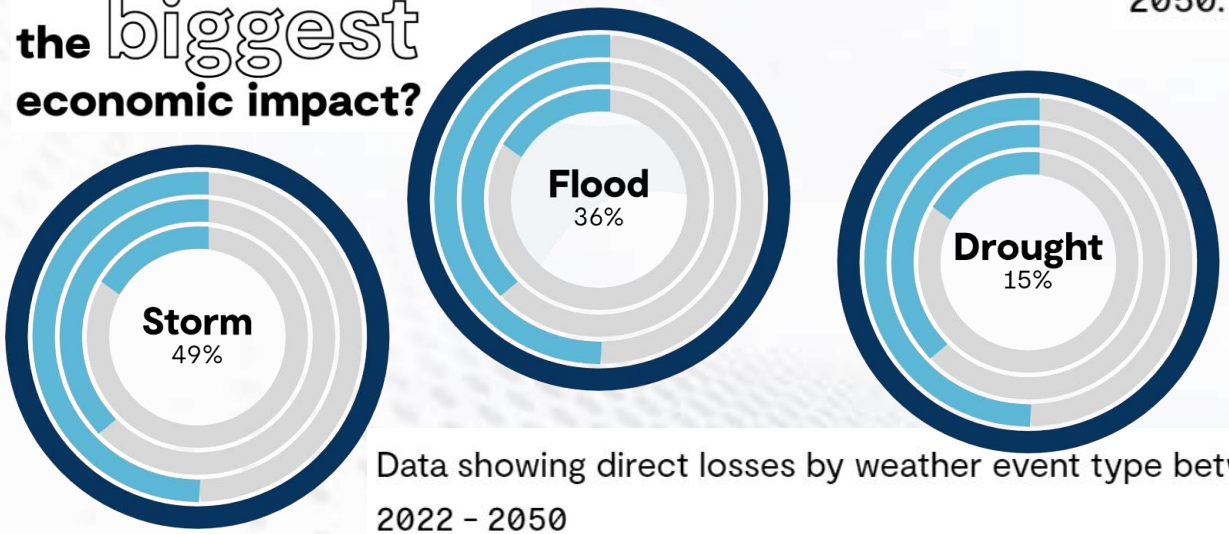
Global-Scale



Water risk could wipe $5.6 trillion from GDP by 2050.

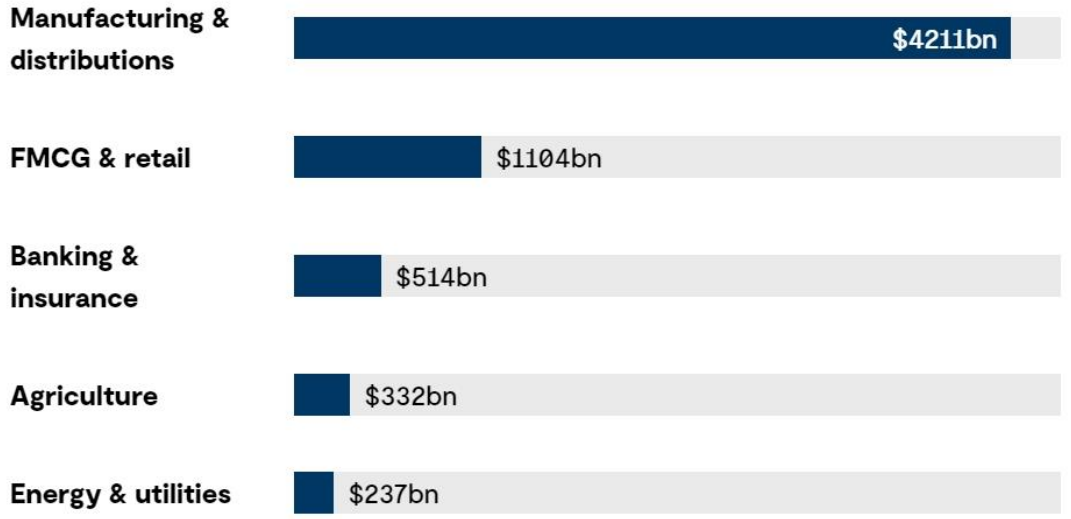


What events will cause the biggest economic impact?

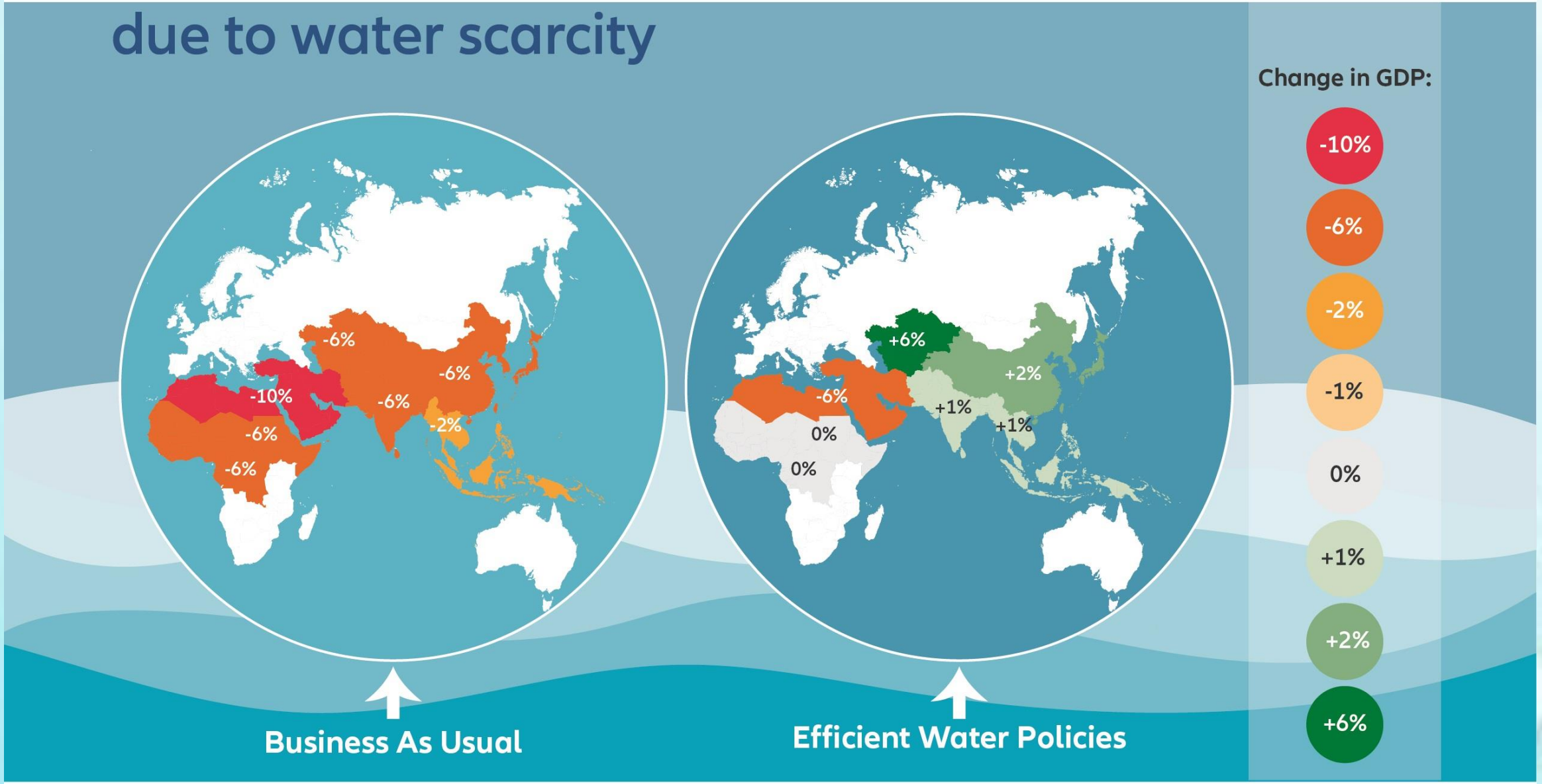


Data showing direct losses by weather event type between 2022 - 2050

Data shown is total global GDP loss in USD (billions) by sector between 2022 and 2050.



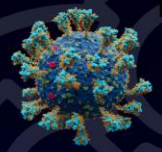
Estimated change in 2050 GDP due to water scarcity



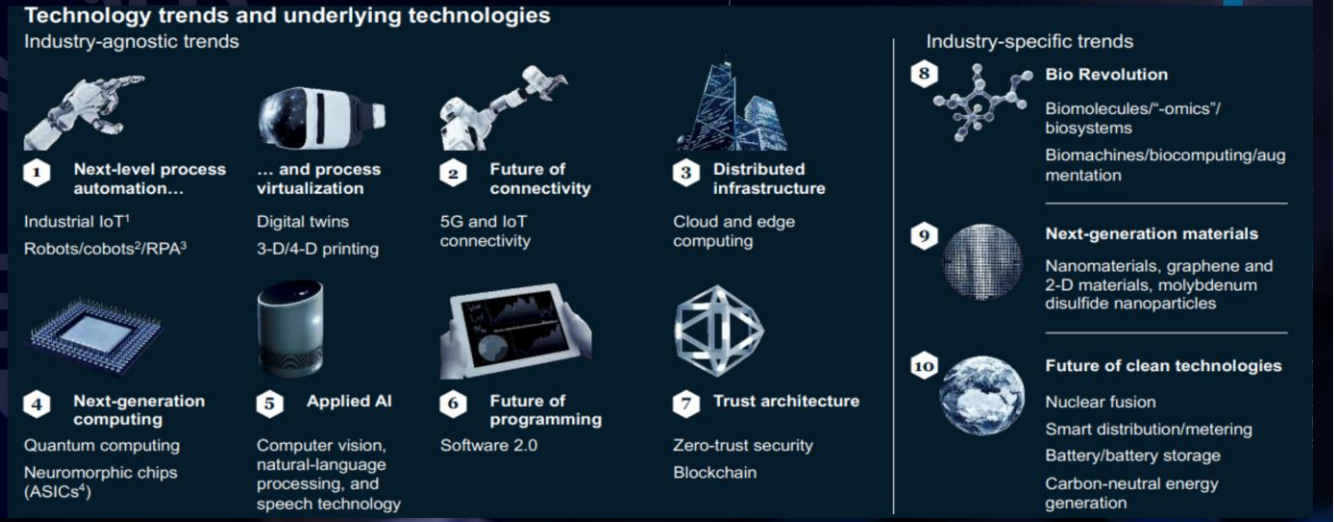
Source: WRI 2023

GLOBAL TRENDS

CLIMATE CHANGE Global Warming of 1.5 °C

RECESSION  COVID-19 recession (2020–2022) “The Great Lockdown”

DISRUPTIVES TECHNOLOGY

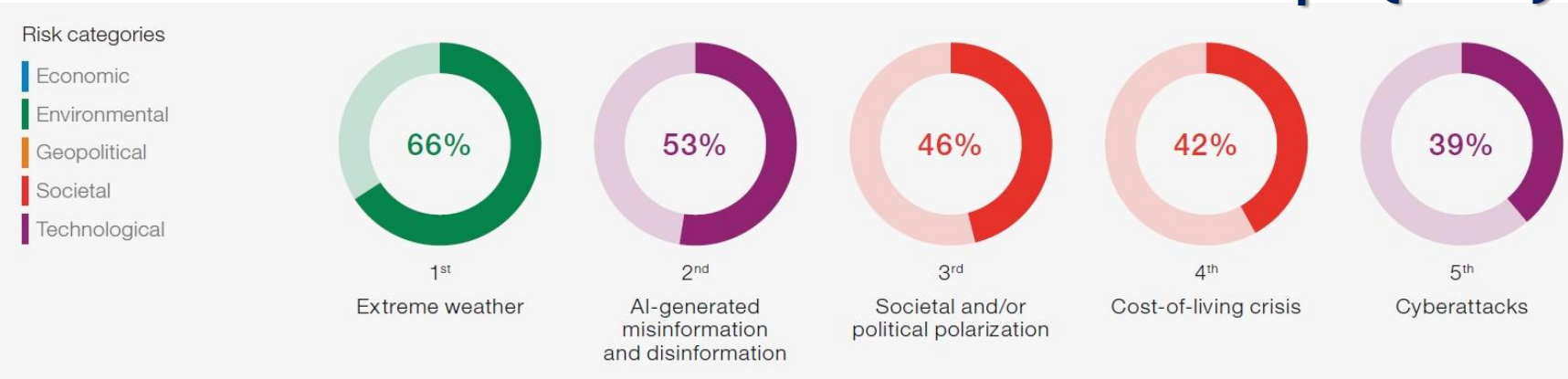


External Drivers and Global Risks with Significant IMPACTS

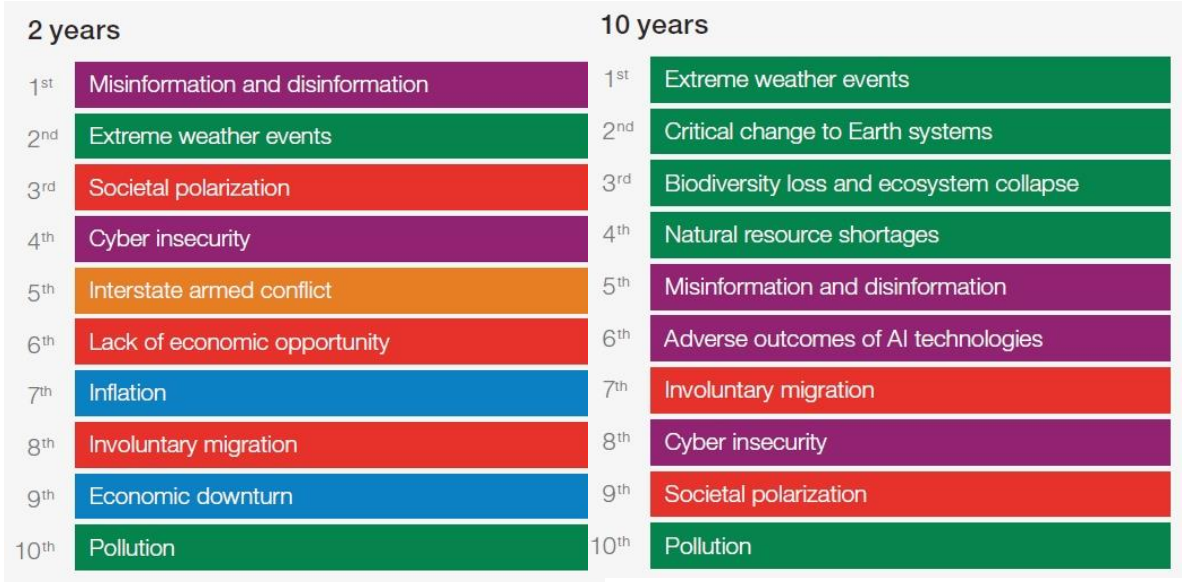
1. Climate Change
2. Population Growth
3. Urbanization
4. Megacities
5. Aging Infrastructure

United Nations. The Sustainable Development Goal Report (2019)

Current Risk Landscape (2024)

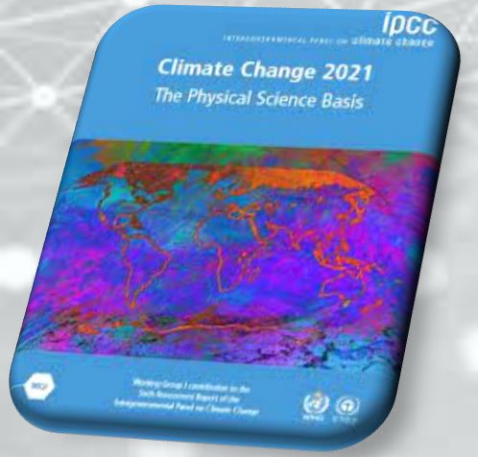


Global Risks Ranked by Severity and Impacts over the Short and Long Term



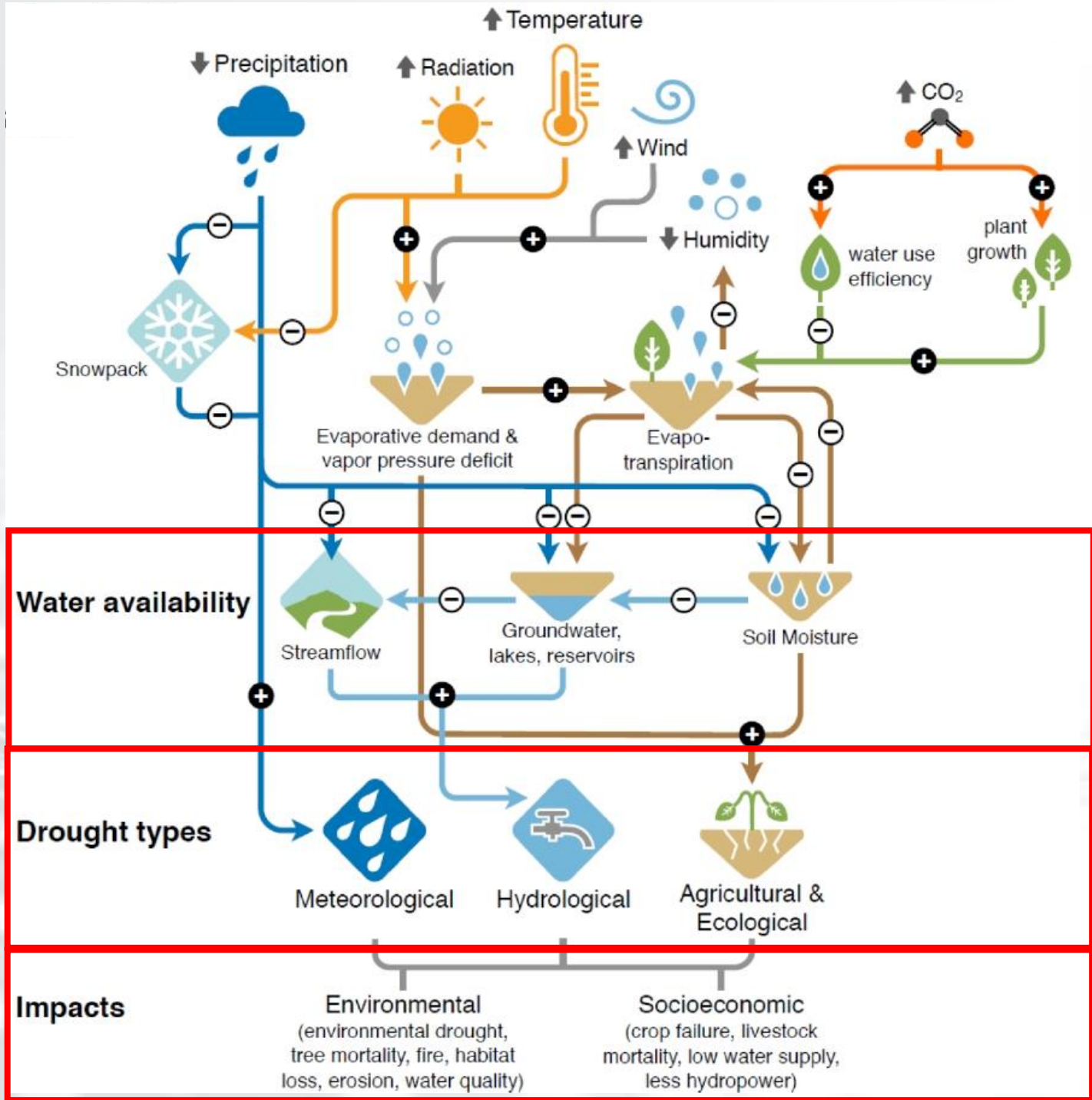
The Global Risks Report 2024 (World Economic Forum Perception Survey 2023-2024)

Climate Drivers of Drought, Effects on Water Availability, and Impacts



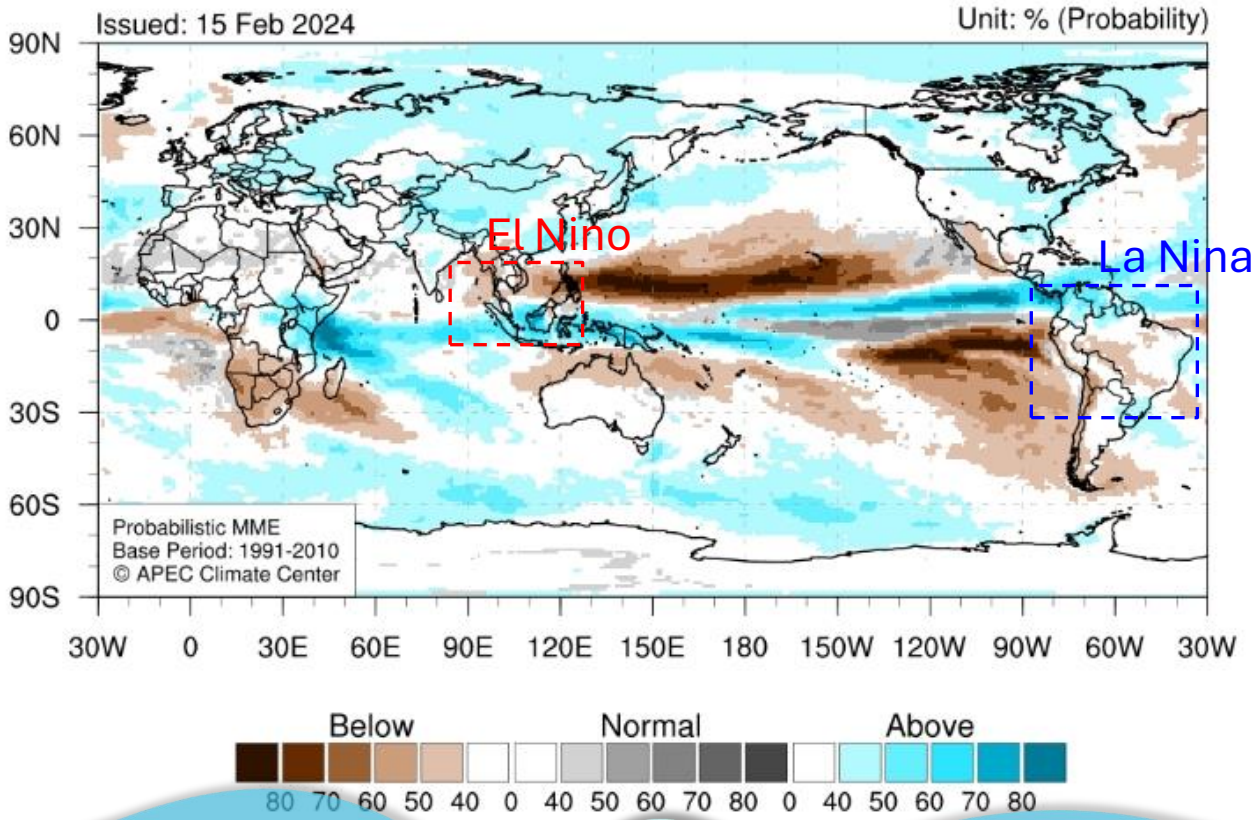
(IPCC WG1 AR6 Ch8, 2021)

+ and - signs denote the direction of change that drivers have on factors such as snowpack, evapotranspiration, soil moisture, and water storage.

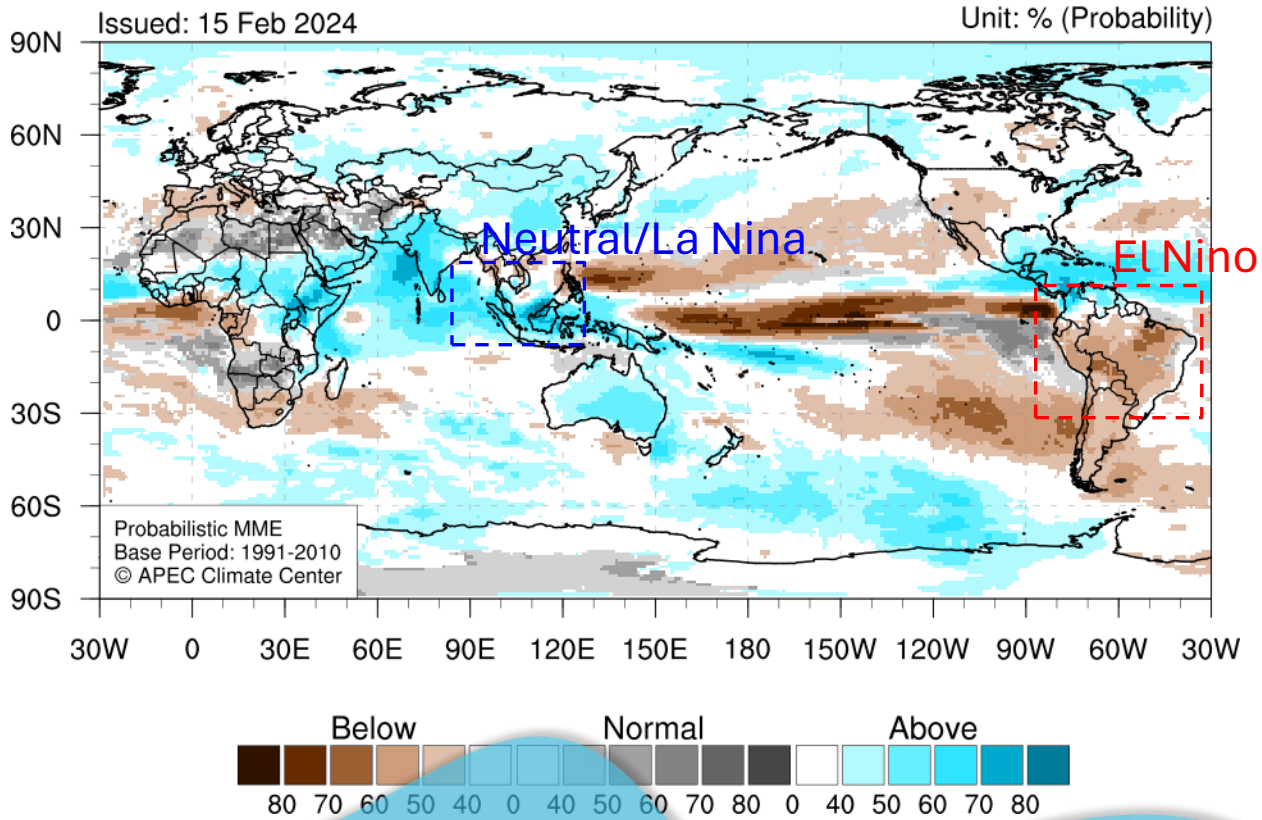


El Nino and La Nina Impacts to Global Precipitation Projection

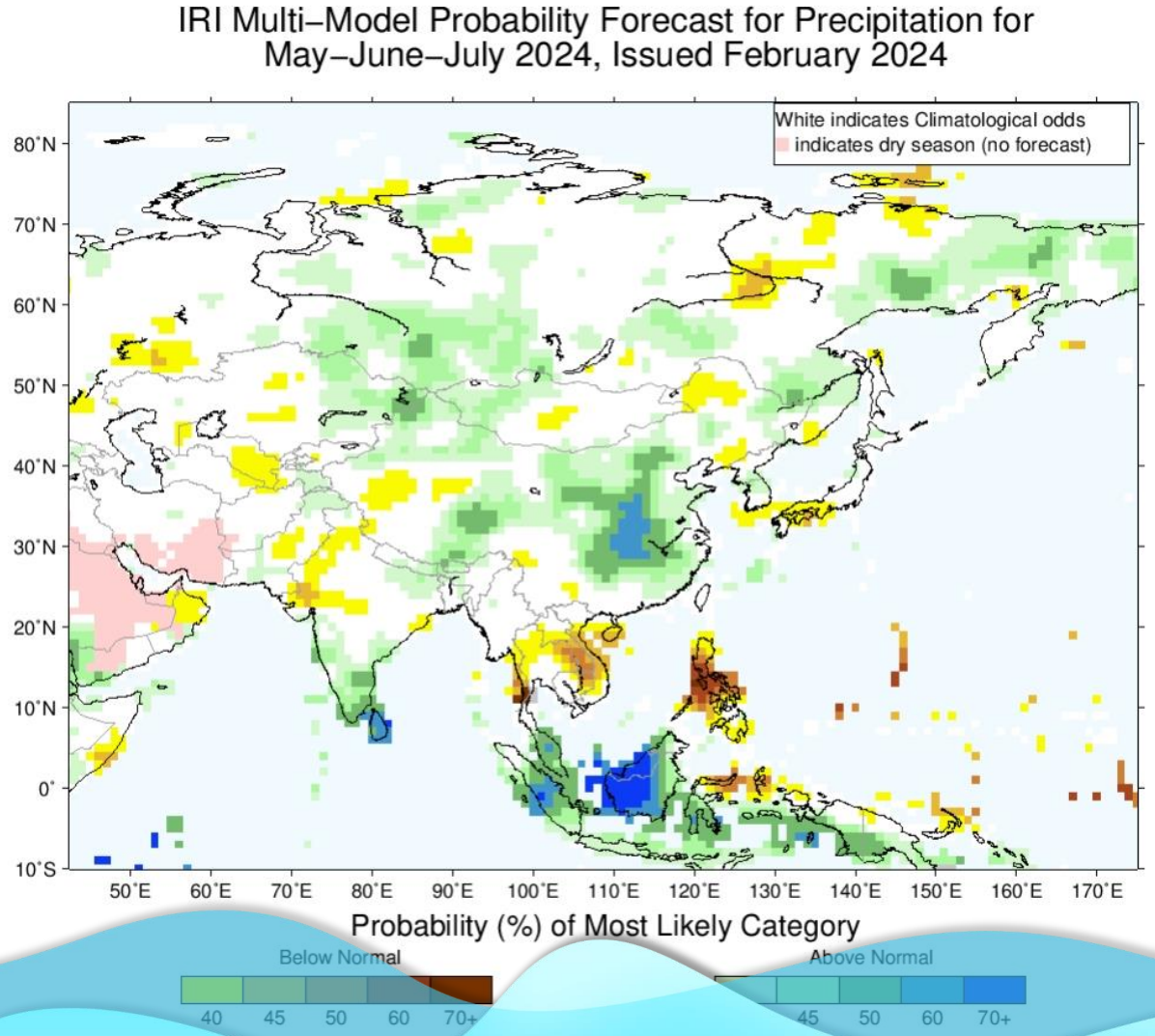
Precipitation for March-May 2024

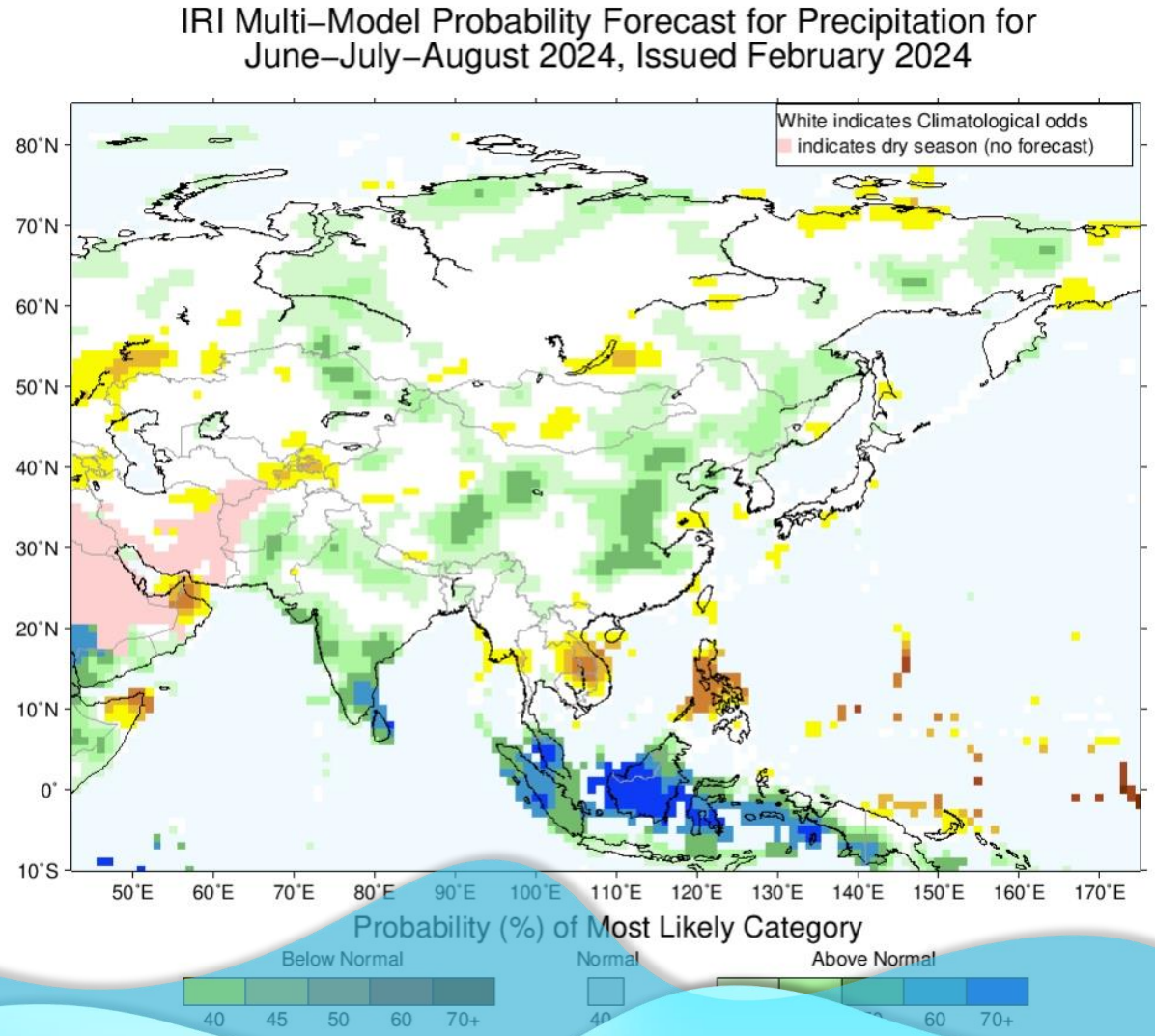


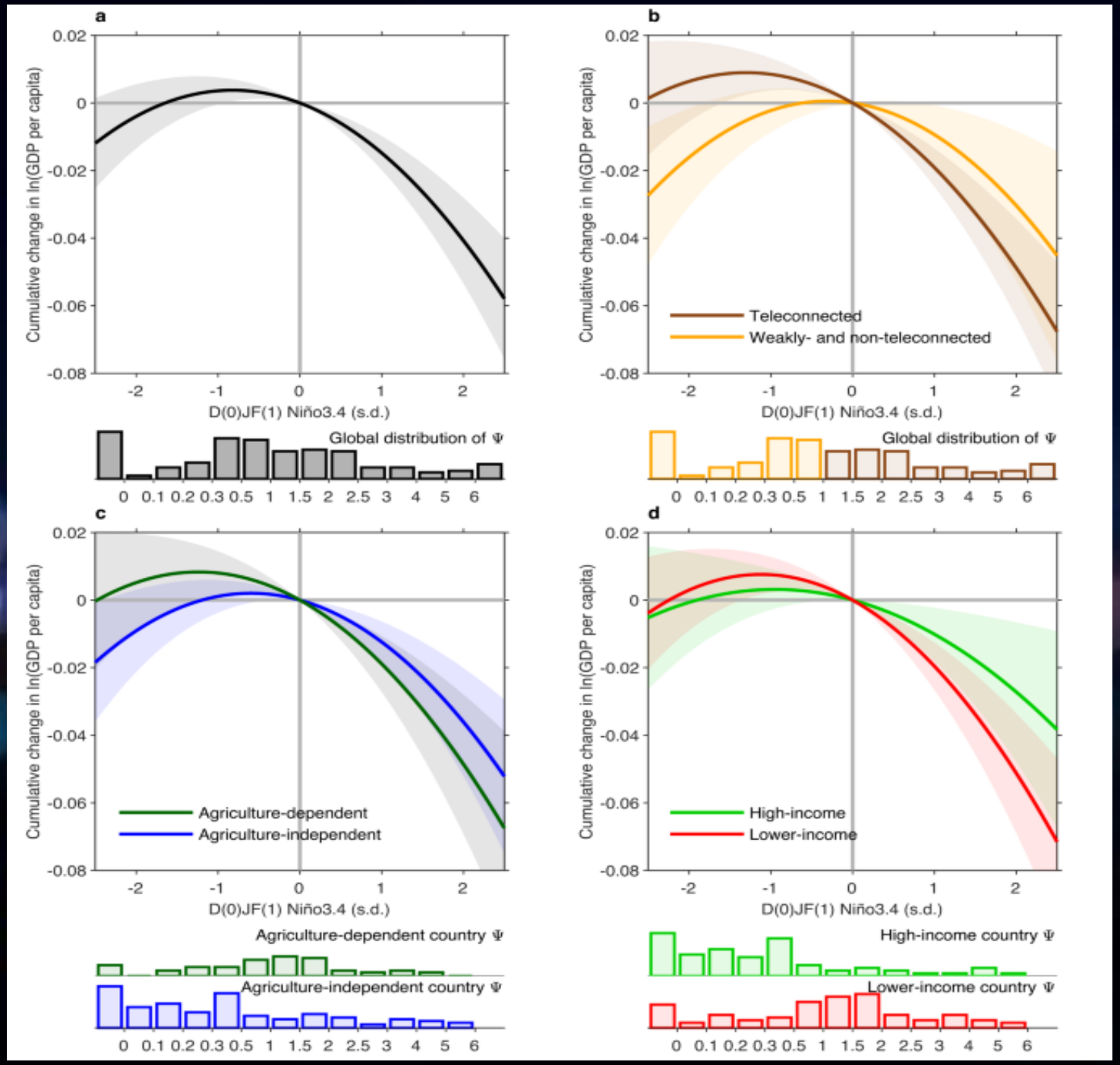
Precipitation for June-August 2024



El Nino and La Nina Impacts to ASIA Precipitation Projection







Non-Linear Effect of ENSO on Global Economic Production (1960-2019)

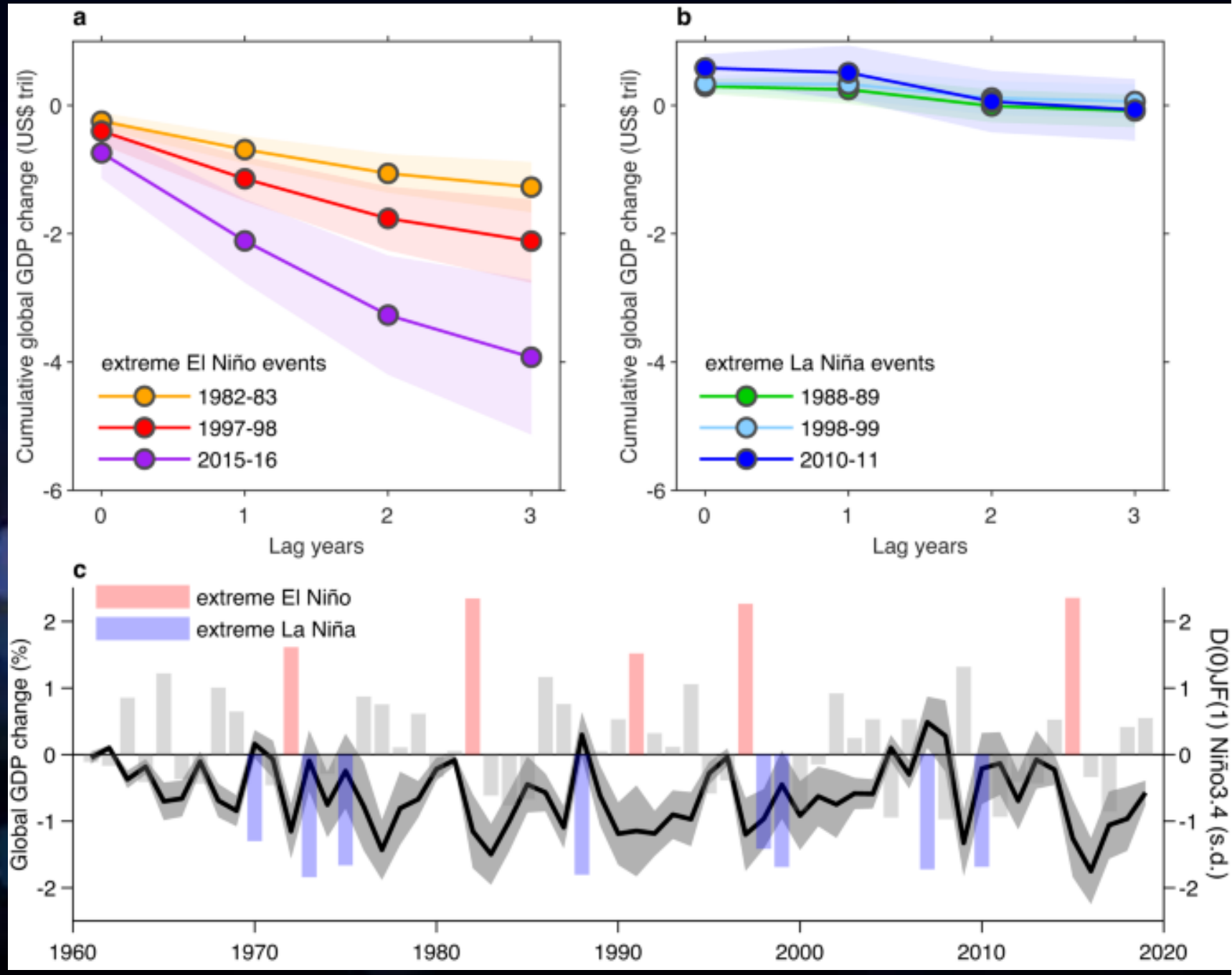
There is a negative and statistically significant impact on economic growth during El Niño, but the impact is by and large insignificant for La Niña.

Both extreme El Niño and La Niña cause damage on economic growth, but the damage is far greater during El Niño than during La Niña; weak and moderate La Niña events produce a smaller benefit, which in amplitude is far smaller than the damage of weak El Niño events.

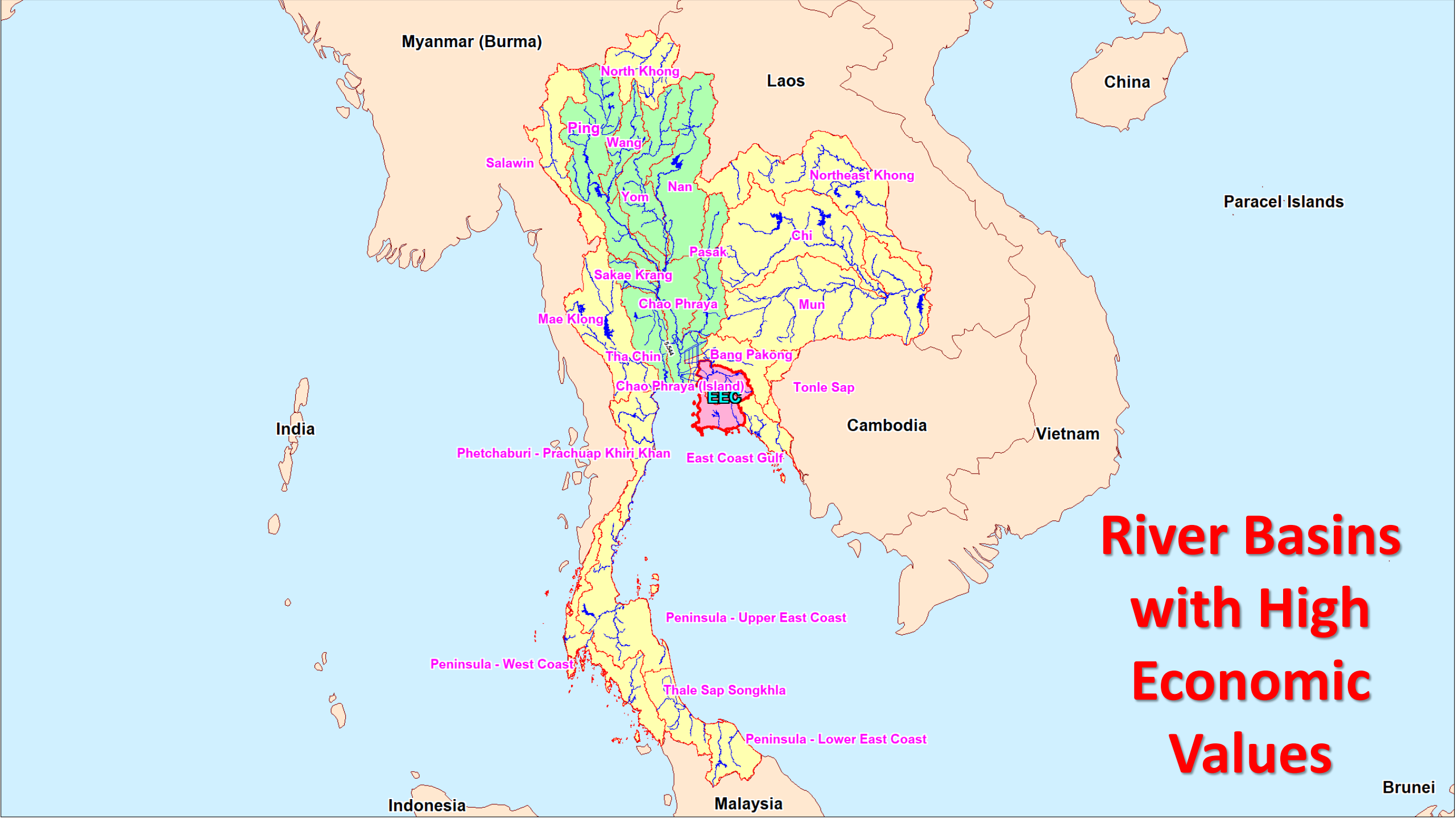
Liu et al. (2023) Nature Communication.

Observed Economic Production Loss from ENSO

The contemporaneous loss amounts to US$246, US$401 and US$739 billion for the extreme El Niño events of 1982–83, 1997–98 and 2015–16, respectively, (about 0.9–1.0% of global GDP at the time) in the El Niño occurrence year



Liu et al. (2023) Nature Communication.


Myanmar (Burma)
Laos
China
Paracel Islands
India
Cambodia
Vietnam
Brunei
Indonesia
Malaysia
North Khong
Ping
Wang
Salawin
Nan
Yom
Northeast Khong
Chi
Pasak
Sakae Krang
Chao Phraya
Mun
Mae Klong
Tha Chin
Bang Pakong
Chao Phraya (Island)
EEC
Tonle Sap
Phetchaburi - Prachuap Khiri Khan
East Coast Gulf
Peninsula - Upper East Coast
Peninsula - West Coast
Thale Sap Songkhla
Peninsula - Lower East Coast
River Basins with High Economic Values

Actionable Solutions and Collaborative Change

Development Approaches

- Inclusiveness
- Integration
- Universal

Data-Driven Solutions for Water Management and Policy

Addressing Hydrological Challenges for Uncertain Future

Participation / Partnership
- Public Participation
- Public Acceptance
- Community-Based Adaptation
- Data Sharing

Policy
- Embracing Sustainability (SDGs)
- 20-yrs Water Resources Master Plan
- River Basin Master Plan
- Building Water and Climate Resilience

Economics
- Water Pricing Reflecting Water Scarcity and Full Supply Costs
- Water Trading

DATA
Big Data
Information

DATA Management
Data Screening

Innovation /Technologies
- AI in Water
- Flood/Drought Forecasting
- Early-Warning System
- Leak/Loss Management
- Nature-Based Solutions

Finance
- Water Funds
- Integrated Budget (Central and Locals)
- Incentives
- Investing for Water Security
- Water Grids

Institutions and Laws
- Water Resources Act B.E. 2561
- Water Institution Reform
- Water Governance

Thailand's National Adaptation Plan

Database of Monitoring and Evaluation

The Sectoral Indicators at the Policy Level in Monitoring and Evaluation of the National Adaptation Plan

The focal point for database of monitoring and evaluation

Office of Natural Resources and Environment Policy and Planning

Water Resources Management

Increase water security and reduce loss and damage from water-related disasters

Sectoral Indicators

Agriculture and Food Security

Maintain productivity and food security

Sectoral Indicators

Tourism

Strengthen the capacity of the tourism sector towards climate resilience and sustainable growth

Sectoral Indicators

Public Health

Effective public health systems to manage risks and reduce impacts from climate change

Sectoral Indicators

Natural Resources Management

Sustainable management of biodiversity resources to respond to climate change impacts

Sectoral Indicators

Human Settlements and Security

Enhance capacity of individuals, communities, and cities, to adapt to Climate Change impacts appropriately according to the local opinion

Sectoral Indicators

Overall Performance by SDG 2023 - Global

SDR 2023

Overall score

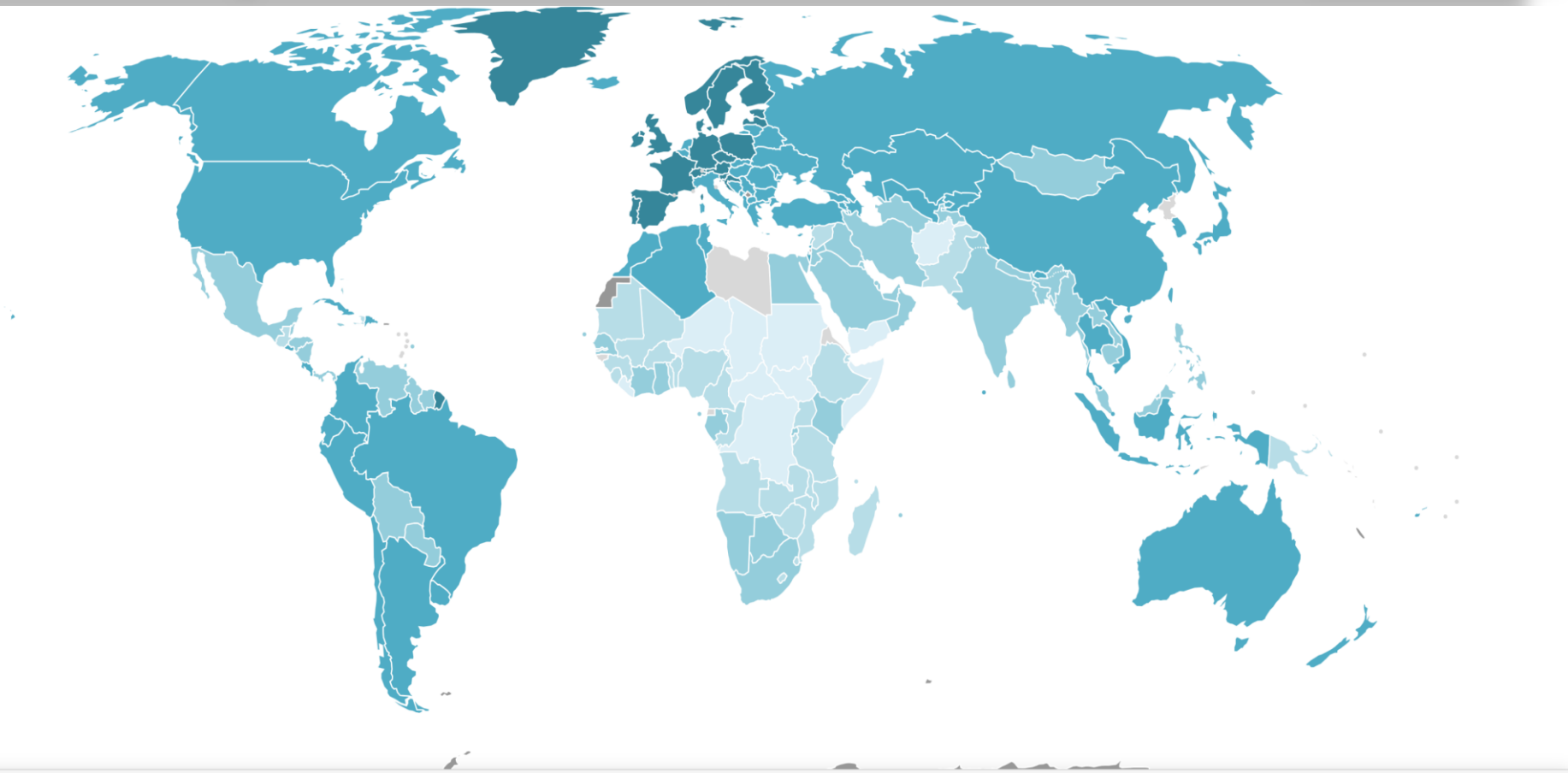
Legend

Click on a country to see its performance.

- > 80
- 70 - 80
- 60 - 70
- 50 - 60
- < 50
- Information unavailable

Description

The overall score measures the total progress towards achieving all 17 SDGs. The score can be interpreted as a percentage of SDG achievement. A score of 100 indicates that all SDGs have been achieved.



SUSTAINABLE DEVELOPMENT REPORT

All data presented on this website are based on the publication Sachs, J.D., Lafortune, G., Fuller, G., Drumm, E. (2023). Implementing the SDG Stimulus. Sustainable Development Report 2023. Paris: SDSN, Dublin: Dublin University Press, 2023. 10.25546/102924

SDG 2023 Dashboards and Trends for Thailand

Thailand

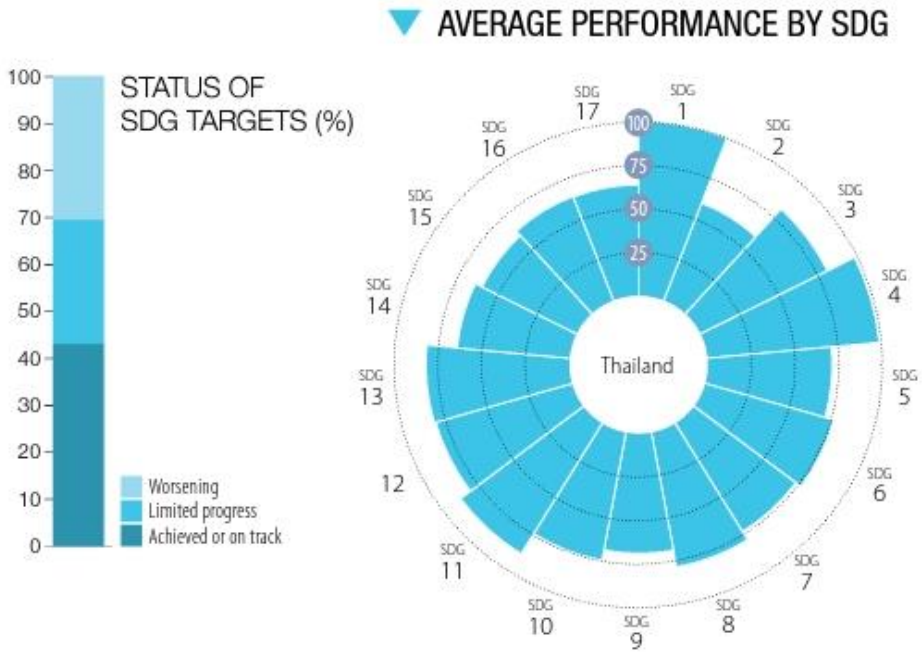
East and South Asia

BACK OVERVIEW INDICATORS FACT SHEET POLICY EFFORTS

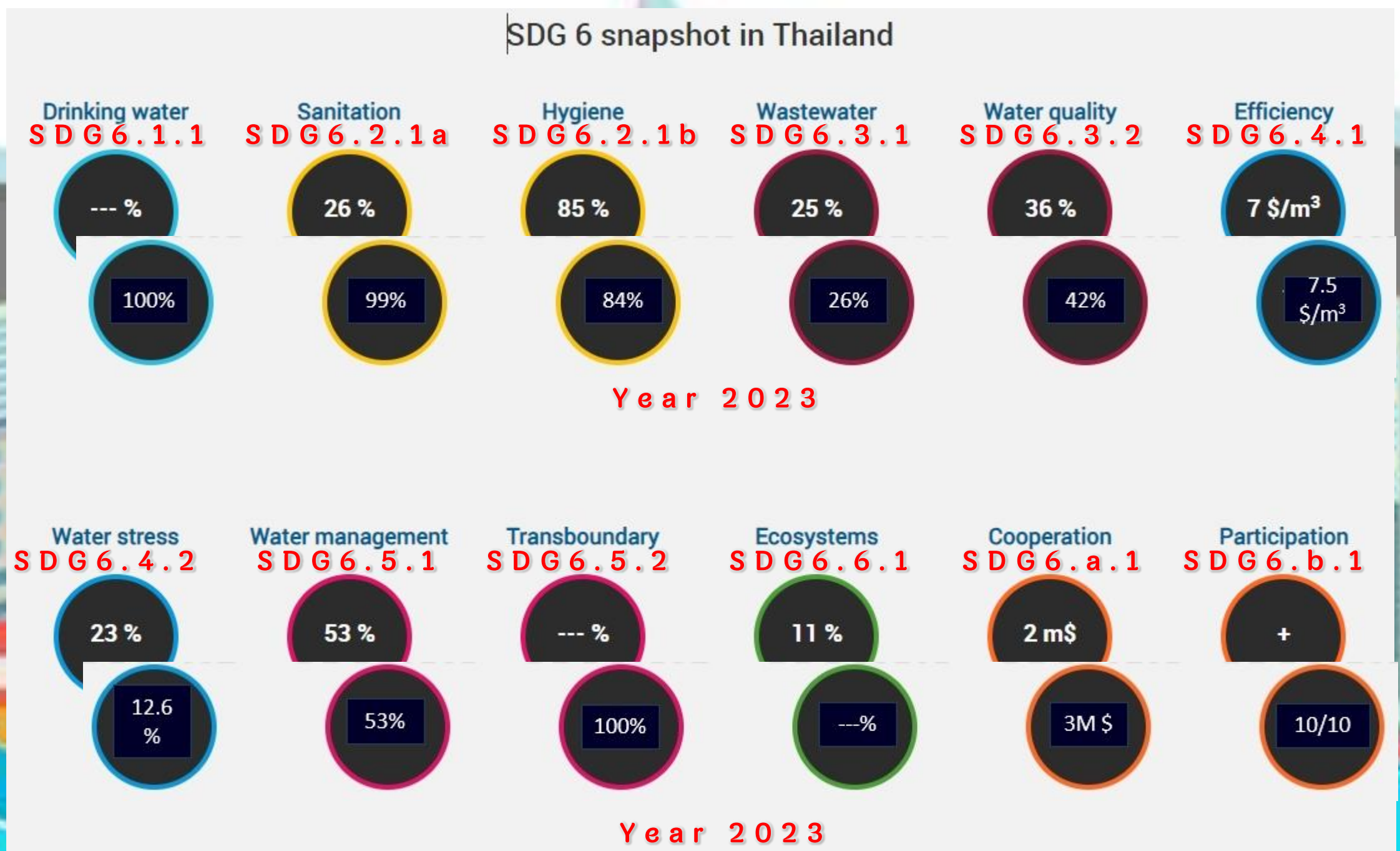
Summary

SDG Index Rank	SDG Index Score	Population	GDP 2021 (PPP)	GDP per capita 2021 (PPP)
43/166	74.7	71,640,251	$ 1.3 Trillion	$ 18,761

East and South Asia



SDG 6 snapshot in Thailand



Key Successful Solutions

Addressing 4 Pain Points

1. Closing the Water Management Gaps
2. Investing for Water Security
3. Embracing Sustainability Trends to Build Resilience
4. Addressing Climate Change

THANK YOU
FOR YOUR
ATTENTION