Addressing the Climate Emergency: Implications for Sustainable Insurance in Thailand

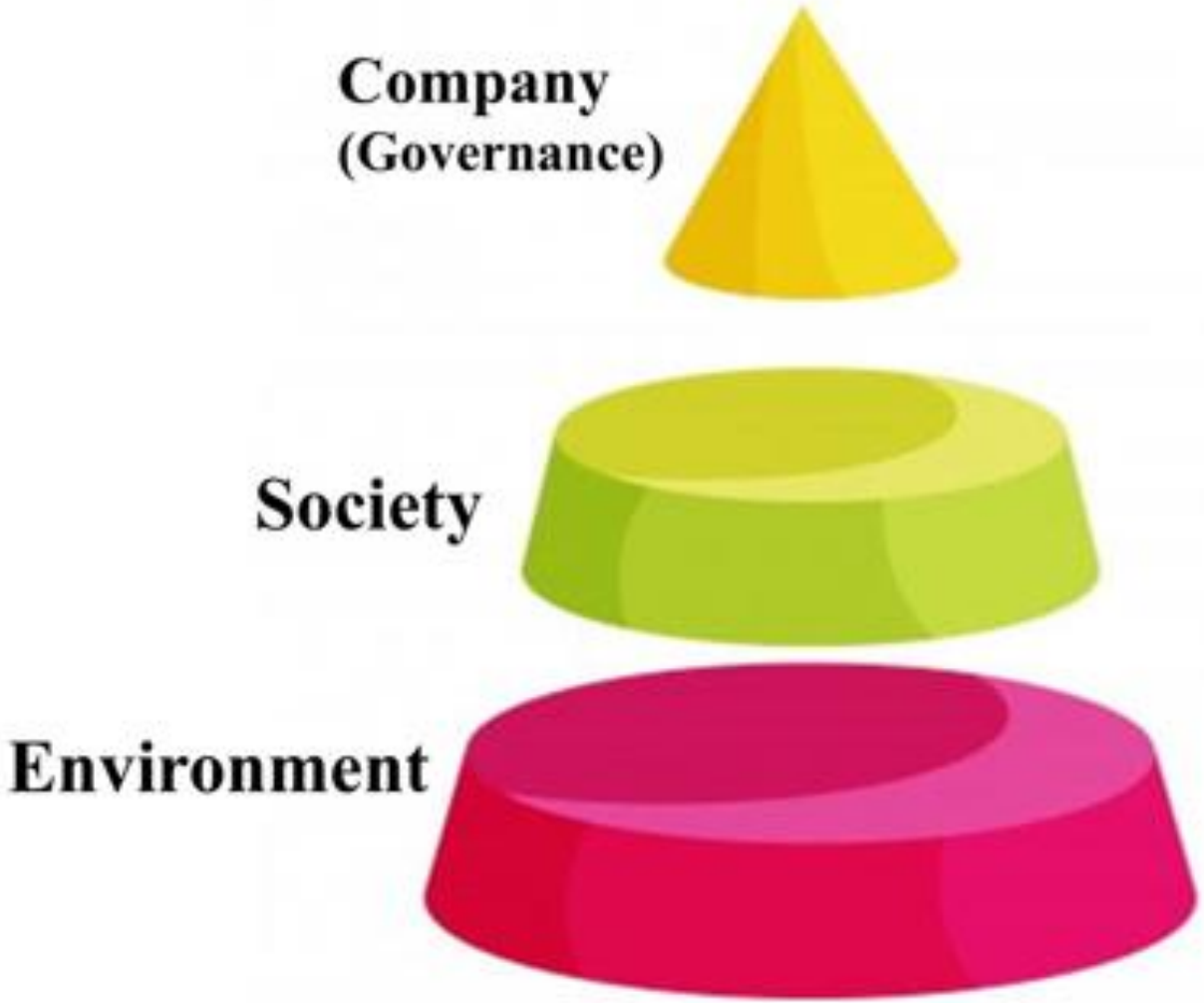
October 20, 2026
Masayuki Tanaka
FALIA

Agenda

1. Why sustainability matters?
2. Nationally Determined Contribution (NDC)
3. Risk related to Climate Change
4. Risk related to Biodiversity Loss
5. Climate Change Impact
6. Principles for Sustainable Insurance (PSI)
7. Thesis Searching via Google Scholar (Case Study)

1. Why sustainability matters?

Why Sustainability Matters for the Insurance Sector?

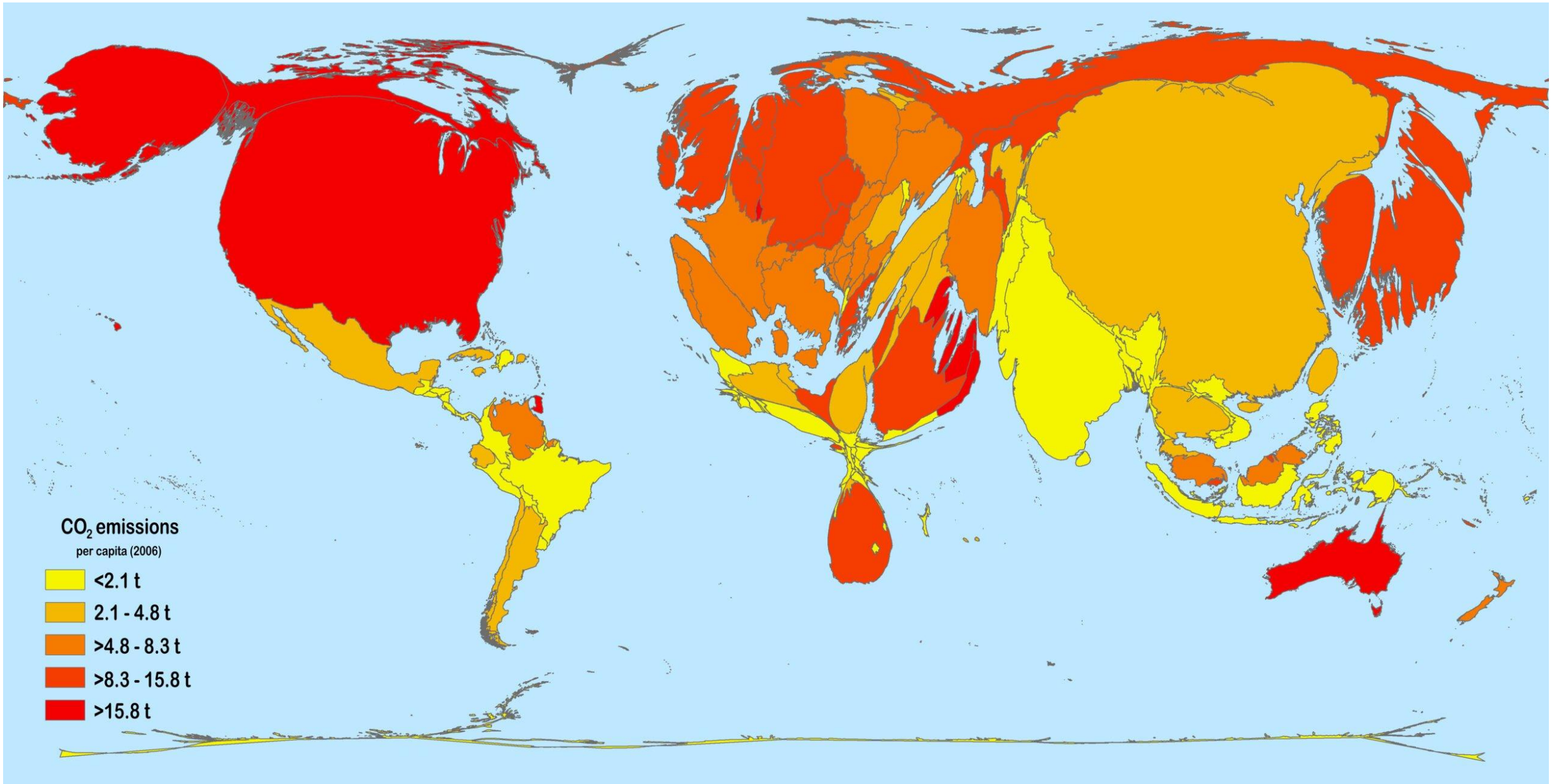


ESG (Sustainability) Management

Based on

Trust From Stakeholders

Carbon Emissions Map



(Source) http://www.viewsoftheworld.net/

2. Nationally Determined Contribution (NDC)

The Paris Agreement, adopted at COP21 in 2015





The Agreement sets goal to guide all nations to reduce GHG emissions and limit the global temperature increase in this century to 2 ℃ above pre-industrial levels.

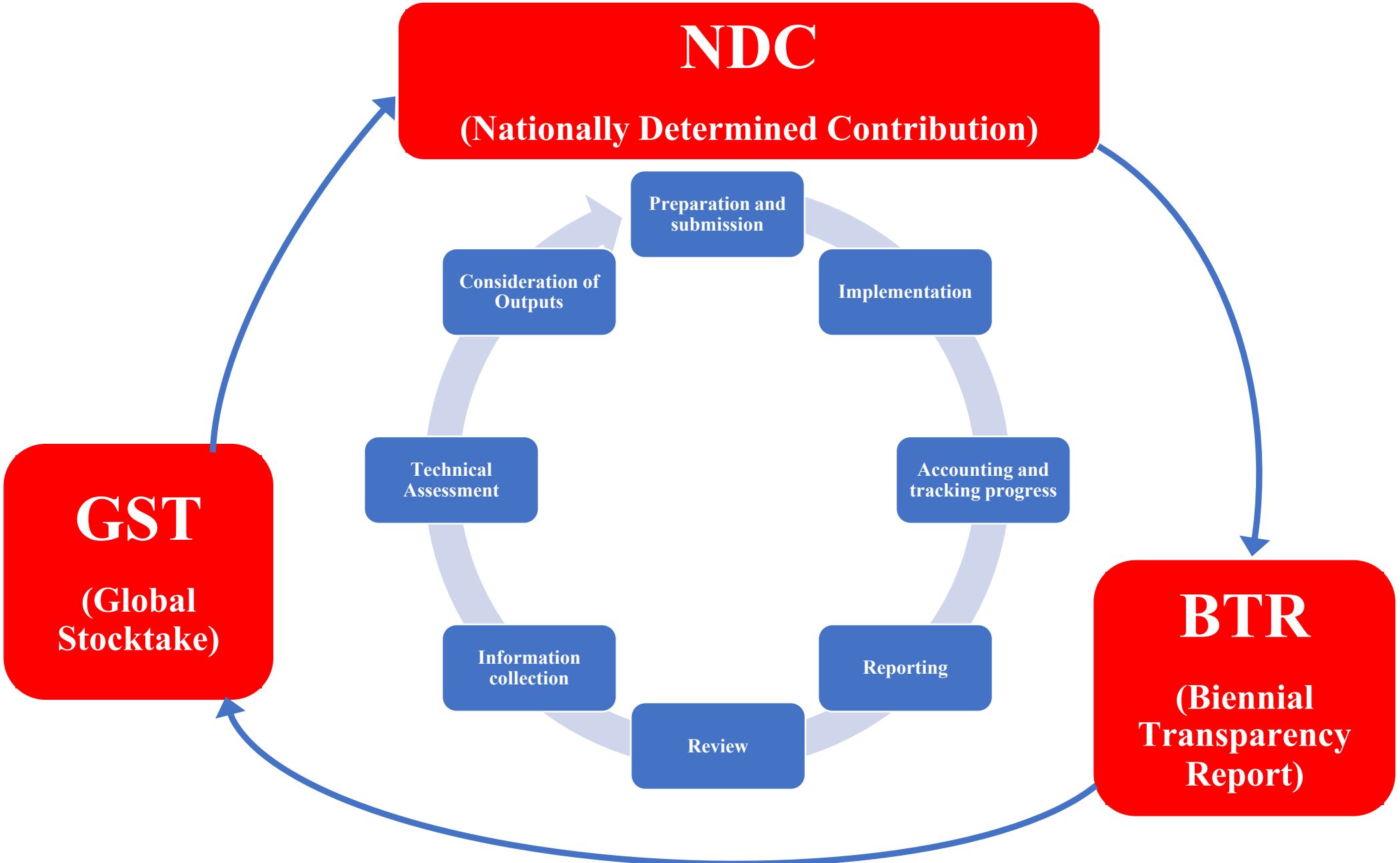
https://www.un.org/en/climatechange/paris-agreement

29 Articles of Paris Agreement

Article	Summary	Article	Summary
Art. 1	Definitions of key terminologies	Art. 13	Enhanced Transparency Framework (ETF)
Art. 2	Objectives, aims, and guiding principles	Art. 14	Global Stocktake (GST) to assess collective progress
Art. 3	Nationally Determined Contributions (NDCs)	Art. 15	Implementation and compliance mechanisms
Art. 4	Mitigation commitments and strategies	Art. 16	Conference of the Parties serving as the meeting of the Parties to the Agreement (CMA)
Art. 5	Sinks and reservoirs (including REDD+)	Art. 17	Secretariat functions and responsibilities
Art. 6	Market mechanisms and Internationally Transferred Mitigation Outcomes (ITMOs)	Art. 18–19	Subsidiary bodies for scientific and technical advice
Art. 7	Adaptation planning and support	Art. 20	Procedures for ratification, acceptance, and approval
Art. 8	Loss and Damage	Art. 21	Entry into force of the Agreement
Art. 9	Finance	Art. 22–24	Adoption, amendment, and dispute settlement provisions
Art. 10	Technology development and transfer	Art. 25–27	Voting rights, depositary arrangements, and prohibition of reservations
Art. 11	Capacity building for developing countries	Art. 28	Withdrawal procedures
Art. 12	Action for Climate Empowerment (ACE)	Art. 29	Deposit, Sign

Compiled by the author based on the official Paris Agreement publication from the UNFCCC website https://unfccc.int/sites/default/files/resource/parisagreement_publication.pdf

Function of Paris Agreement



COP Time Line

Year	1995	. . .	2022	2023	2024	2025	2026	2027	2028
COP Location (Chair Country)	COP1 Berline Germany		COP27 Sharm El-Sheikh Egypt	COP28 Dubai UAE	COP29 Baku Azerbaijan	COP30 Belém Brazil	COP31 Turkey (Negotiation Chair Australia)	COP32 Addis Ababa Ethiopia	COP33 Asia Pacific
NDC BTR GST				GST1	BTR1	NDC 3.0	BTR2		GST2
									BTR3

COP (Conference of the Parties) started in 1995

International conference where the parties to the United Nations Framework Convention on Climate Change (UNFCCC) gather to discuss and make decisions on measures to address global warming

Where to get NDC?

UNFCCC web-site: https://unfccc.int/

⇒ “Documents and decisions” ⇒“Submissions” ⇒“NDCs”

United Nations Climate Change

Search English

Home | COP 29 | Process and meetings | Topics | Calendar | Climate action | Documents and decisions | About us | News

Documents and decisions.

Documents

Decisions

Resources

Session documents

Submissions

All Party-authored reports

Submission portal

NDCs

Adaptation communications

National adaptation plans

REDD+ submissions

Go to NDC Registry

NDC Registry.

In accordance with Article 4, paragraph 12 of the Paris Agreement, NDCs communicated by Parties shall be recorded in a public registry maintained by the secretariat.



Showing 15 of 195 results

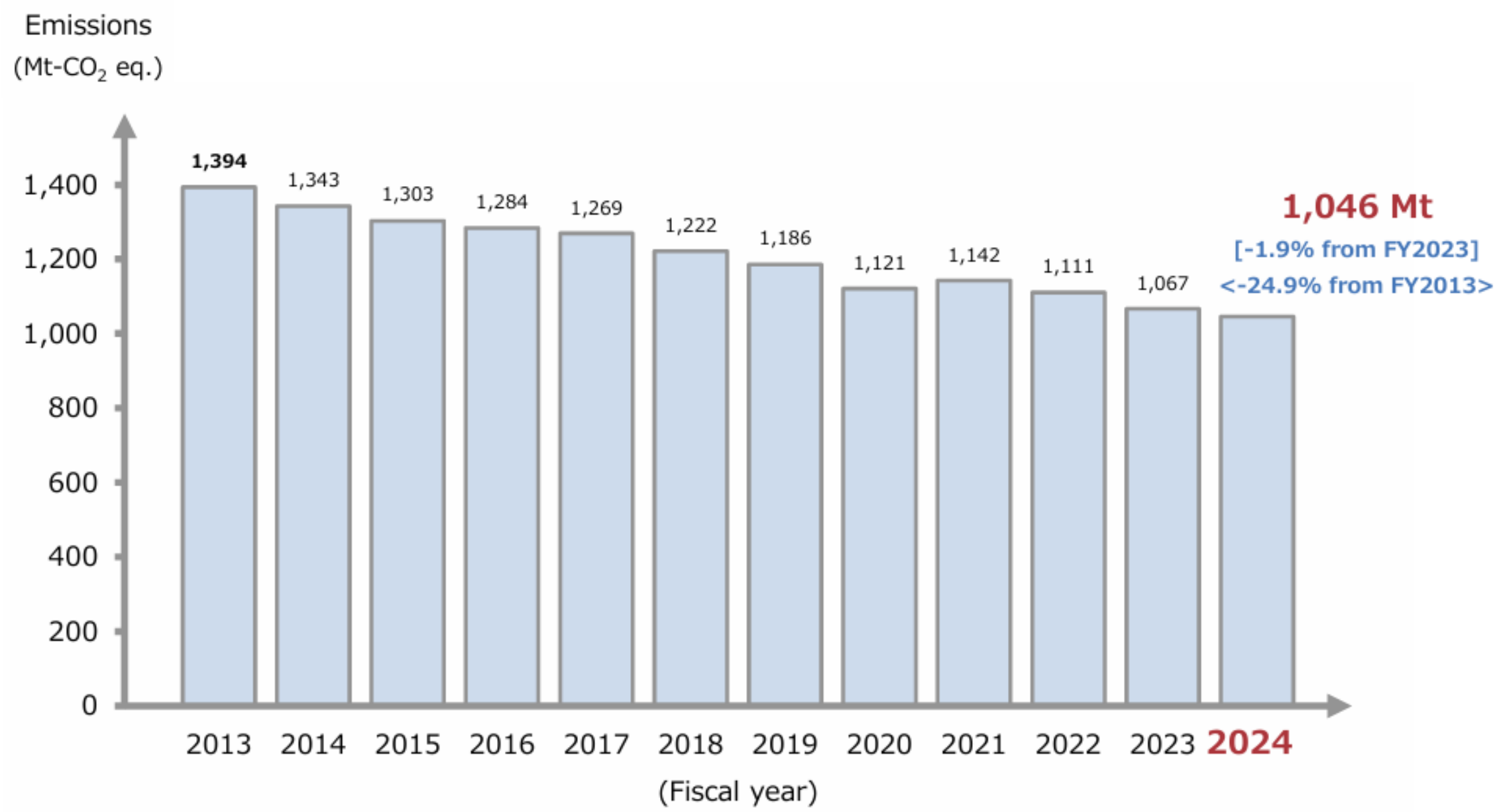
Party	Title	Language	Translation	Version	Status	Submission Date	Additional documents
Afghanistan	Afghanistan First NDC	English		1	Active	23/11/2016	
Albania	Albania First NDC (Updated submission)	English		2	Active	12/10/2021	
Algeria	Algeria First NDC	French	Algeria First NDC Translation	1	Active	10/10/2016	
Andorra	Andorra 2022 NDC Update	Spanish		1	Active	08/11/2022	Andorra 2022 NDC Update (Draft)
Angola	Angola First NDC (Updated submission)	English		2	Active	31/05/2021	
Antigua and Barbuda	Antigua and Barbuda First NDC (Updated submission)	English		2	Active	02/09/2021	
Argentina	Argentina Second NDC (Updated submission)	Spanish	Argentina Second NDC (Updated submission)	3	Active	02/11/2021	Argentina Second NDC (Archived)

Japan’s NDC on February 18, 2025

Japan aims to reduce its greenhouse gas emissions by 60 percent in fiscal year (FY) 2035 and by 73 percent in FY 2040, respectively, from its FY 2013 levels, as ambitious targets aligned with the global 1.5°C goal and on a straight pathway towards the achievement of net zero by 2050.

(Source) https://unfccc.int/sites/default/files/2025-02/Japans%202035-2040%20NDC.pdf

Japan's national GHG emissions



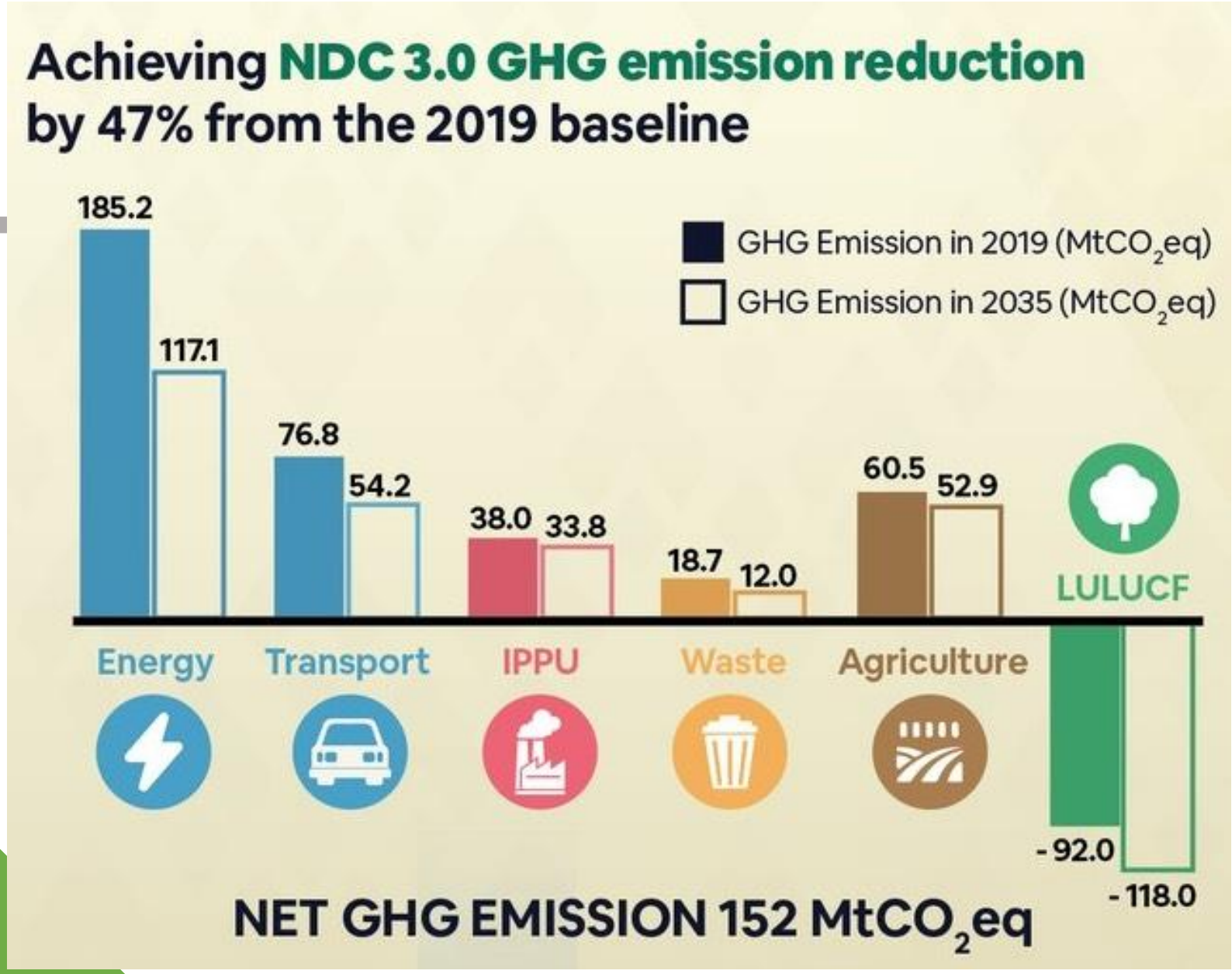
(Source) https://www.env.go.jp/content/000392895.pdf

Thailand's Latest NDC (NDC 3.0)

- **47% emissions reduction from 2019 levels by 2035.**
- **Net-zero by 2050.**
- **Covers all sectors of the economy.**
- **Requires USD 7.05 billion in climate investment.**
- **Relies on international climate finance and Article 6 cooperation.**

(Source) https://unfccc.int/sites/default/files/2025-02/Japans%202035-2040%20NDC.pdf

Thailand's GHG Emissions and Removals by Sector (2019-2035)



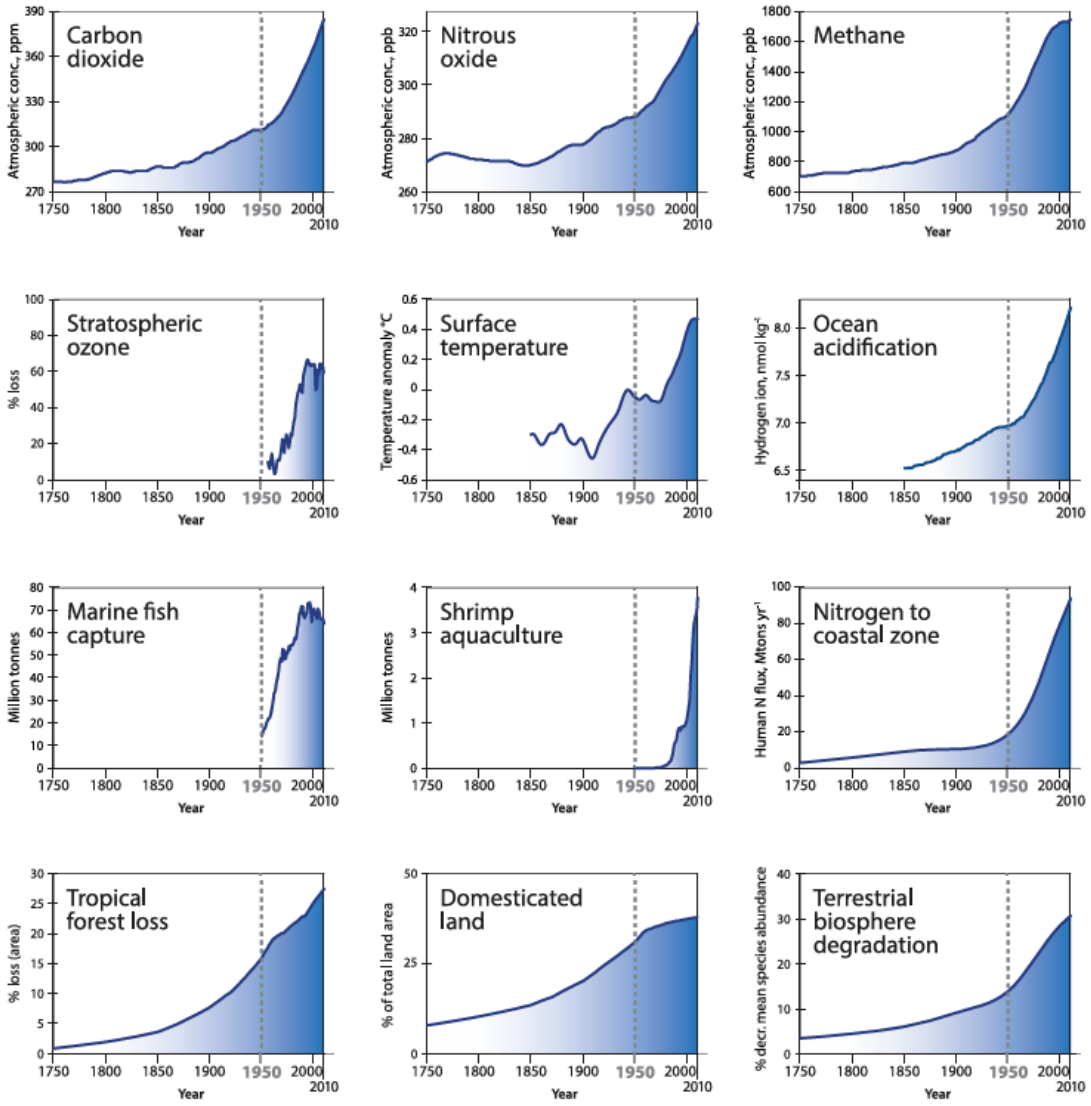
https://thailand.prd.go.th/en/content/category/detail/id/48/iid/438646

3. Risk related to Climate Change

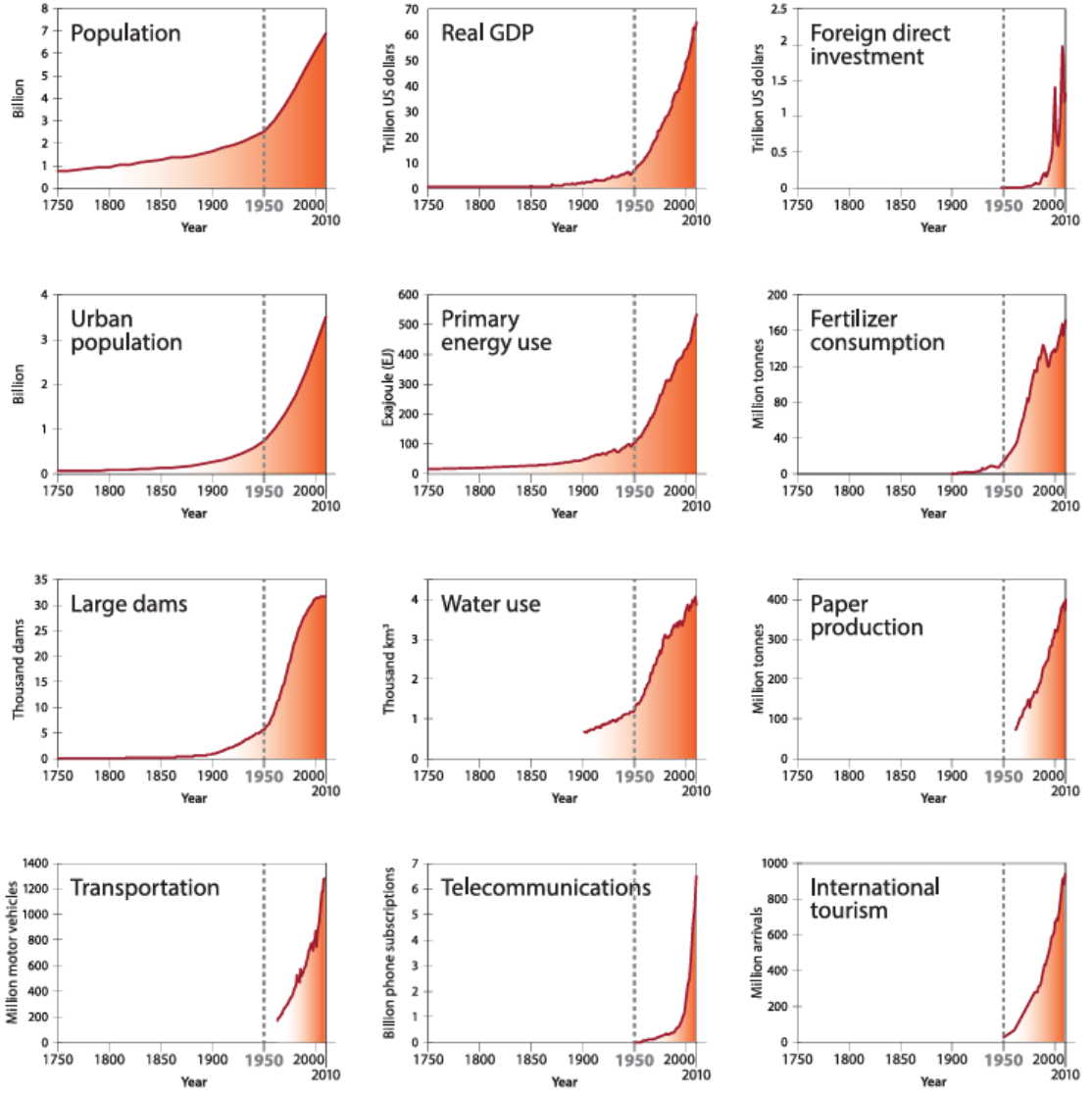
The Great Acceleration

https://www.bpb.de/system/files/dokument_pdf/Steffen2015Thetrajectoryoftheanthropocene TheGreatAcceleration.pdf

Earth system trends

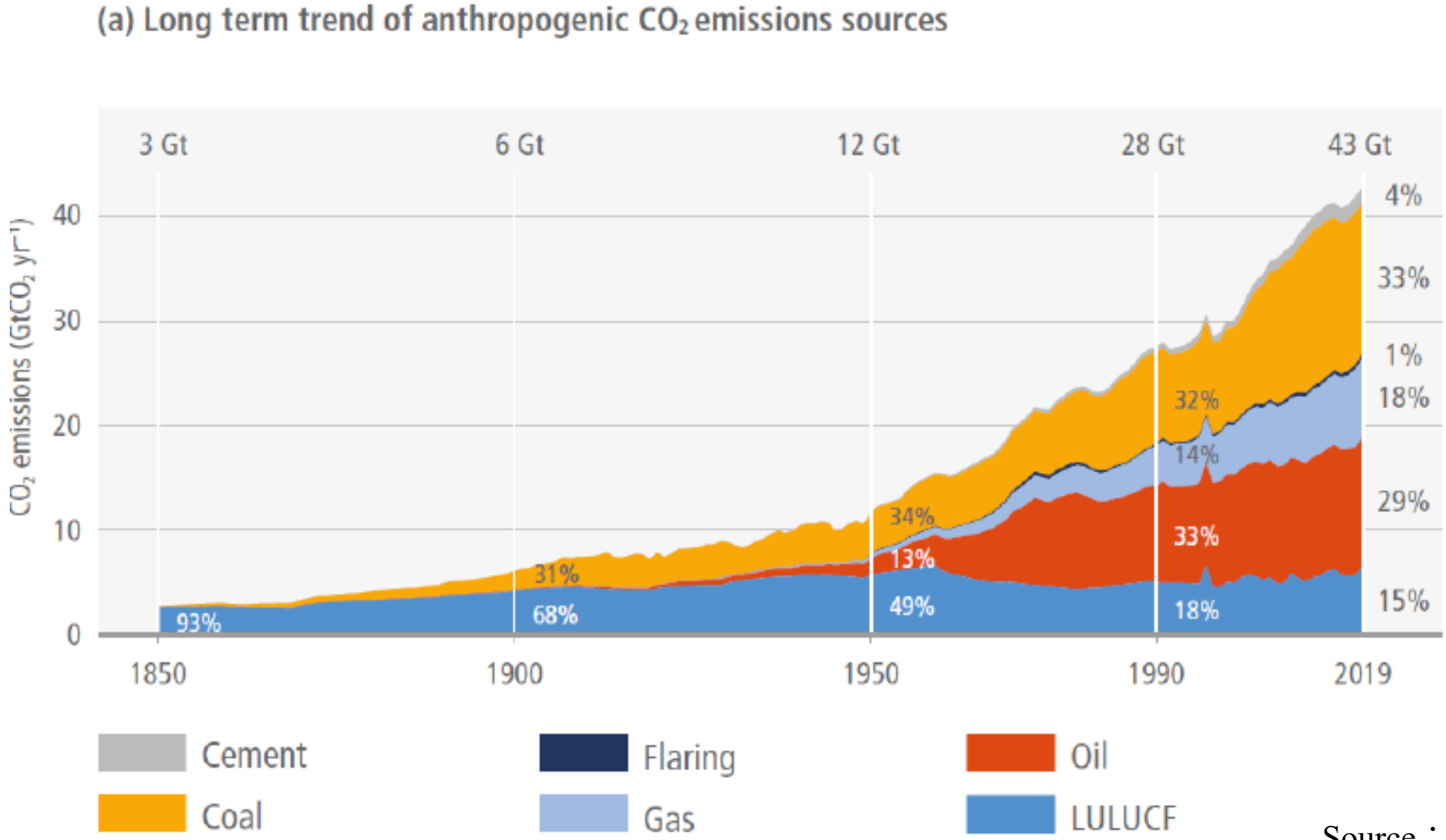


Socio-economic trends



(Source) Will Steffen et al (2015)The trajectory of the Anthropocene: The Great Acceleration

Cumulative CO2 emissions



https://globalcarbonbudget.org/fossil-fuel-co2-emissions-increase-again-in-2024/

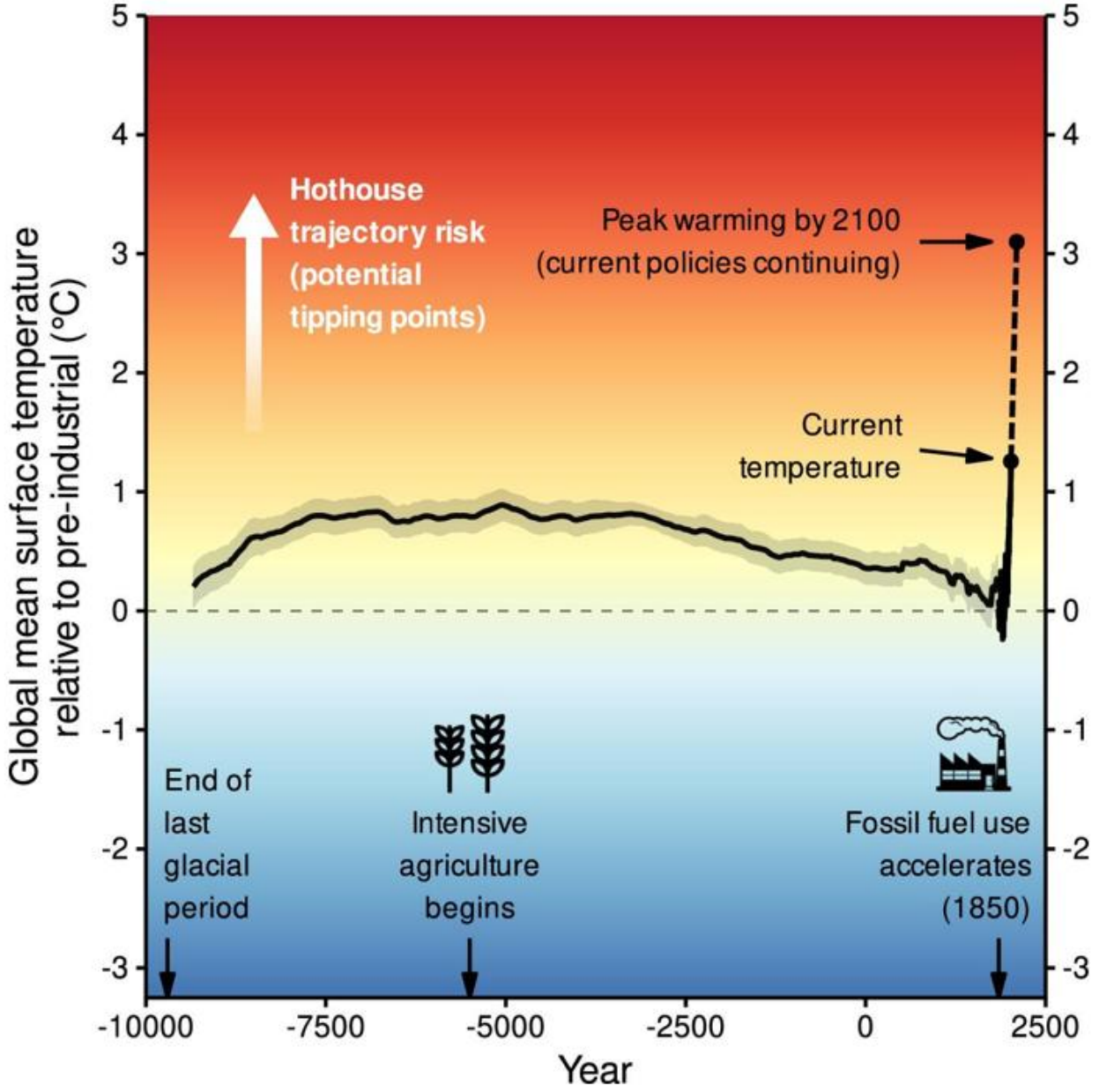
Source：AR6/WG3 chapter 2, Figure 2.7

Approximate global average temperature from –9340 BCE to 2020 CE.



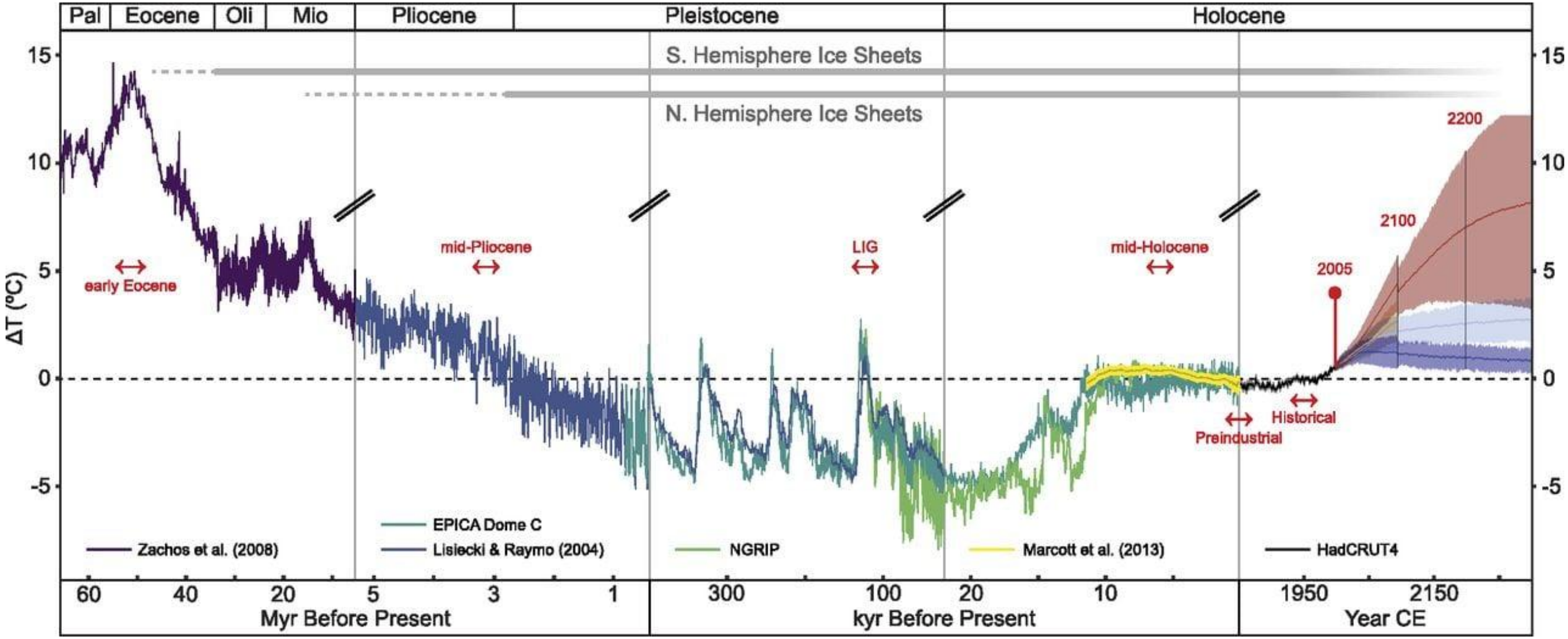
Volume 75, Issue 12

December 2025



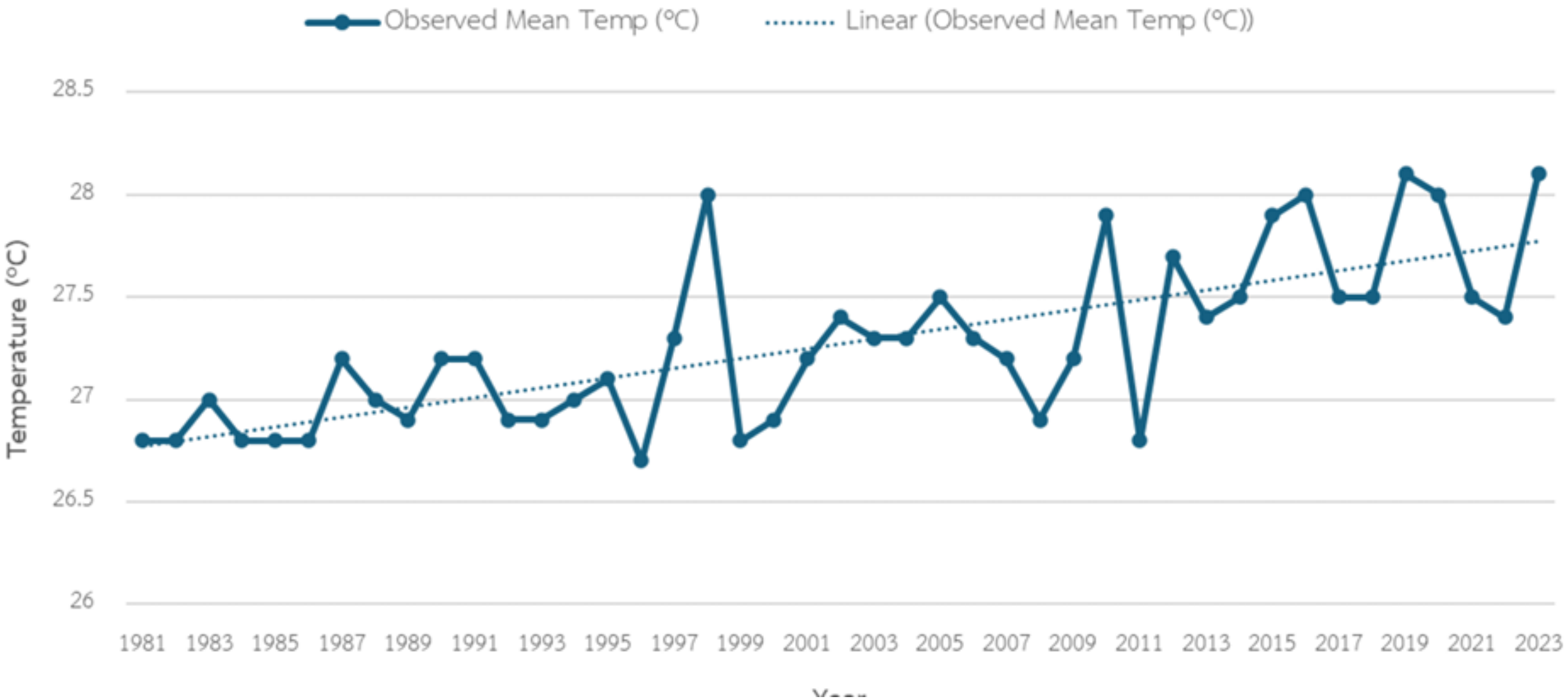
BioScience, Volume 75, Issue 12, December 2025, Pages 1016–1027, https://doi.org/10.1093/biosci/biaf149

Global land temperature



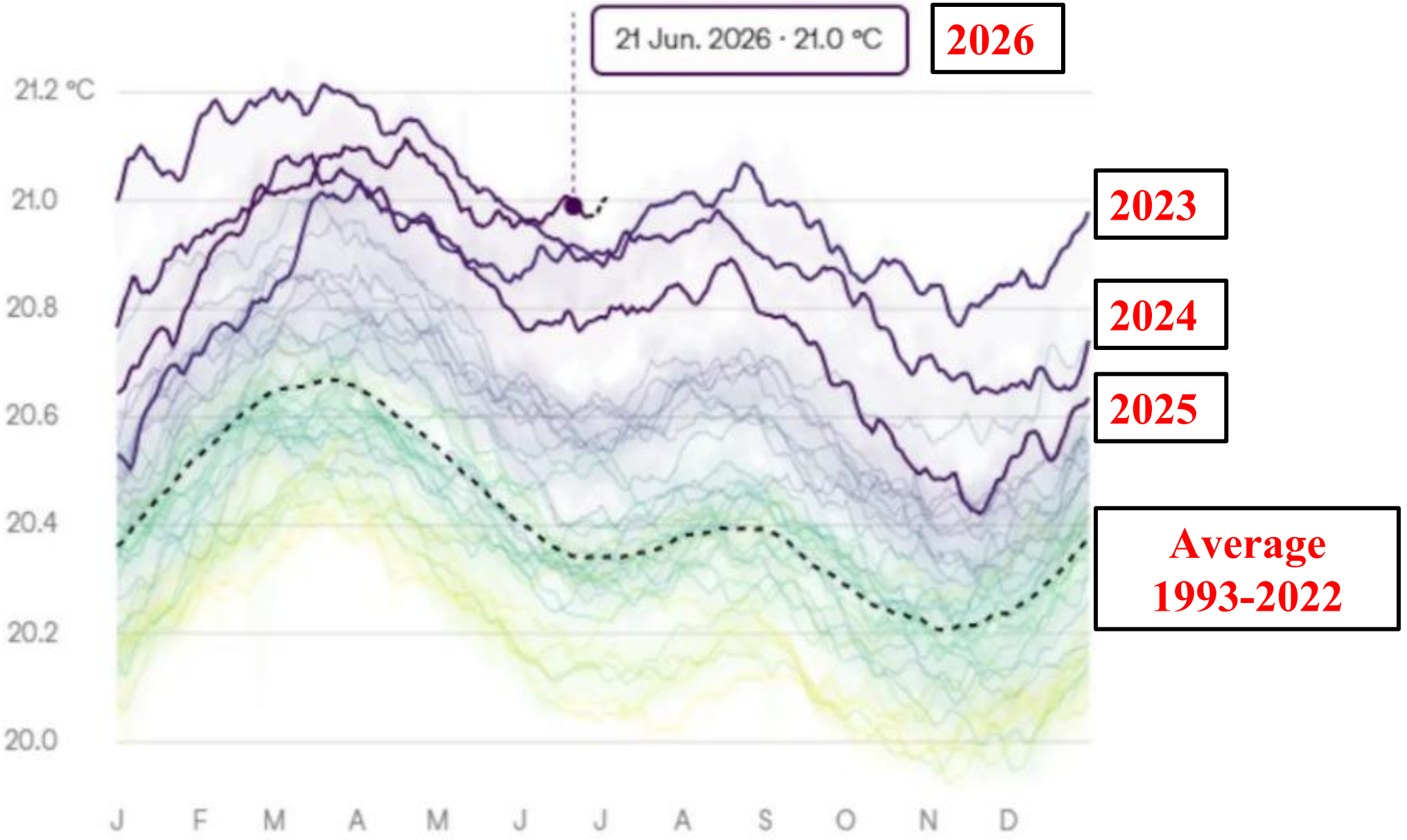
https://www.pnas.org/doi/full/10.1073/pnas.1809600115

Mean temperature in Thailand from 1981 to 2023



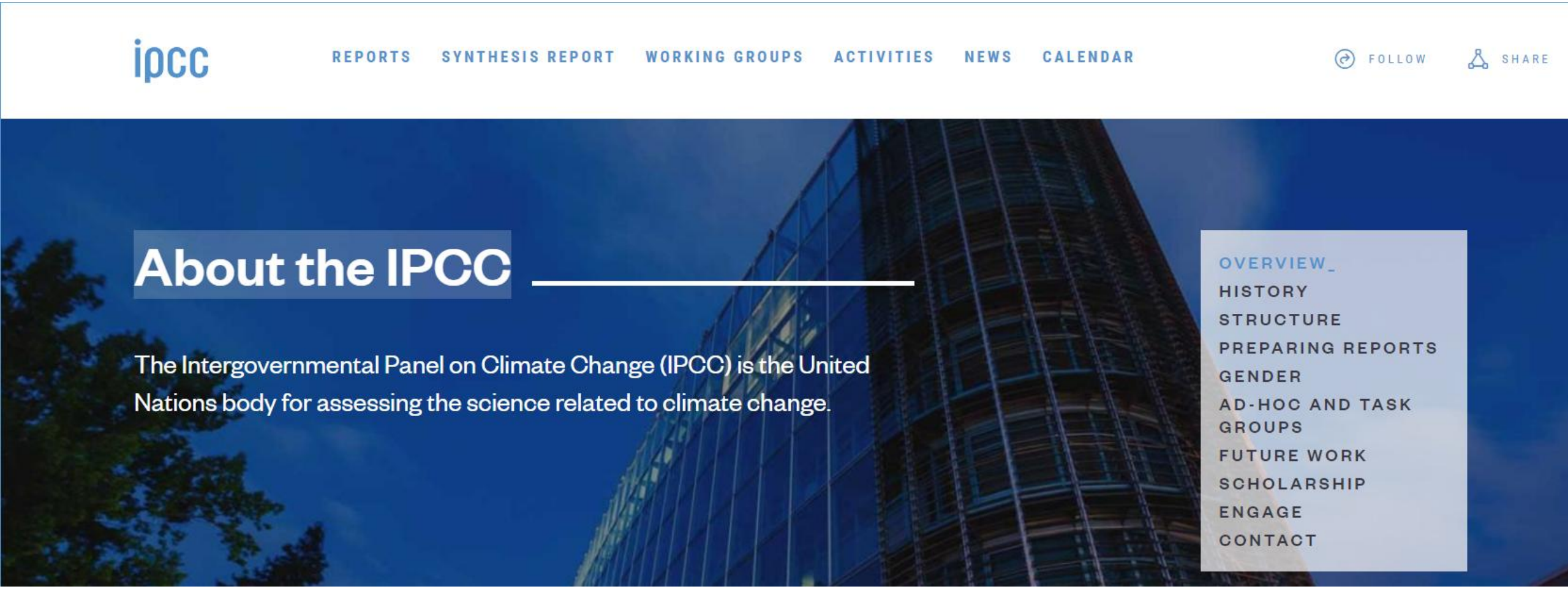
(Source) Thailand's First BTR

Global Sea Surface temperature - Monthly anomaly



https://marine.copernicus.eu/bulletin/june-2026-global-ocean-temperatures-reach-new-record

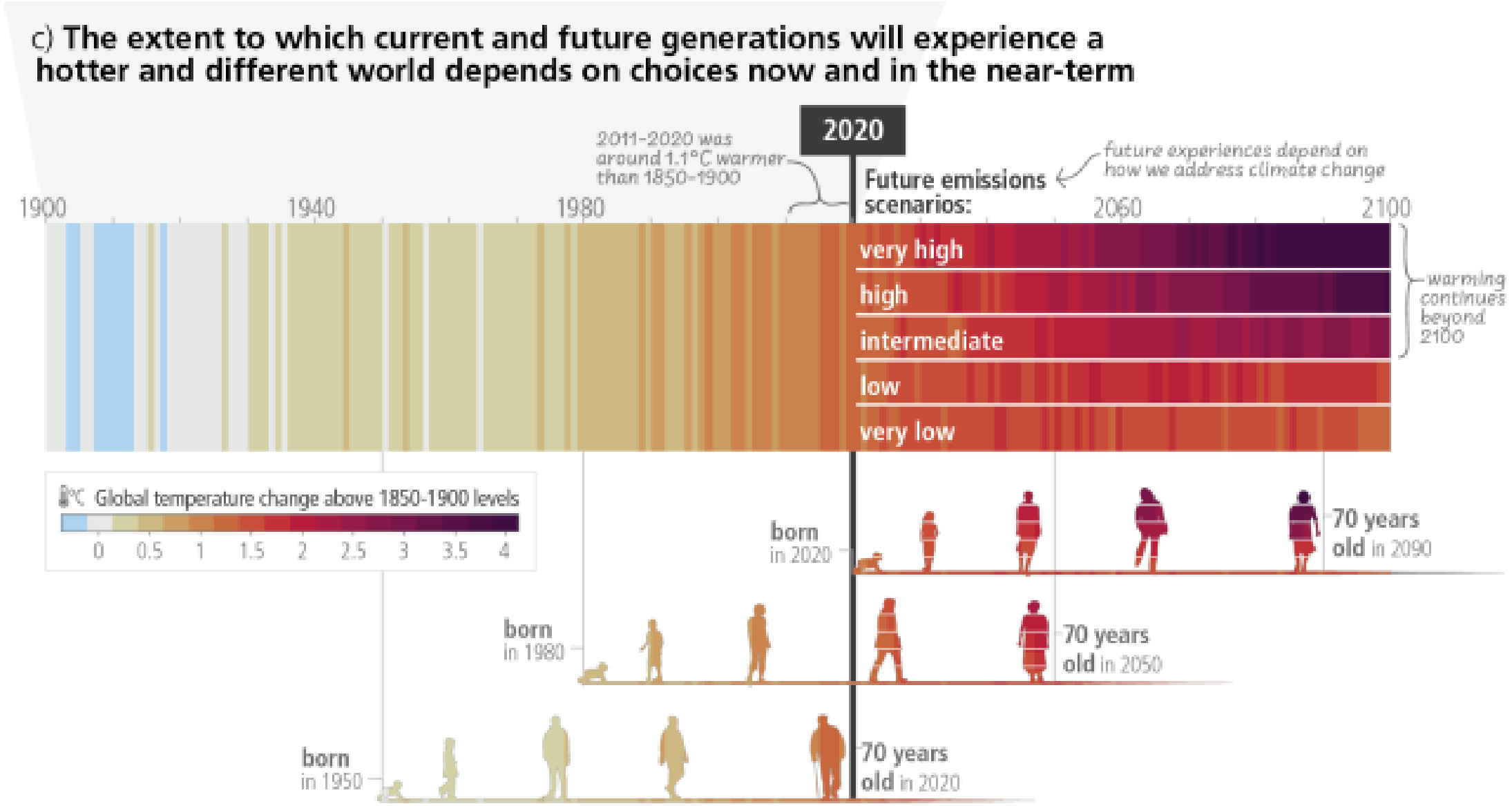
What is IPCC?



"It is unequivocal that human influence has warmed the atmosphere, ocean and land" (AR6)

https://www.ipcc.ch/

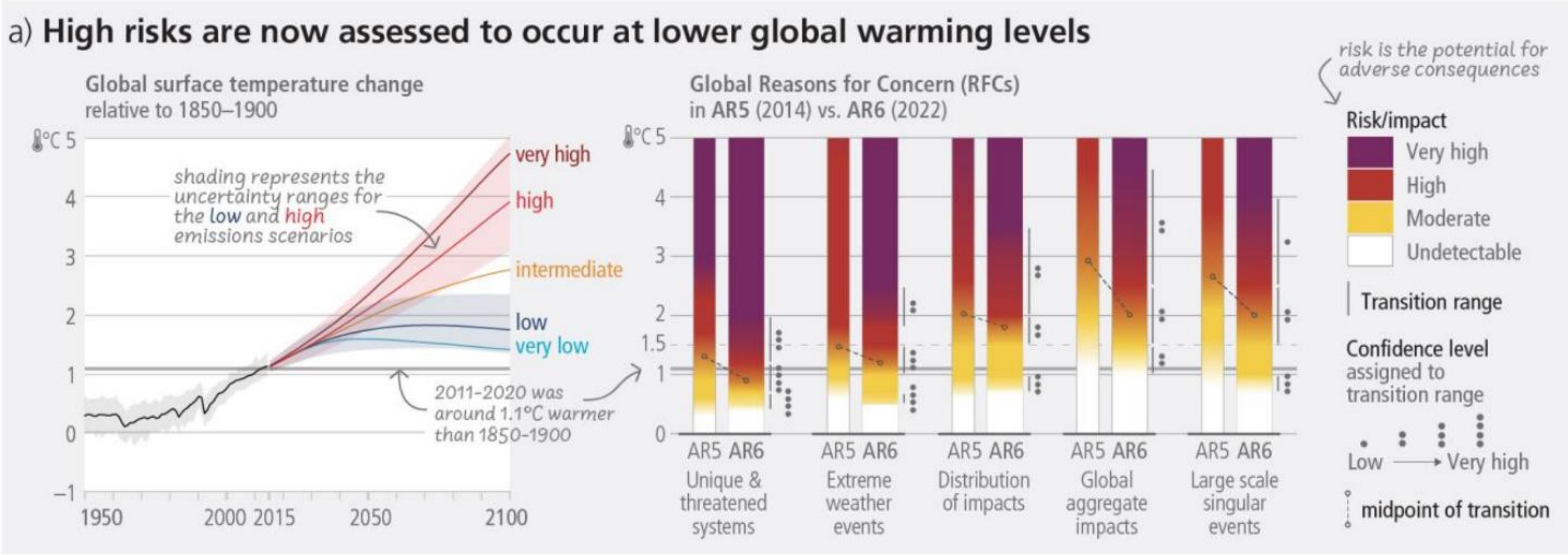
IPCC 6th Assessment Report (AR6)



https://report.ipcc.ch/ar6syr/pdf/IPCC_AR6_SYR_SPM.pdf

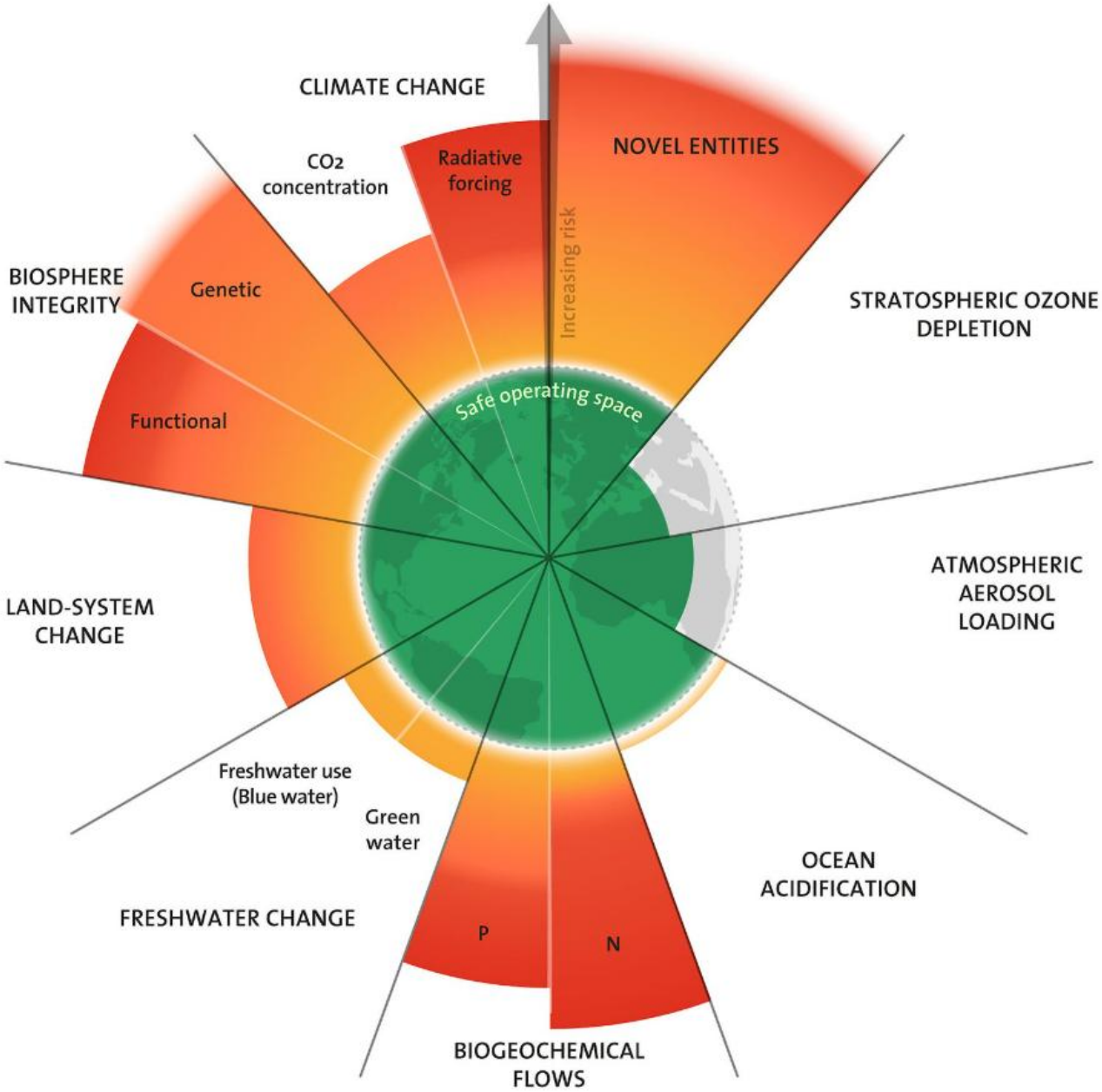
IPCC 6th Assessment Report (AR6)

Risks are increasing with every increment of warming



https://report.ipcc.ch/ar6syr/pdf/IPCC_AR6_SYR_SPM.pdf

Planetary Boundaries



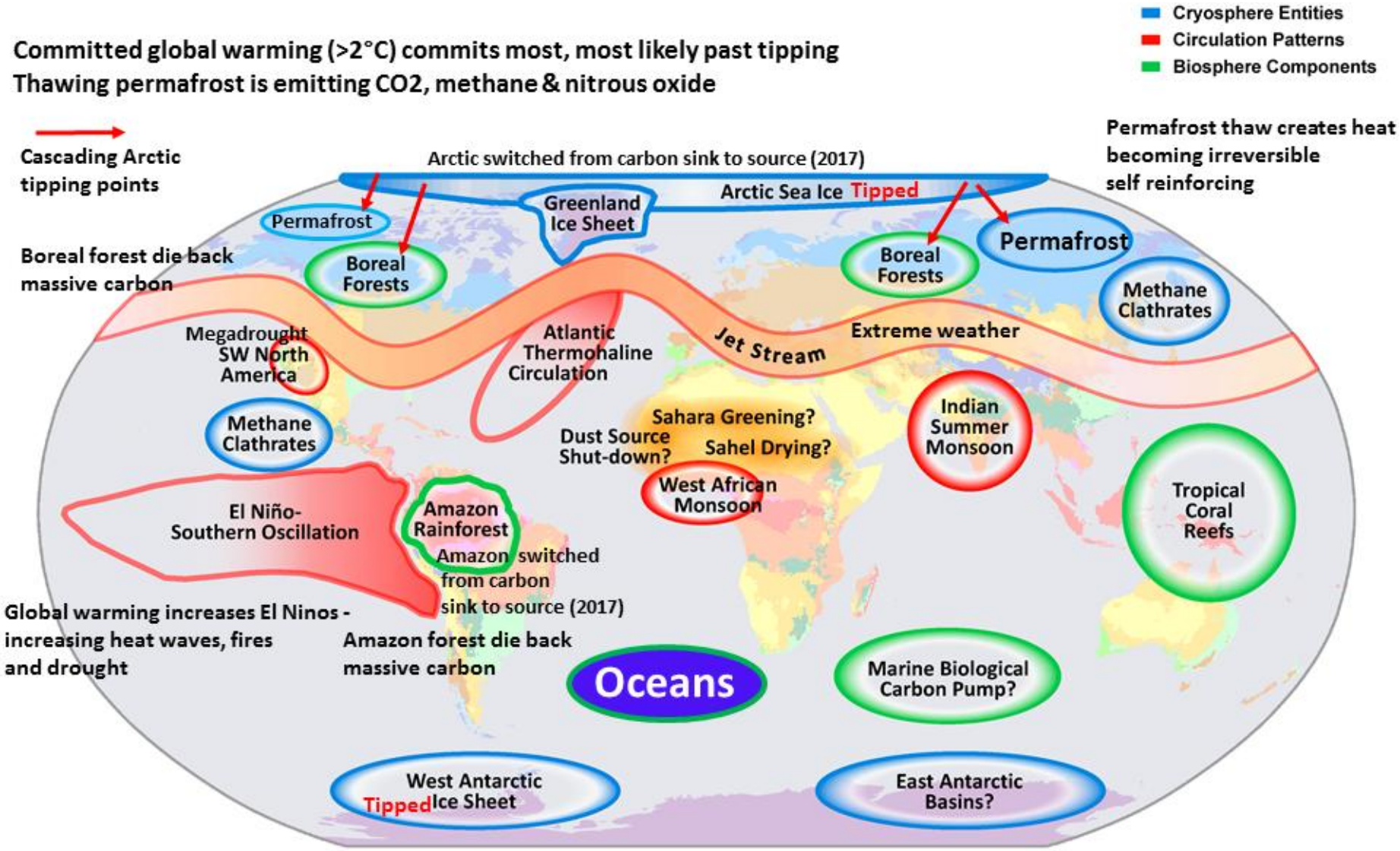
Stockholm Resilience Centre | Stockholm University



Johan Rockström

https://www.stockholmresilience.org/research/planetary-boundaries.html

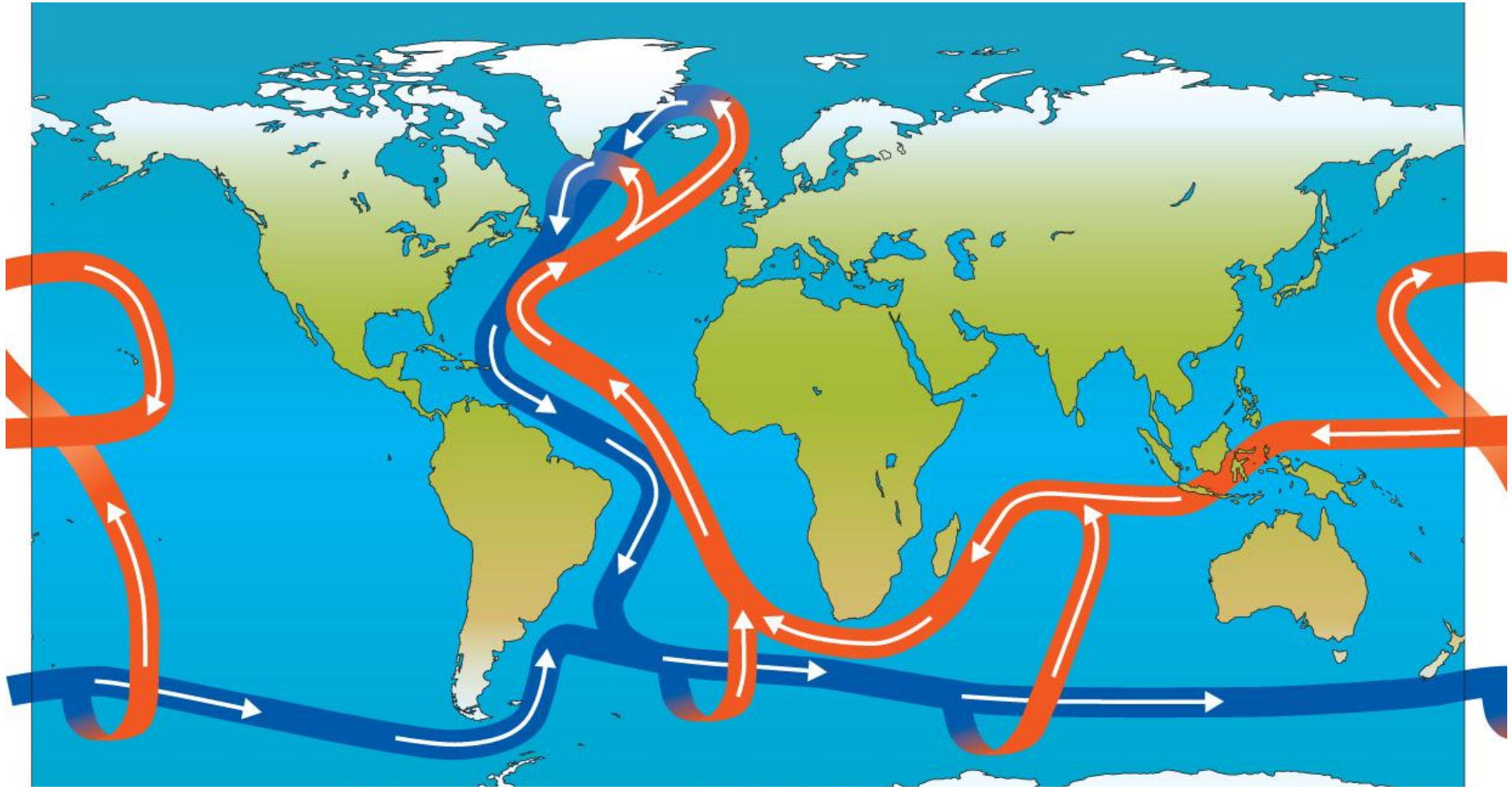
Global Warming Vulnerable Tipping Points



Adapted from Potsdam Climate Institute
Tipping Elements the Achilles Heels of the Earth System

https://www.pik-potsdam.de/en/output/infodesk/tipping-elements

The Atlantic Meridional Overturning Circulation (AMOC)



Mechanism: The AMOC is driven by differences in water temperature and salinity, which affect water density. Warm, salty water flows northward near the surface, cools, and sinks in the North Atlantic, then flows back southward at deeper levels

https://climate.metoffice.cloud/amoc.html

Potential Impact of collapse of AMOC

Cooling in Europe: Despite global warming, Europe could experience significant cooling due to the disruption of heat distribution.

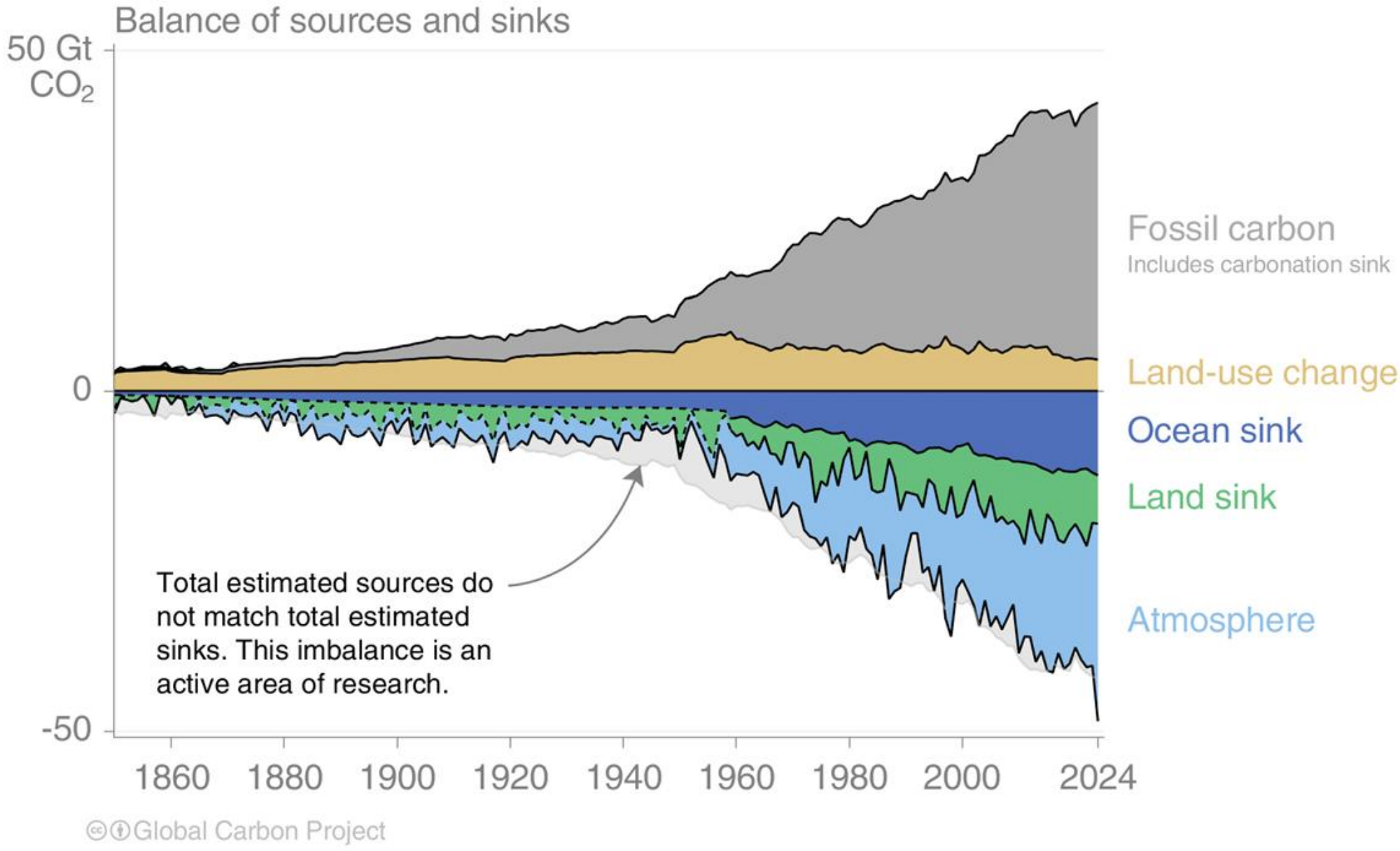
Warming in the Tropics: Increased temperatures in tropical regions, exacerbating already challenging living conditions.

Sea Level Rise: Particularly along the East Coast of the United States, due to changes in ocean currents and thermal expansion.

Extreme Weather: More intense storms and altered precipitation patterns globally.

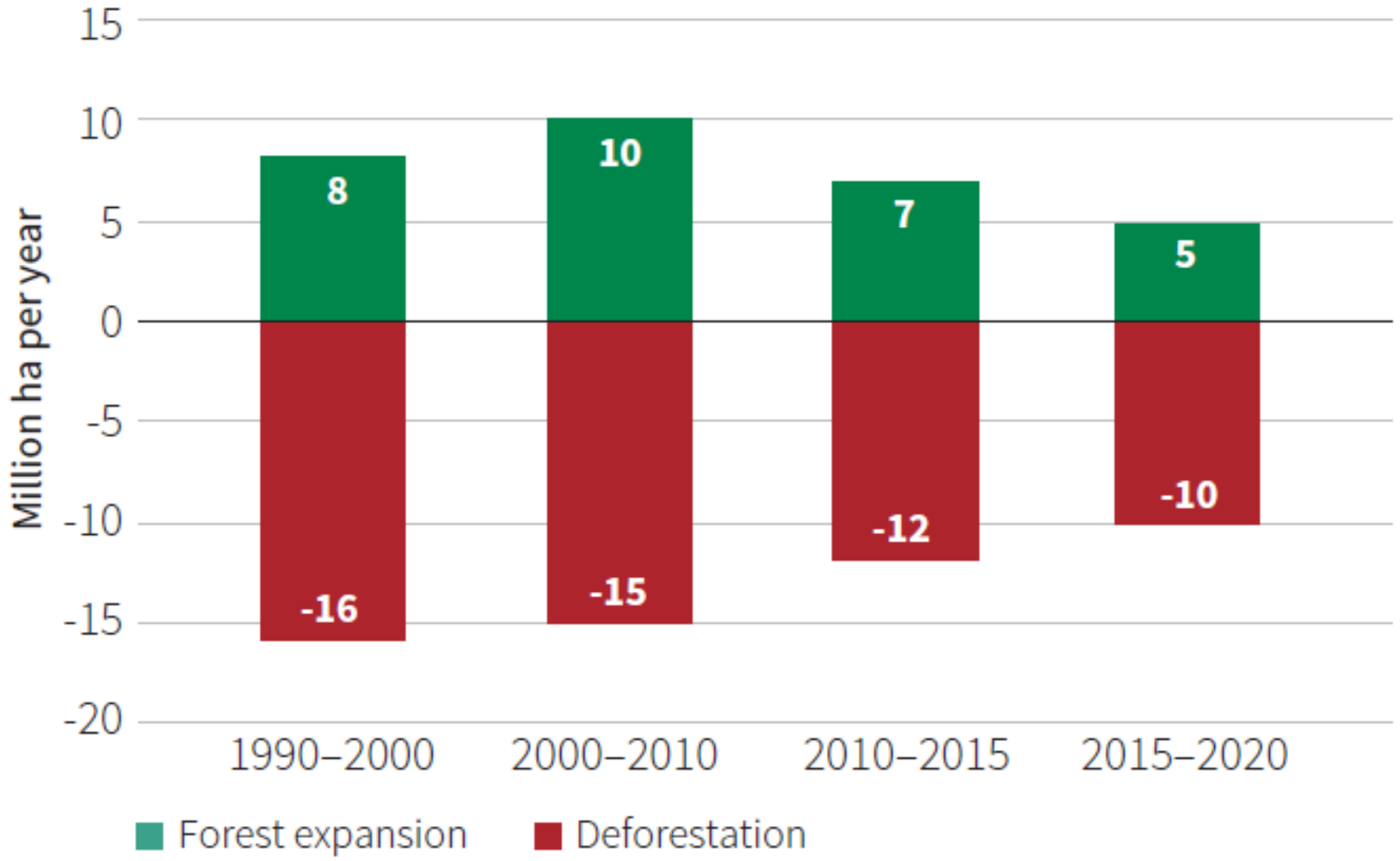
https://climate.metoffice.cloud/amoc.html

Global Carbon Sink



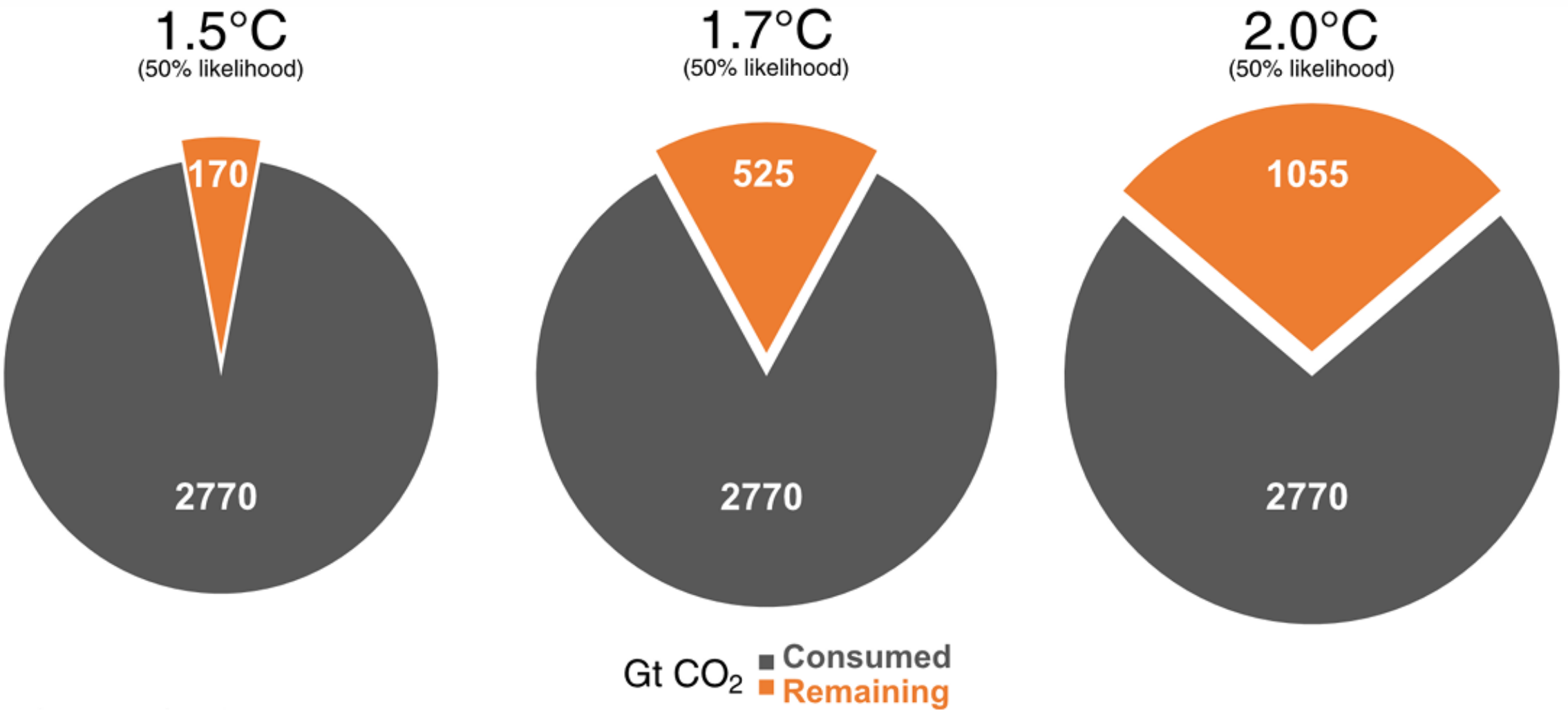
https://globalcarbonbudget.org/

Annual rate of forest expansion and deforestation,1990–2020



（Reference）Global Forest Resources Assessment 2020

Remaining Carbon Budget



https://globalcarbonbudget.org/

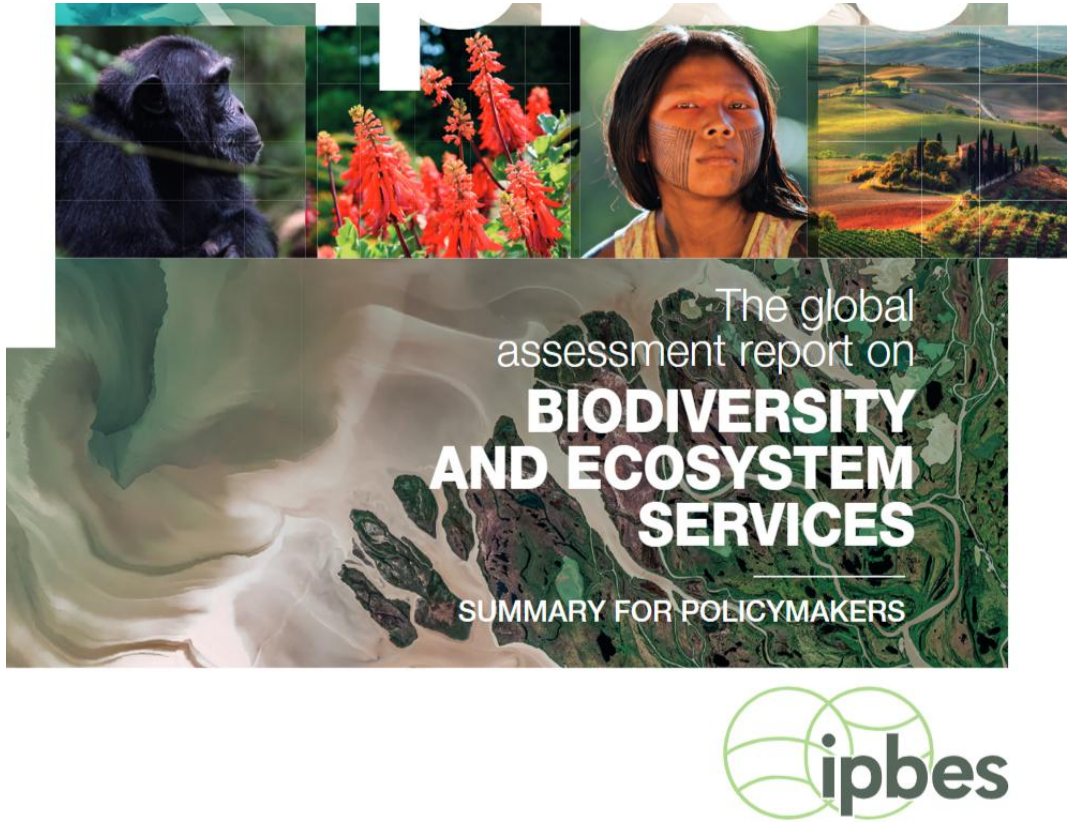
Asian Case Examples



Nepal on alert as Bhote Koshi River flow increases amid flash flood crisis. IMAGE SOURCE : INDIA TV

4. Risk related to Biodiversity Loss

What is IPBES?



- **Establishment:** Founded in **2012** as an independent intergovernmental body, currently supported by **140+ member states**.
- **Core Mission:** Bridging the gap between **science and policy** to protect global biodiversity and sustain human well-being.

https://zenodo.org/records/3553579

Biodiversity Loss

Unprecedented rate of extinction

- On the Earth, 8.7 million or more of animal and plant species exist (estimate)
- Currently, 37,480 species (28%) are threatened to extinction out of 134,425 species identified
- If we don't take urgent actions, most of them will extinct within a few decades. (IPBES, 2019)



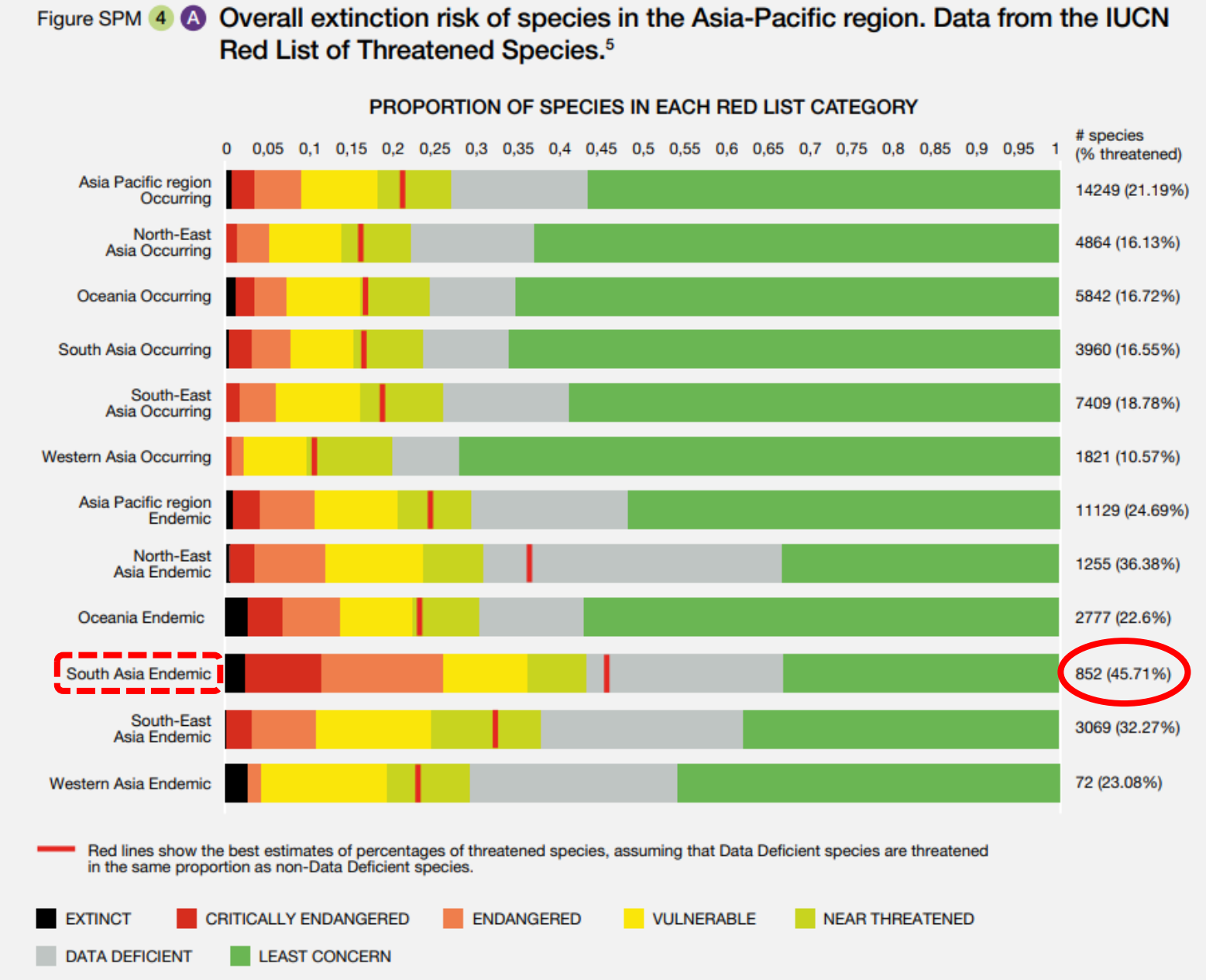






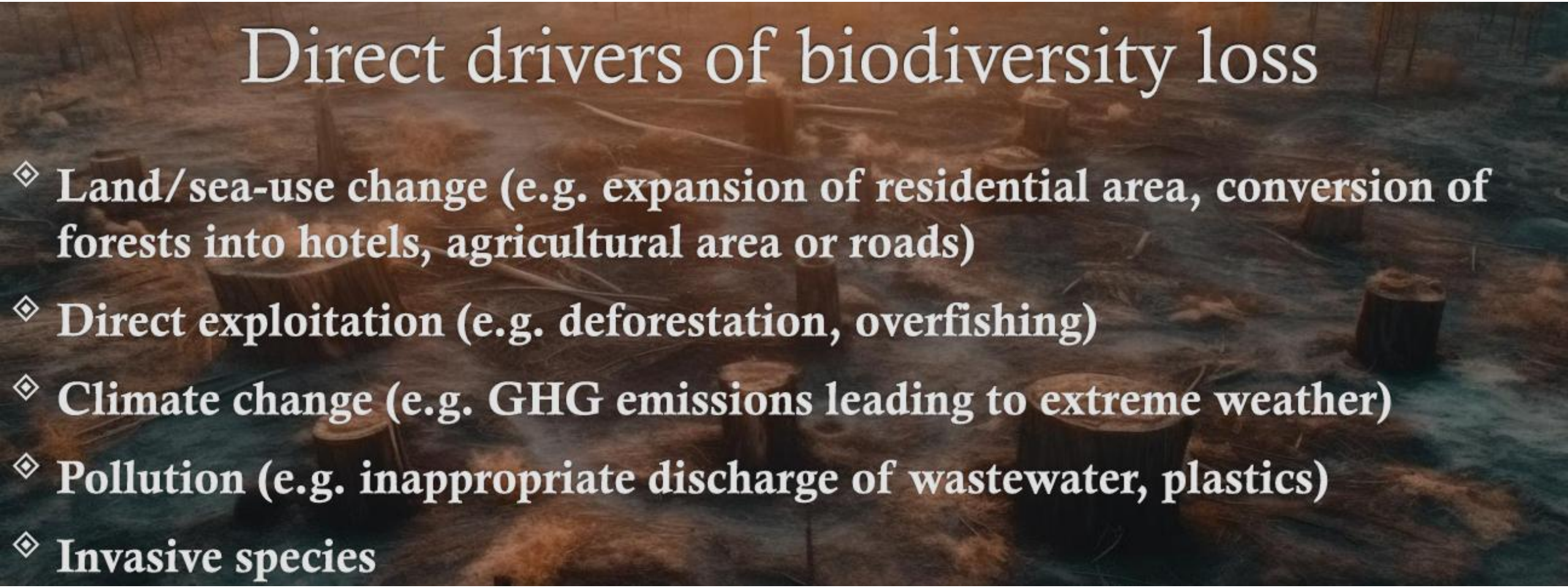
https://www.iges.or.jp/en/pub/need-sustainable-tourism-face-enviromental-crises/en

Biodiversity Issues



https://www.biodic.go.jp/biodiversity/about/ipbes/deliverables/files/spm_biodiversity_ecosystem_pacific_2018.pdf

Biodiversity Loss



https://www.iges.or.jp/en/pub/need-sustainable-tourism-face-enviromental-crises/en

UN Biodiversity Conference (COP15) in December 2022



- **196 countries joined**
- **The Kunming-Montreal Global Biodiversity Framework (GBF) adopted**
- **4 goals and 23 targets were formulated**

Four Goals for 2050:

1. **Halt human-induced extinction**: Reduce the rate of extinction of all species tenfold by 2050.
2. **Sustainable use and management of biodiversity**: Ensure that nature's contributions to people are valued, maintained, and enhanced.
3. **Fair sharing of benefits**: From the utilization of genetic resources and digital sequence information on genetic resources.
4. **Accessible implementation**: Adequate means of implementing the GBF accessible to all Parties, particularly Least Developed Countries and Small Island Developing States

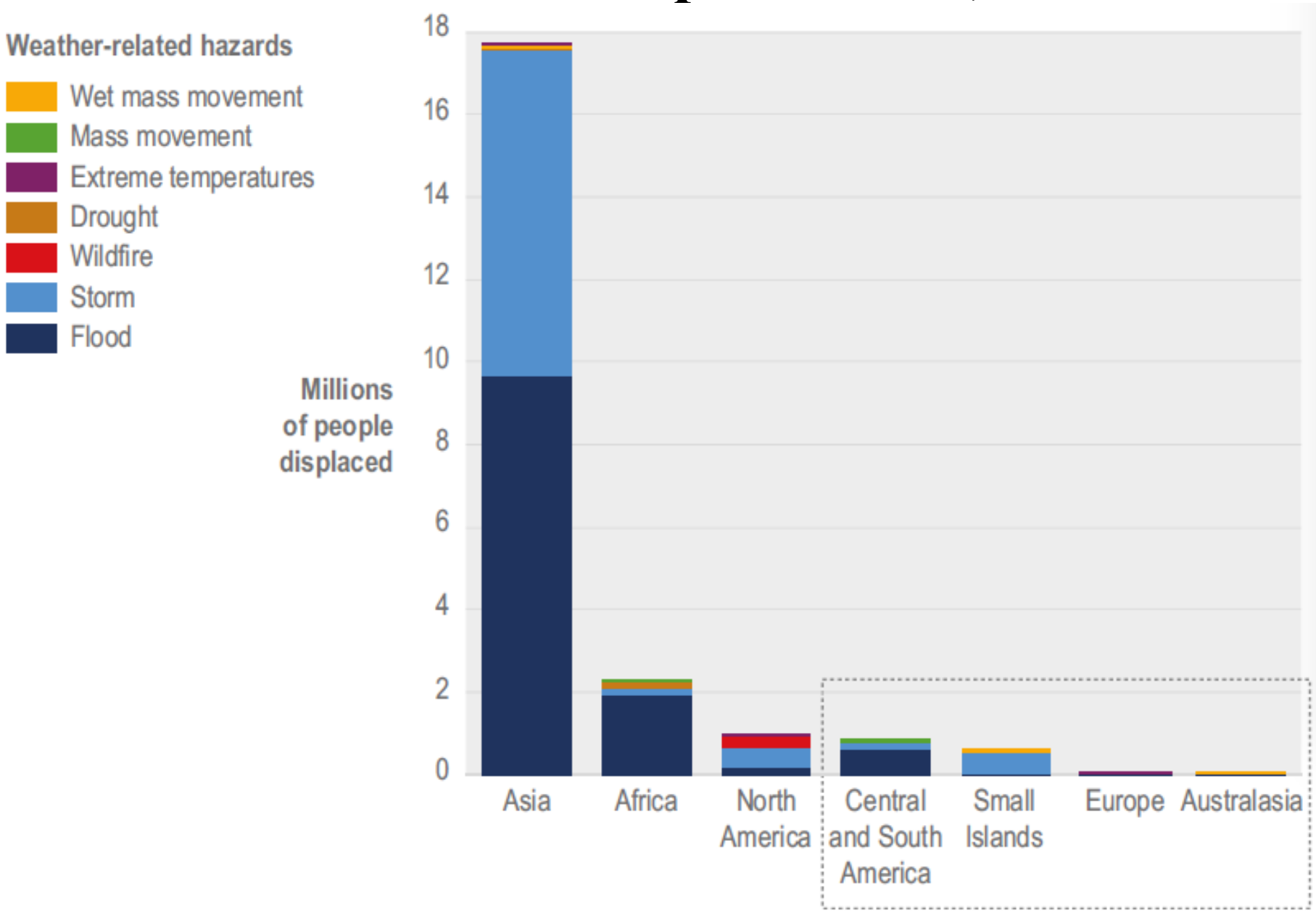
https://www.cbd.int/doc/decisions/cop-15/cop-15-dec-04-en.pdf

23 Targets for 2030:

- **Effective conservation and management**: At least **30%** of the world's lands, inland waters, coastal areas, and oceans, emphasizing biodiversity-rich regions.
- **Restoration**: Complete or initiate restoration on **30%** of degraded terrestrial, inland waters, and coastal and marine ecosystems.
- **Reduce food waste**: Cut global food waste in half.
- **Nutrient and pesticide reduction**: Halve excess nutrients and overall risk from pesticides.
- **Subsidy reform**: Phase out or reform subsidies harming biodiversity by at least $500 billion annually.
- **Biodiversity funding**: Mobilize at least $200 billion per year in biodiversity-related funding.
- **Invasive species control**: Prevent introduction of priority invasive alien species and reduce their establishment.
- **Corporate transparency**: Require large companies to disclose their biodiversity risks and impacts

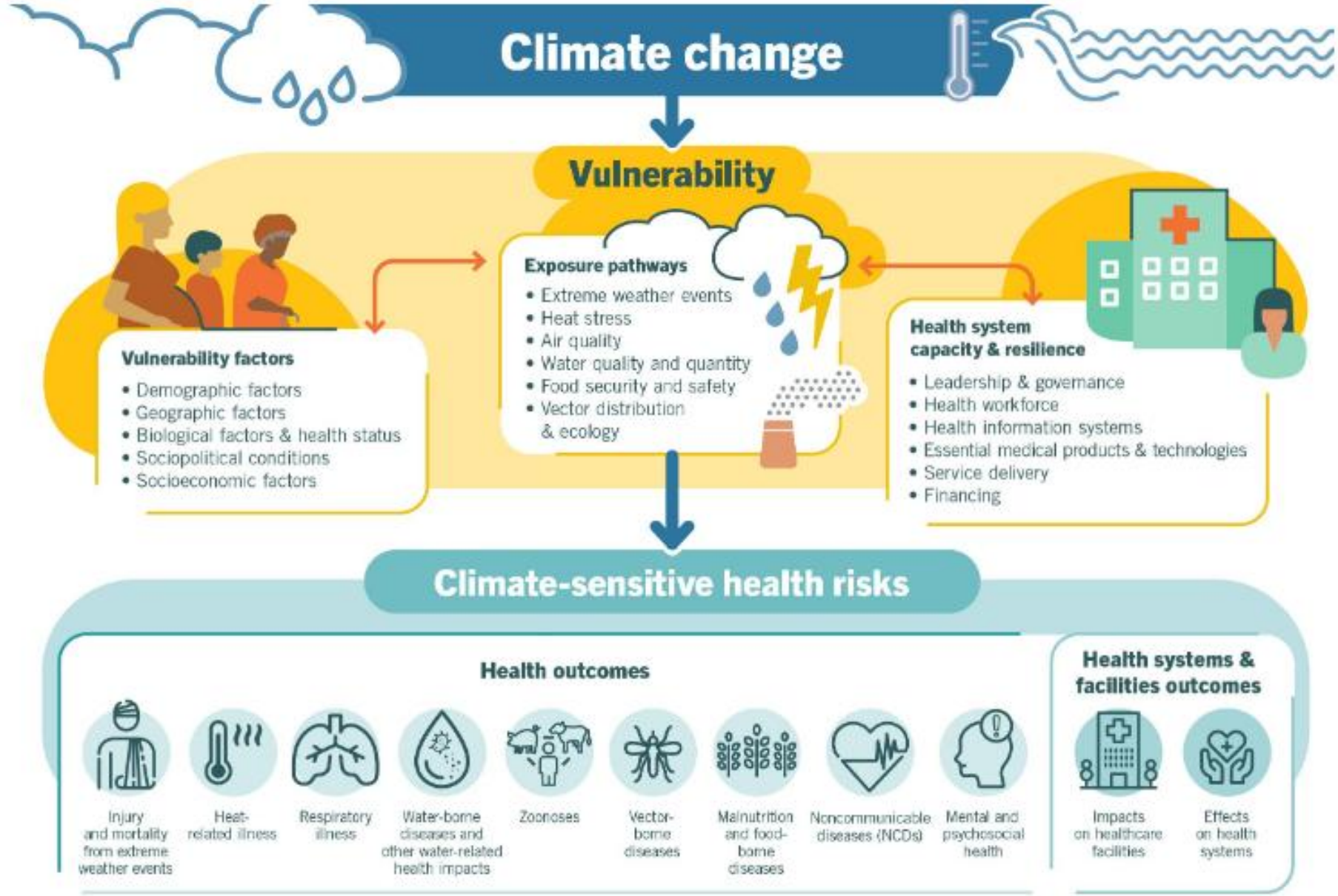
5. Climate Change Impact

Average annual weather-related displacements, 2010–2020



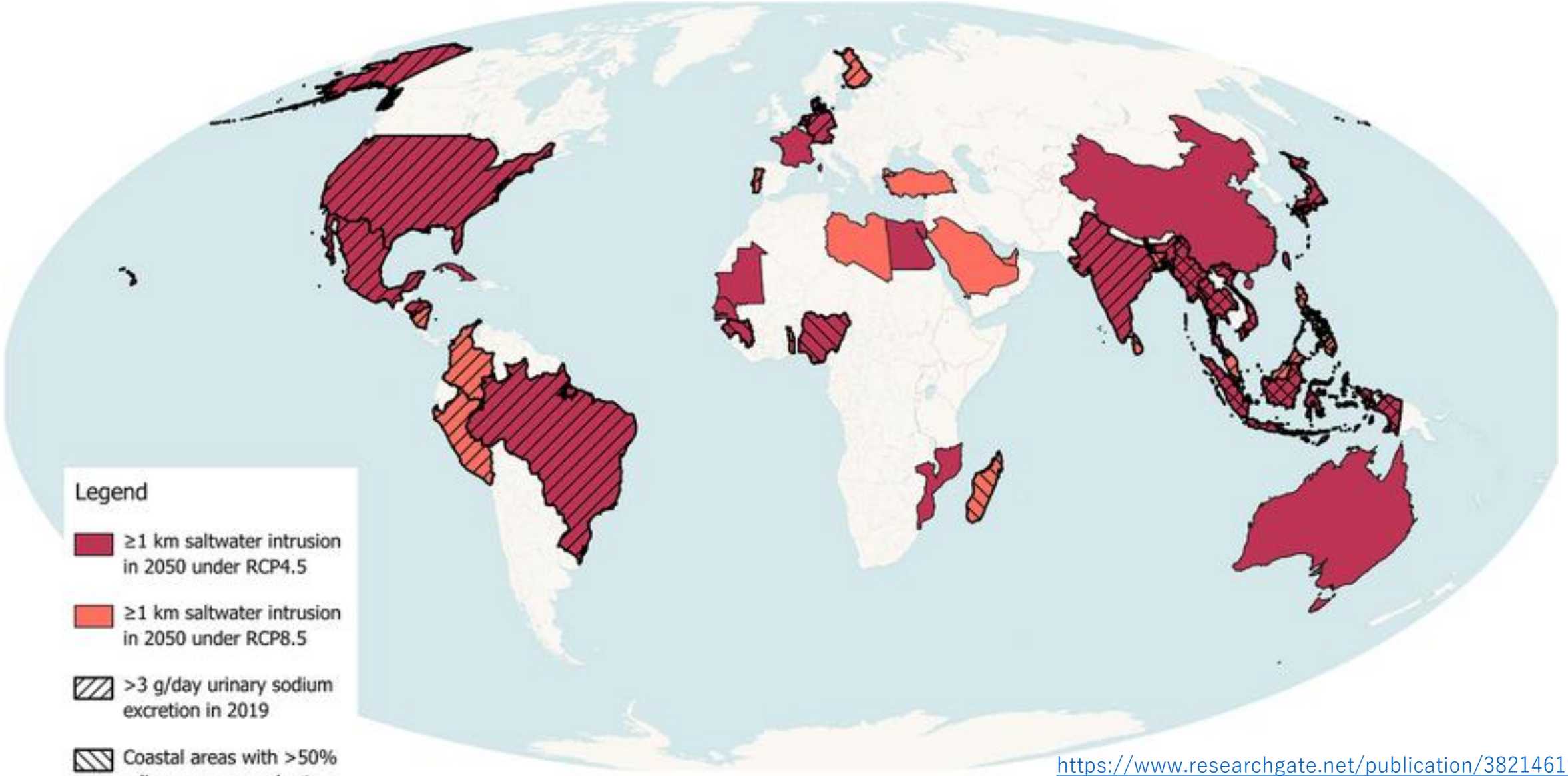
(Reference) IPCC AR6 WGII Chapter 7

Climate Change as a Health Risk



(Reference) https://www.who.int/news-room/fact-sheets/detail/climate-change-and-health

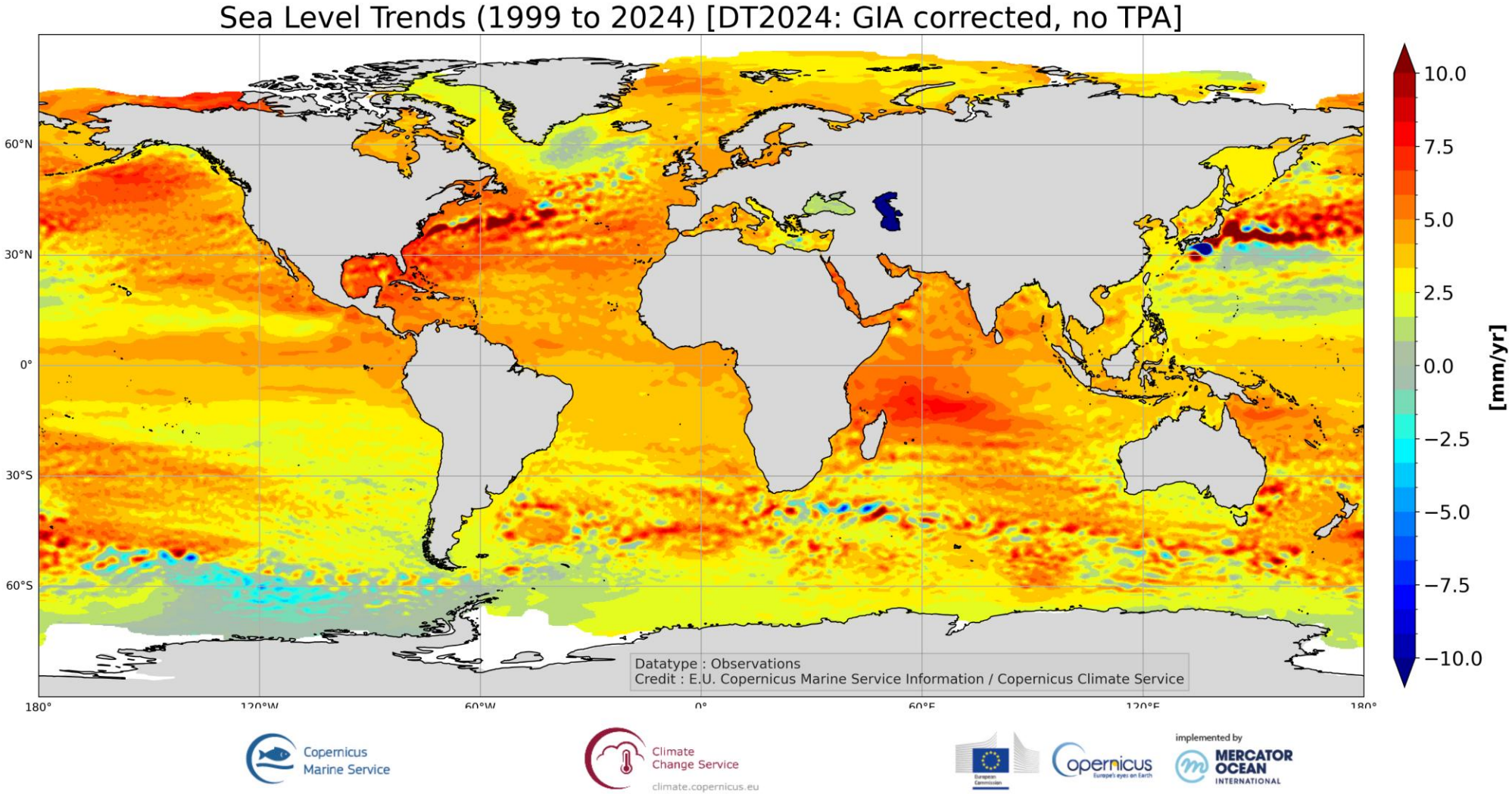
Saltwater intrusion and human health risks for coastal populations



https://www.researchgate.net/publication/382146190_Saltwater_intrusion_and_human_health_risks_for_coastal_populations_under_2050_climate_scenarios

(Source) Mueller et al., 2024, Saltwater intrusion and human health risks for coastal populations under 2050 climate scenarios

Global Sea Level Rise



Global ocean sea level trends from satellite altimeter observations (in mm/yr) over the period 1999/02/20 to 2024/11/19. The ocean monitoring indicator is derived from the DUACS delayed-time reprocessed dataset for climate applications (DT-2024).

https://marine.copernicus.eu/access-data/ocean-monitoring-indicators/global-ocean-mean-sea-level-trend-map-observations

Impact of Sea Level Rise

Drinking Water Supply: Contaminated groundwater affects the availability of potable water.

Agriculture: High salinity levels in irrigation water can harm crops and reduce agricultural productivity.

Ecosystem Disruption: Saline groundwater can affect the health of ecosystems, especially in wetlands and lakes.

Activities to improve Planetary Health

Mangrove Planting Activities



(Source) Tokio Marine Website

Forest Conservation



(Source) MS&AD Insurance Group Website

Blue Carbon Project



(Source) Samsung Fire & Marine insurance website

Promotion of greening of buildings



(Source) Dai-ichi Life Group Sustainability Report 2025

6. Principles for Sustainable Insurance (PSI)

Principles for Sustainable Insurance (PSI)



Launched at the 2012 UN Conference on Sustainable Development, the UNEP FI Principles for Sustainable Insurance (PSI) serve as a global framework for the insurance industry to address environmental, social and governance risks and opportunities. The PSI initiative is the largest collaborative initiative between the UN and the insurance industry.

https://www.unepfi.org/insurance/insurance/

4 Principles of PSI



Ban Ki-moon
Secretary-General of the United Nations

UN environment programme | finance initiative

Principles for Sustainable Insurance

Principles for Sustainable Insurance (PSI)

Environment

Society

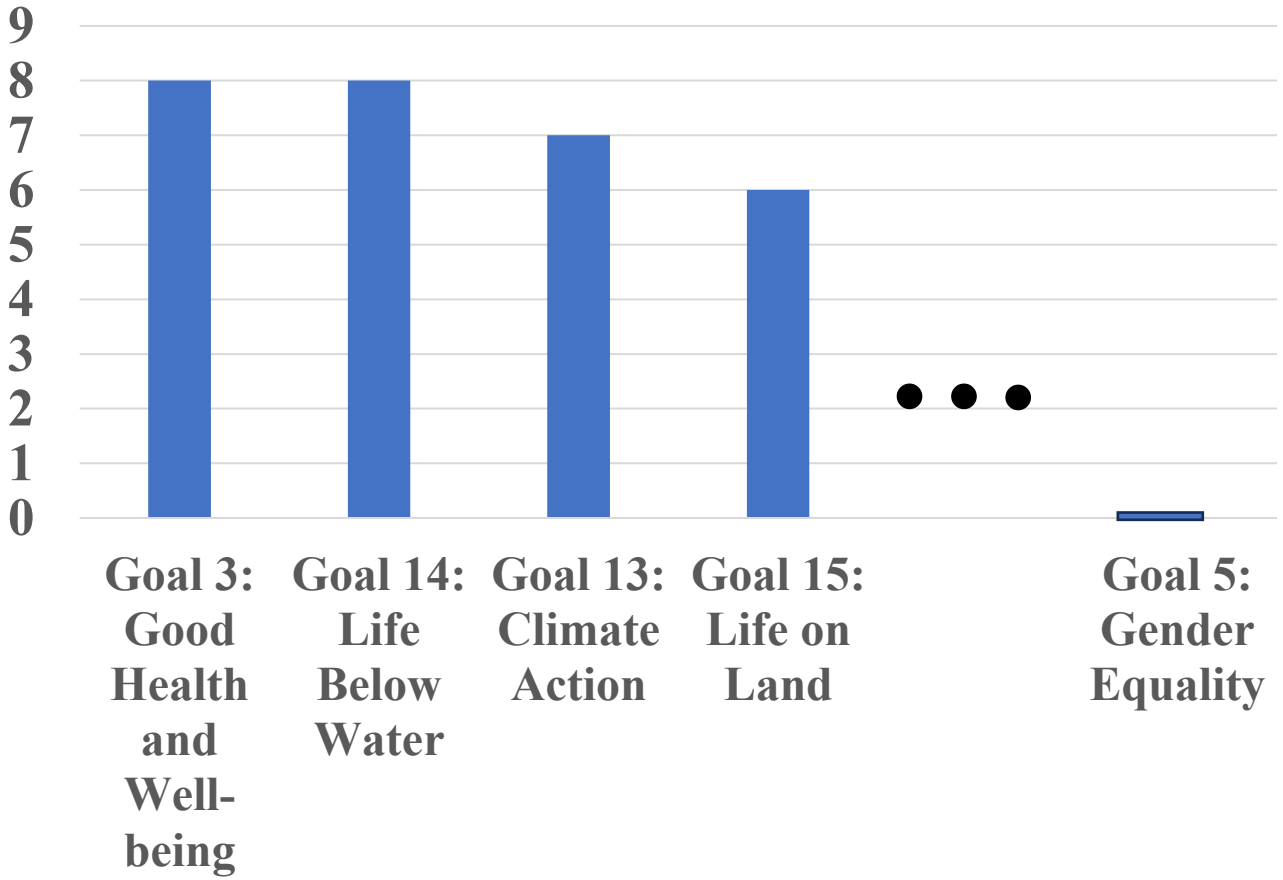
Governance

Principle 1 ESG based decision making
Principle 2 Raise awareness of ESG
Principle 3 Work together with Stakeholders
Principle 4 Accountability and Transparency

https://www.unepfi.org/insurance/insurance/the-principles/#

PSI publications





Compiled by the author based on the PSI publication website https://www.unepfi.org/insurance/



Health is Our Greatest Wealth: How life & health insurers can drive better health outcomes and address the protection gap

The global health crisis has highlighted the importance of population access to healthcare and the need for individuals to take…

The Four-Point Plan for Life & Health Insurers

to drive better health outcomes and address the protection gap

Strategy 1	Strategy 2	Strategy 3	Strategy 4
Offering insurance products that are suitable, affordable and accessible	Engaging with policyholders and other stakeholders to promote preventative healthcare	Leveraging technology and ethical use of data to expand access to insurance and support prevention measures	Collaborating with healthcare providers, policymakers and local communities

https://www.unepfi.org/category/publications/?ca%5B%5D=5



Supporting institutions

Asia Pacific

Association of Insurers and Reinsurers of Developing Countries, Philippines

Australian Prudential Regulation Authority, Australia

Friends of the Earth (HK), China

Financial Services Council of New Zealand, New Zealand

Foundation for Advancement of Life and Insurance Around the World (FALIA), Japan

General Insurance Council of India, India

Hong Kong Federation of Insurers , China

Insurance Commission of the Philippines, Philippines

Insurance Council of Australia, Australia

Insurance Council of New Zealand, New Zealand

Insurance Institute for Asia & the Pacific, Philippines

Insurance Institute of India, India

Korea Deposit Insurance Corporation, Republic of Korea

Philippine Insurers & Reinsurers Association, Philippines

Philippine Life Insurance Association, Philippines

Thaipat Institute, Thailand

Tobacco Free Portfolios, Australia

University of Technology, Sydney (UTS) Business School, Australia

≡MENU

Principles for Sustainable Insurance

> About the Principles

Priorities and Initiatives

Signatory Companies

Supporting institutions

Become a PSI Signatory Company or Supporting Institution

> Principles for Sustainable Insurance Member Area

> Resources

PSI Board

Insurance Team

The insurance industry and sustainable development: A UN system-wide agenda

PSI Principles for Sustainable Insurance

UN Framework Convention on Climate Change

UN Environment

International Labour Organization

UN Dept. of Economic & Social Affairs

UN Global Compact

World Health Organization

Office of the UN High Commissioner for Human Rights

PSI Principles for Sustainable Insurance

UN Human Settlements Programme

UN Office for Disaster Risk Reduction

UN Development Programme

Food & Agriculture Organization

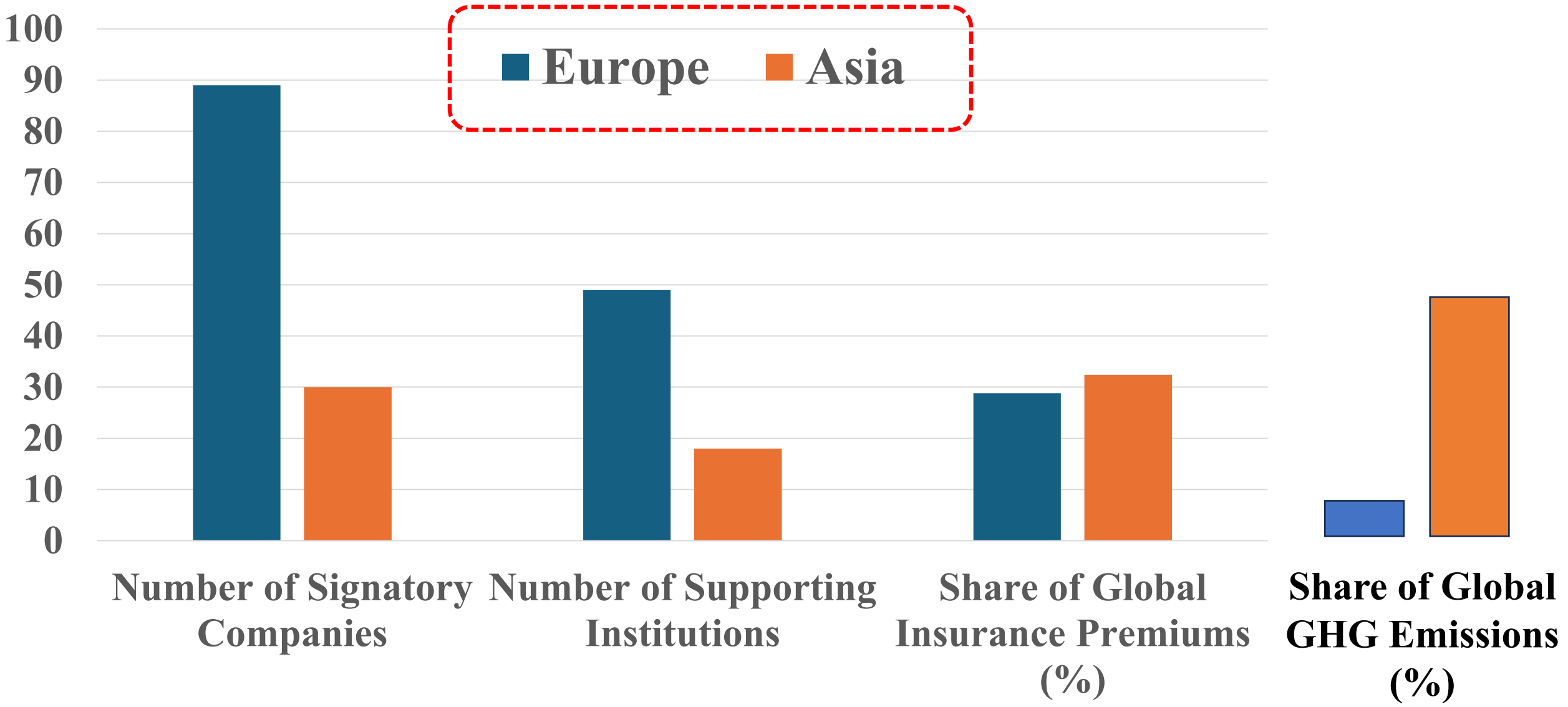
World Food Programme

UN Educational, Scientific & Cultural Organization

World Meteorological Organization

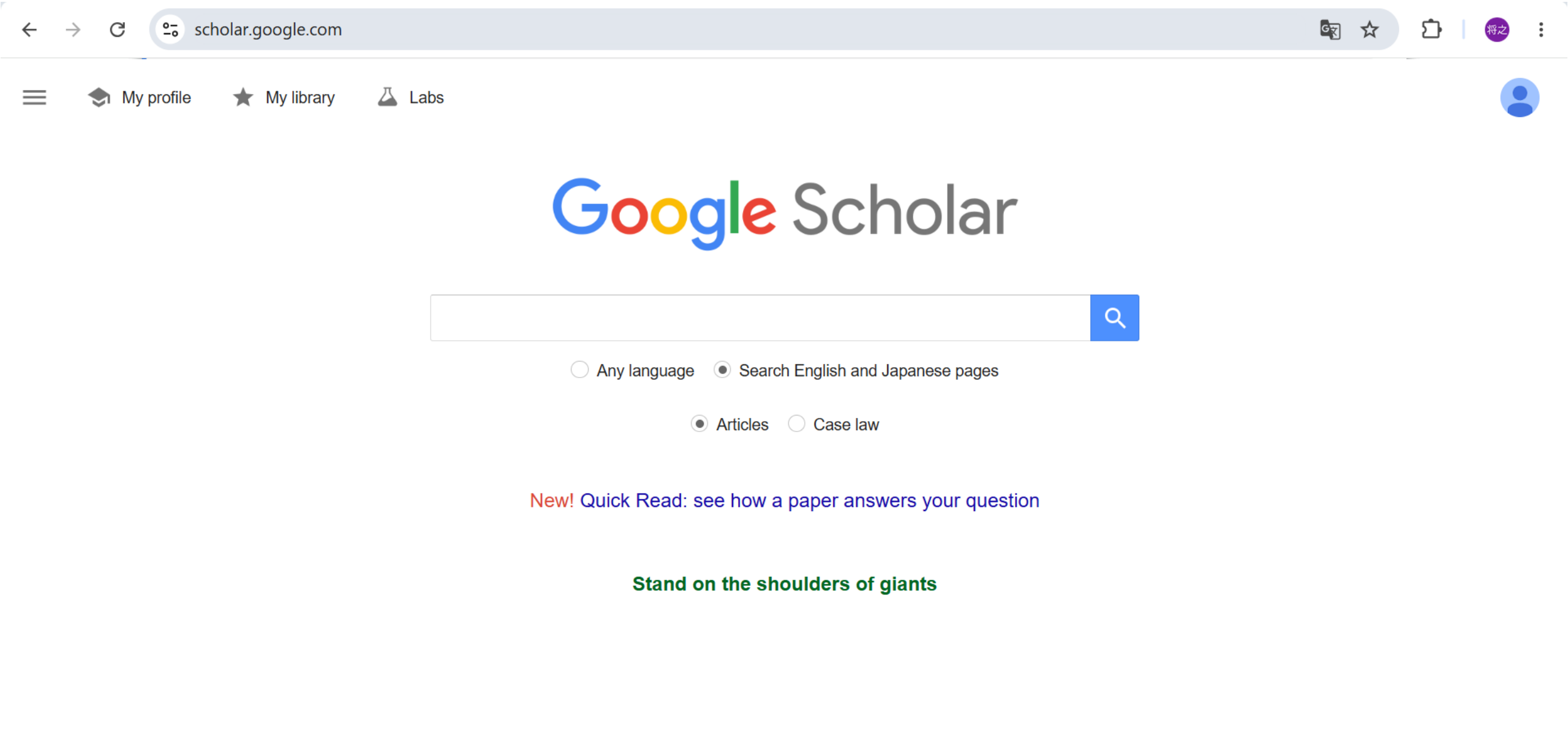
UN Conference on Trade & Development

PSI Adoption by Insurers as of January 4th 2026



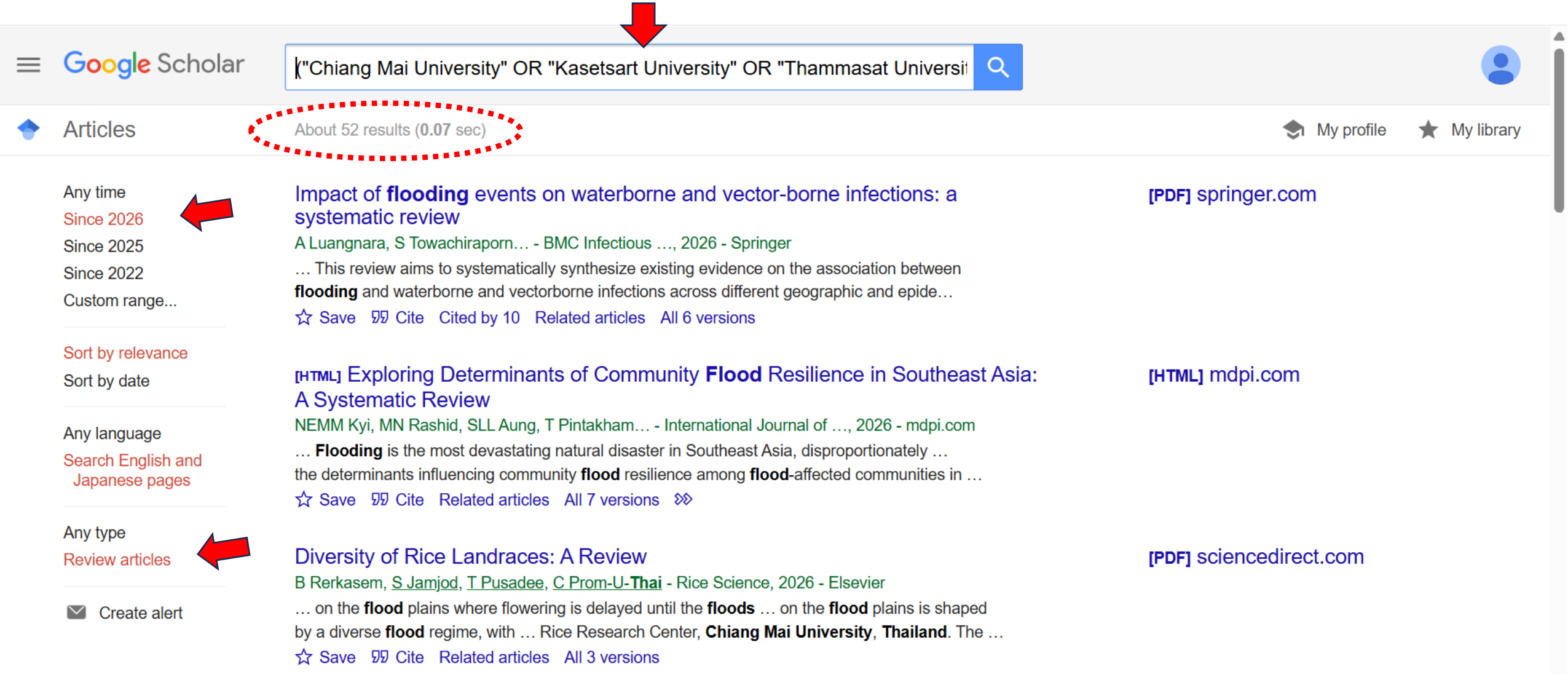
7. Thesis Searching via Google Scholar (Case Study)

Google Scholar



Case Study 1

("Chulalongkorn University" OR "Chiang Mai University" OR "Kasetsart University" OR "Thammasat University" OR "Lampang Rajabhat University") AND Thailand AND flood



Selection of thesis 1

Roadmap for leveraging satellite data to advance soil moisture monitoring in Mainland Southeast Asia

GAC Ganepola, N Tangdamrongsub… - Vadose Zone …, 2026 - Wiley Online Library

… **flooding**, as demonstrated in the case of the 2011 great **flood** that covered more than 18,000 km2 in Cen- tral **Thailand** … ulty of Agriculture, **Kasetsart University** (KU), **Thailand**. This site is …

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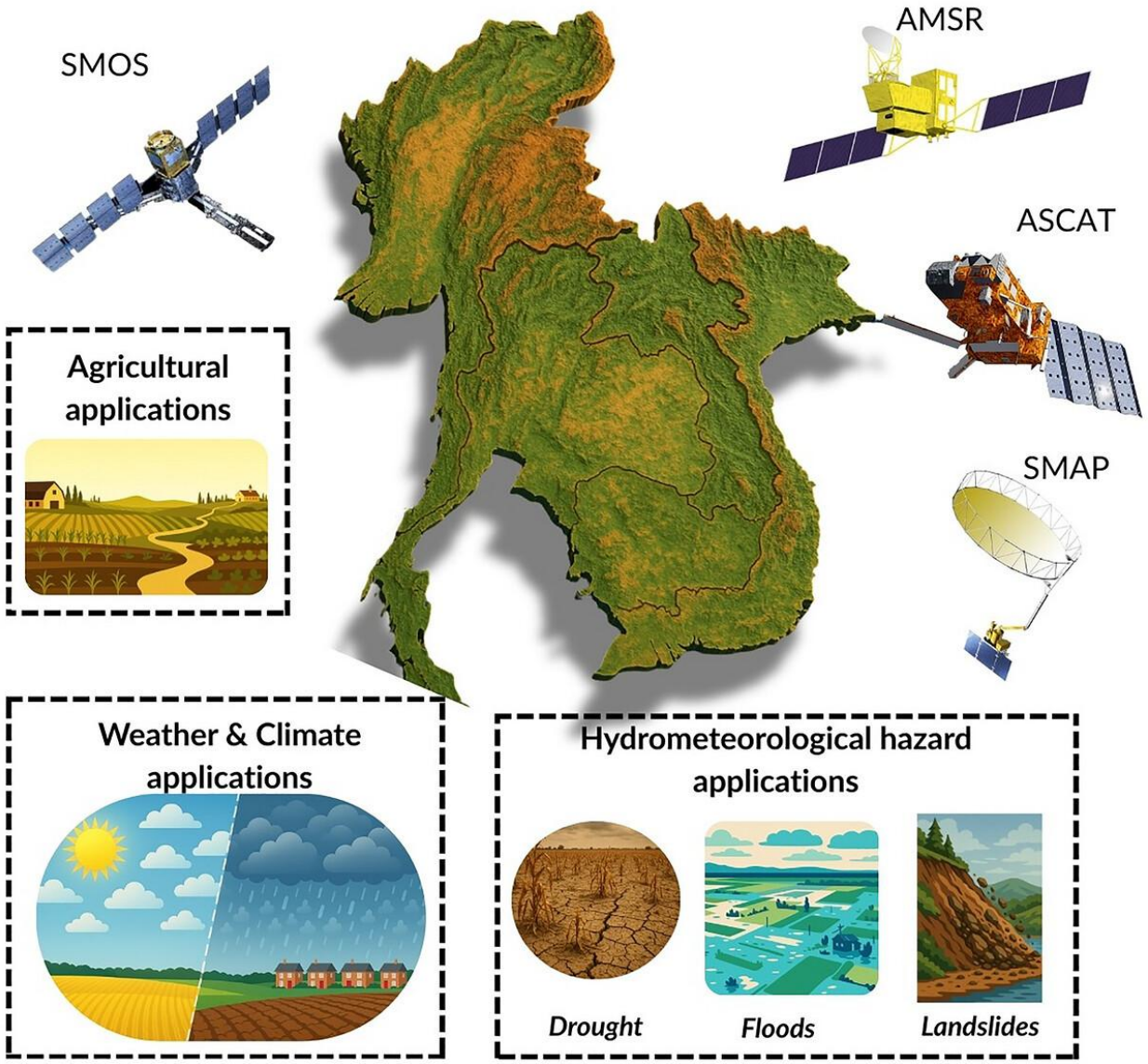
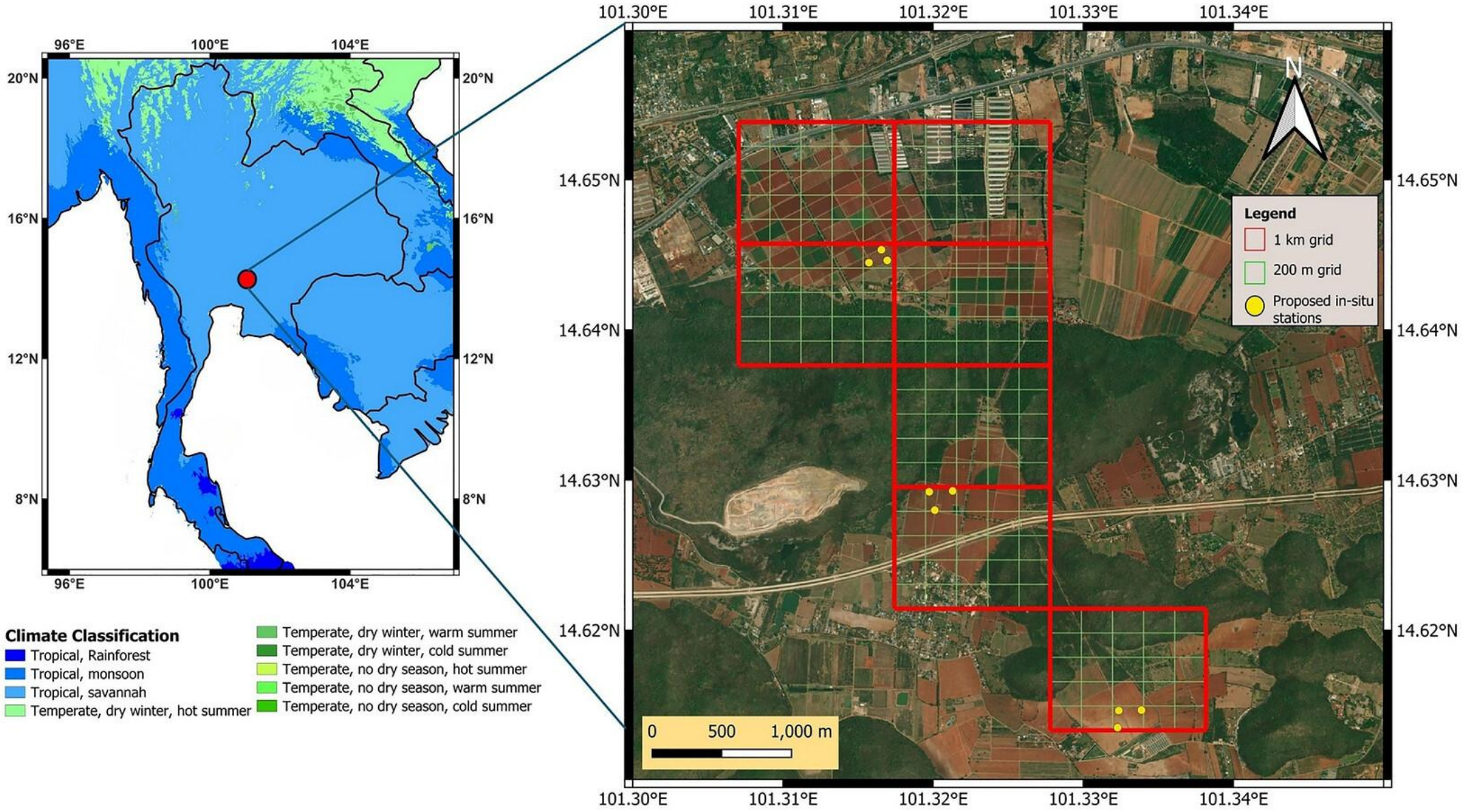
Satellite soil moisture observations



(Source) Ganepola et al. (2026) Roadmap for leveraging satellite data to advance soil moisture monitoring in Mainland Southeast Asia. Vadose Zone Journal, First published 4 June 2026. https://doi.org/10.1002/vzj2.70107

Soil moisture monitoring



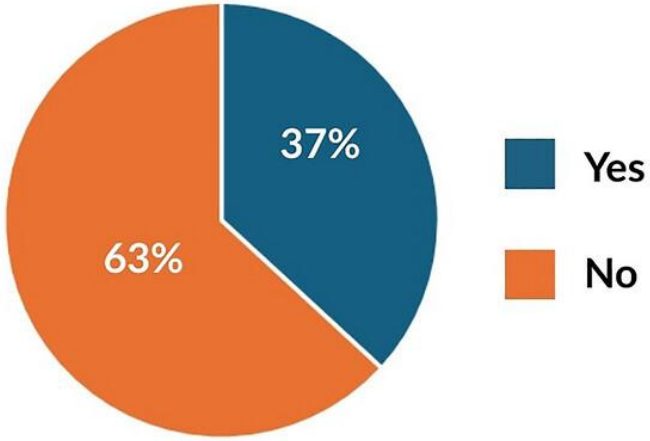
Survey results from the regional workshop

Advancing Agriculture, Climate, Environmental and Disaster Monitoring through Satellite-based Soil Moisture Retrieval and Applications in Southeast Asia

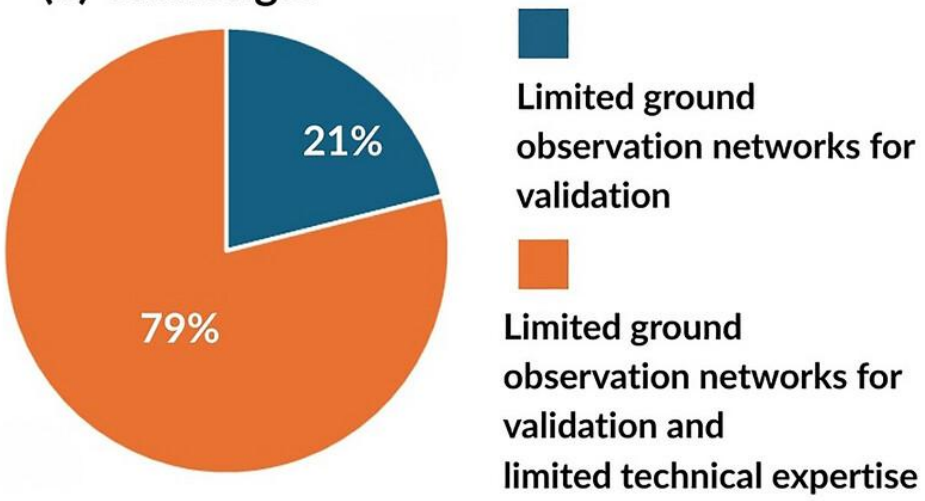
07 November 2024, Pathum Thani, Thailand

Organized by:

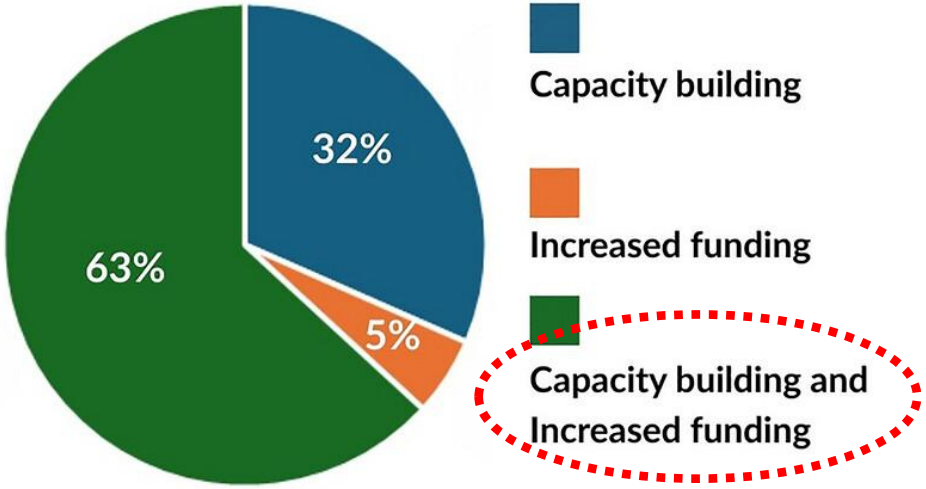
(a) Satellite soil moisture users



(b) Challenges



(c) Stakeholder recommendations



(Source) Workshop titled "Advancing Agriculture, Climate, Environmental, and Disaster Monitoring Through Satellite-Based Soil Moisture Retrieval and Applications in Southeast Asia"

What Insurance Companies Can Contribute

1 Flood-Risk Pricing and Predictive Modelling

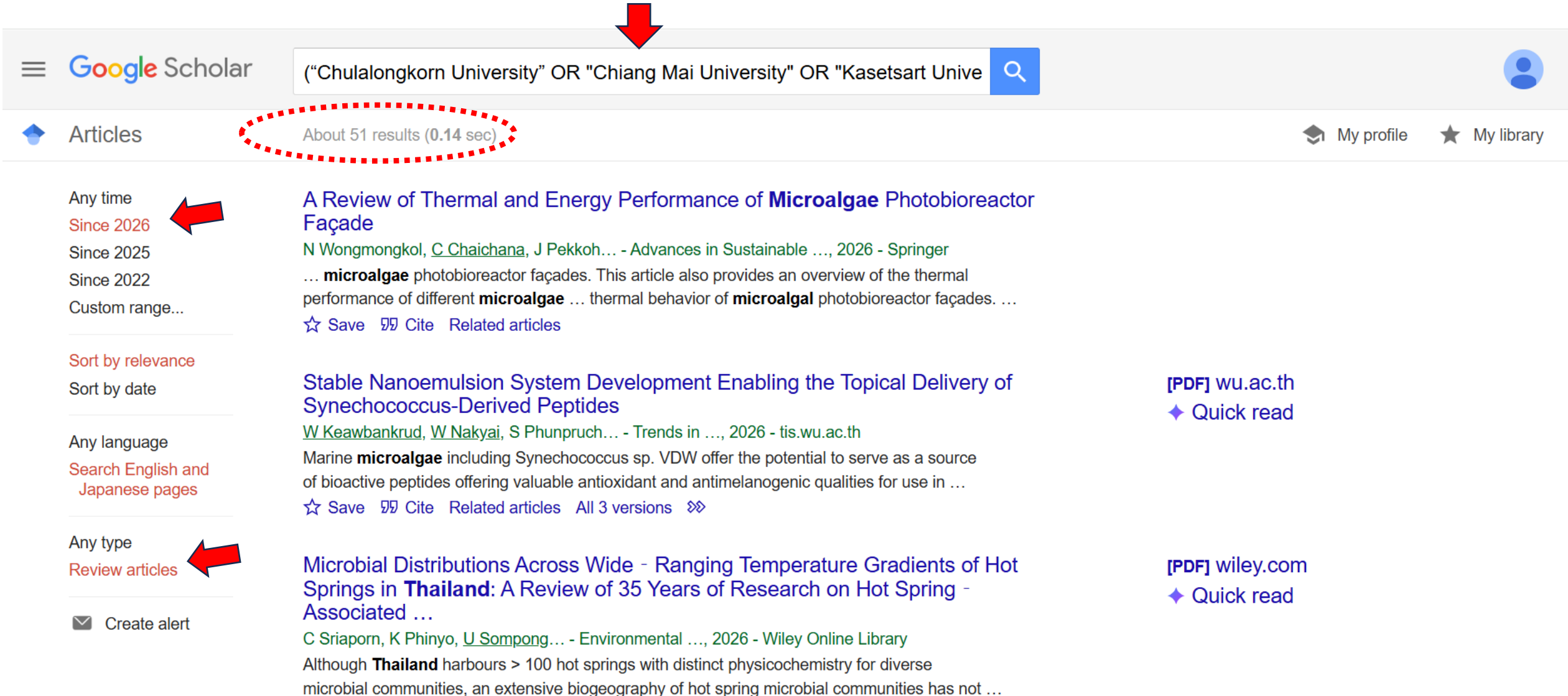
- **Insurers can play a central role in improving flood-risk assessment, one of the most critical climate challenges in the region.**
- **By collaborating with scientific partners and using NASA satellite data together with local hydrological observations, insurers can help advance flood-forecasting models.**
- **Introducing regional risk-based pricing encourages municipalities and communities to invest in stronger disaster-prevention measures.**

2 Investment in Climate Adaptation

- **Many governments face funding gaps in implementing climate-adaptation policies, creating an opportunity for insurers to contribute.**
- **As providers of Adaptation Finance, insurers can support investments in disaster-resilient infrastructure, water-resource management, and urban green infrastructure.**
- **Such investments strengthen long-term societal resilience and reduce future losses across vulnerable regions.**

Case Study 2

("Chulalongkorn University" OR "Chiang Mai University" OR "Kasetsart University" OR "Thammasat University" OR "Lampang Rajabhat University") AND Thailand AND microalgae



Selection of thesis 2

Machine Learning–Enabled **Microalgae** Bioprocess Optimization for Alternative Foods and Water Sustainability

MAU Haq, M Irfan, S Malik, N Kaewman… - Current Pollution …, 2026 - Springer

… **Microalgae** have emerged as a strong candidate in this … While several **microalgal** species are already produced as … the potential and limitations of **microalgae** as a scalable solution for …

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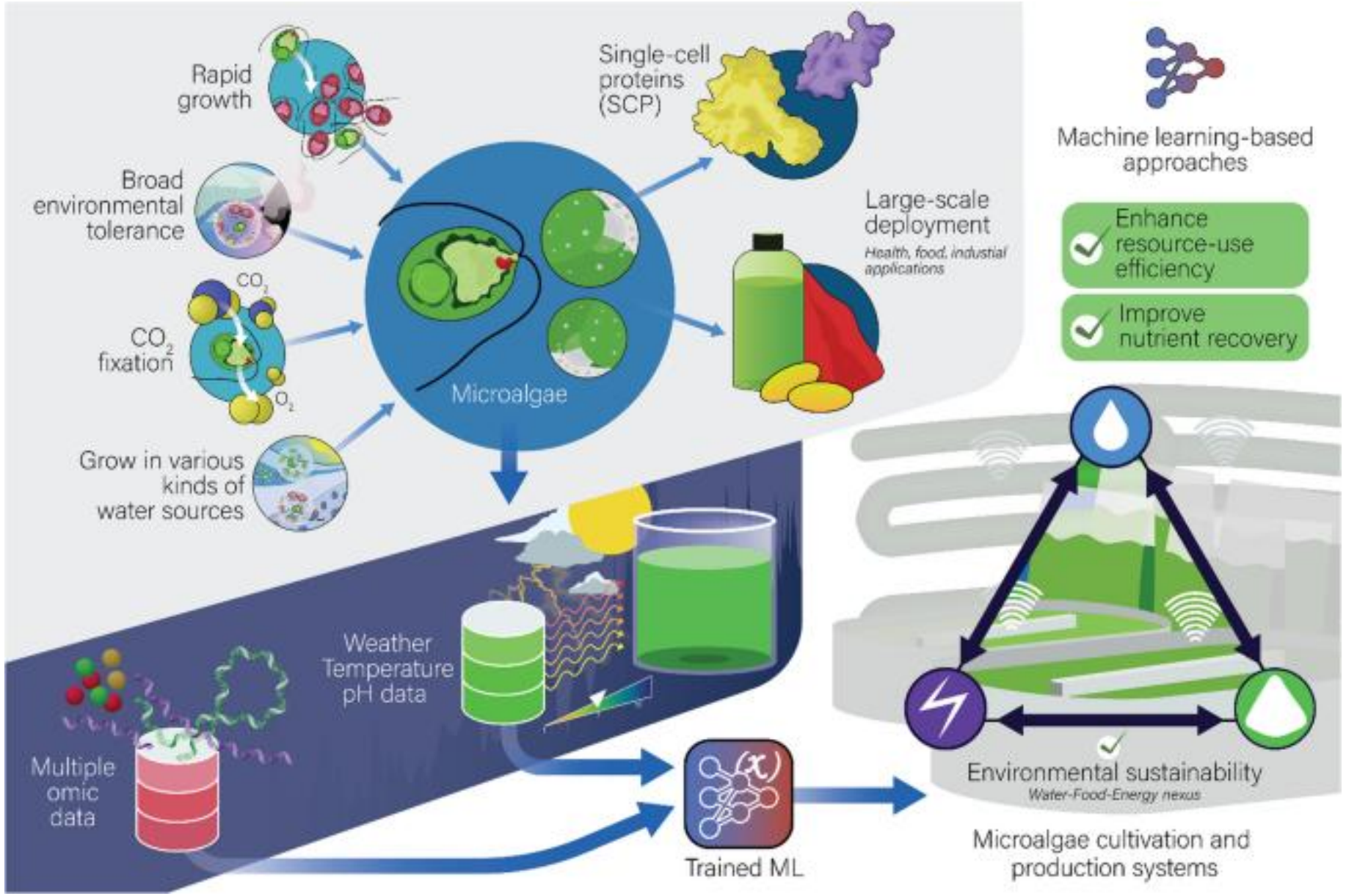
Microalgae have to be focused



(Source) Haq, M., Irfan, M., Malik, S., Kaewman, N. & others (2026) 'Machine Learning–Enabled Microalgae Bioprocess Optimization for Alternative Foods and Water Sustainability', Volume 12, Article 23, published 19 May 2026.

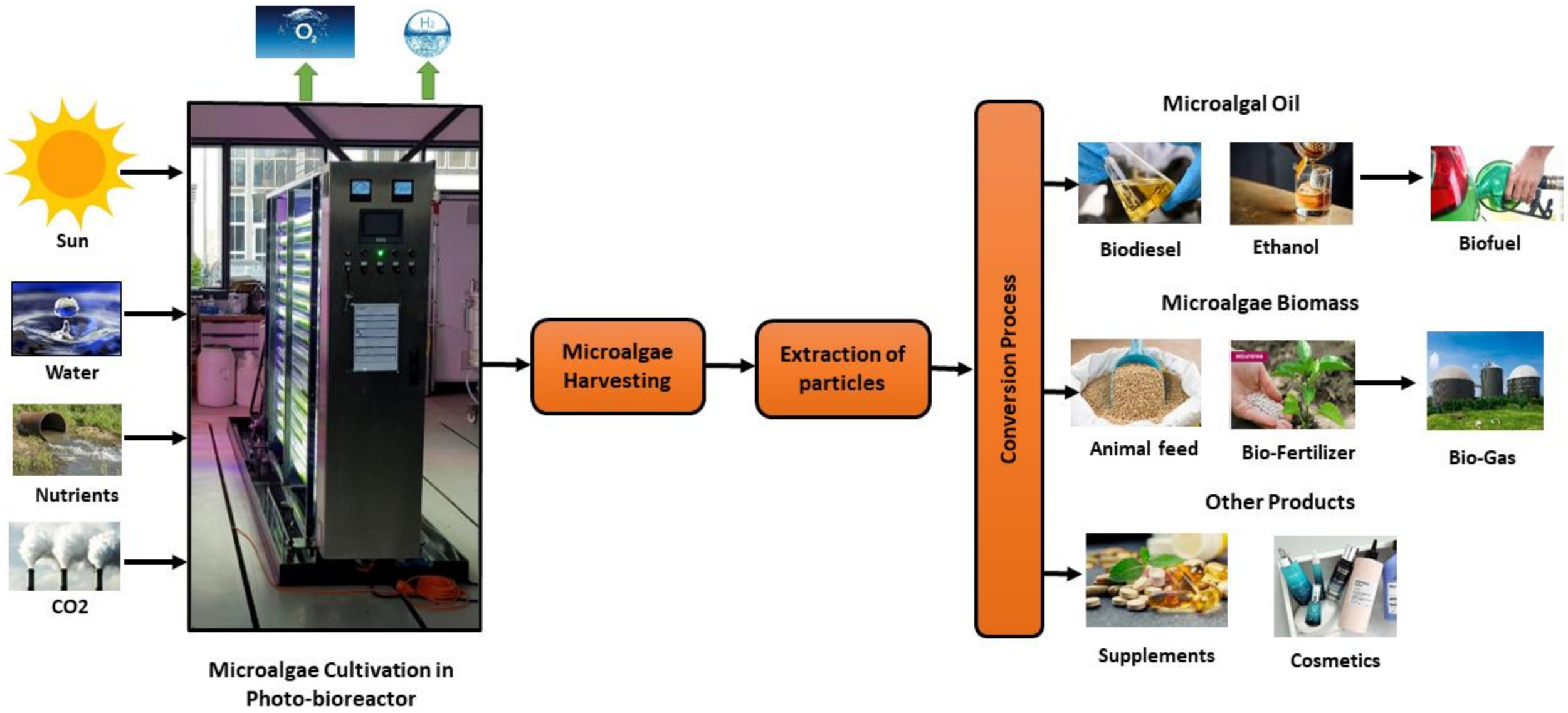
Benefit of Microalgae

- High-protein alternative food ingredients
- Water purification (wastewater treatment)
- CO_2 absorption for decarbonization
- Biomass feedstock for biofuels

However, conventional production processes face the following challenges:

- Difficulty in optimizing cultivation conditions
- High energy demand for biomass harvesting
- Production efficiency strongly affected by environmental conditions
- High costs that hinder commercial scalability.

Machine Learning



(Source) digitalgaesation (2023) Prediction of microalgae growth using Machine Learning models, 17 October. Available at: https://digitalgaesation (Accessed: 8 October 2026)

Overall Implication

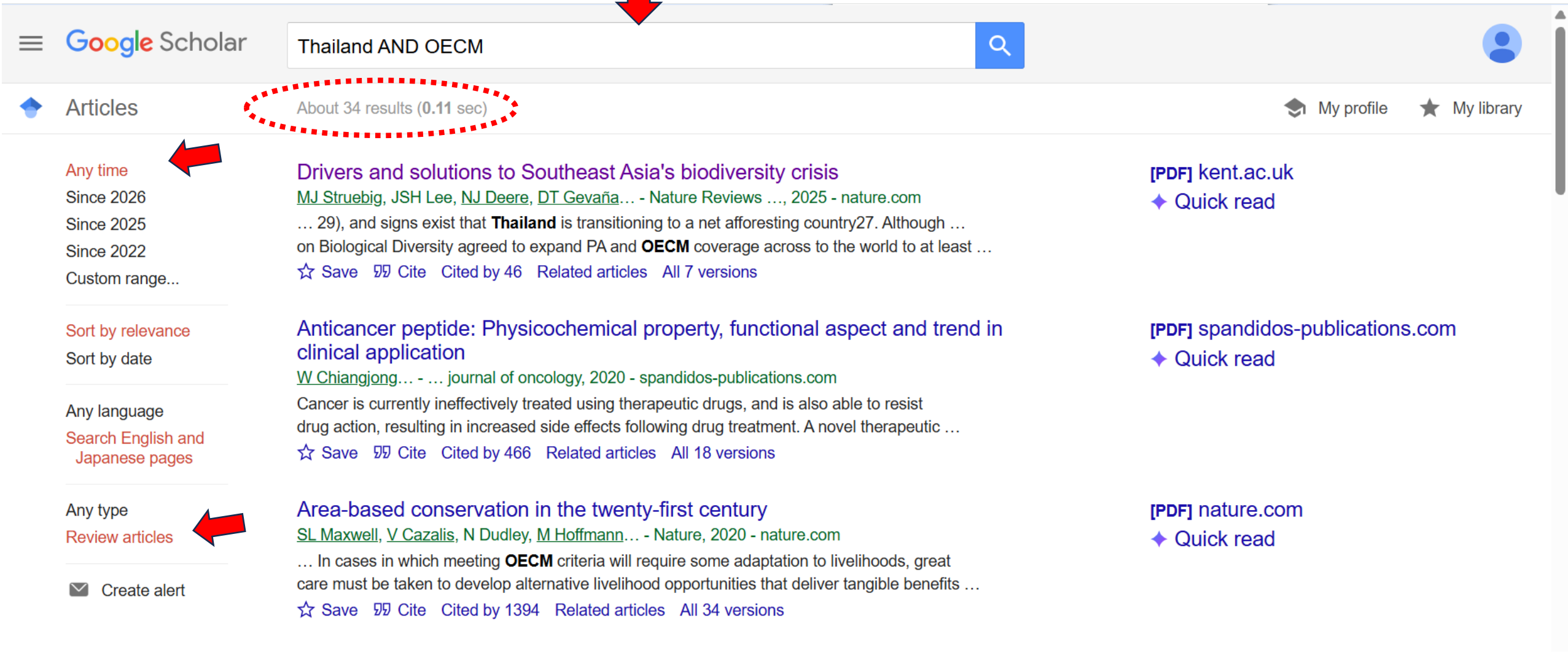
This paper shows that "microalgae × machine learning" is an innovative technology capable of simultaneously improving alternative food production, water resource sustainability, and decarbonization.

And insurers can accelerate the social implementation of this field as key stakeholders through:

1. **New-technology risk guarantees,**
2. **ESG investment,**
3. **Support for carbon credit markets, and**
4. **New products for food and water risks**

Case Study 3

Thailand AND OECM



Selection of thesis 3

Protecting and restoring habitats to benefit freshwater biodiversity

ML Piczak, D Perry, SJ Cooke, I Harrison… - Environmental …, 2023 - cdnsciencepub.com

… Mae Ngao Community Fish Reserve, **Thailand** Fish This **OECM** is a fisheries reserve that is managed by Indigenous P'ganyaw (Karen) communities where they enforce boundaries, …

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What is OECM?

OECMs (Other Effective Area-Based Conservation Measures) are areas that deliver strong and measurable biodiversity and ecosystem benefits even though they are not formally designated as protected areas.

Thailand has many such high-potential sites. However, official OECM designation has progressed slowly due to strict global criteria, complex land-tenure and governance arrangements, limited monitoring systems, and the absence of a single responsible government agency. Thailand's OECM potential is therefore high, but institutionalization is still at an early stage.

What Insurance Companies Can Contribute

- **Invest in natural capital (ESG)**
  Support community forests, mangrove restoration, and agroforestry systems that directly reduce disaster risks.
- **Improve risk models for OECM regions**
  Enhanced natural-capital data strengthens the accuracy of flood and drought models.
- **Enable parametric insurance solutions**
  Ecosystem indicators—such as forest cover and wetland extent—can serve as measurable triggers.
- **Support TNFD-aligned nature risk management**
  SEPLS and OECM sites are central to natural-capital assessment and disclosure.

TEI (Thailand Environment Institute)

Who They Are

Thailand's leading independent environmental think tank
Expert in biodiversity, climate resilience, SEPLS, and OECM

Why It Matters for Insurers

- **Provides nature-related risk data (flood, drought, land-use, ecosystem services)**
- **Supports TNFD-aligned assessments and ESG integration**
- **Identifies OECM/SEPLS landscapes that reduce disaster risk**
- **Enables risk modelling using forest, watershed, and community-based conservation data**
- **Strong network with local communities → foundation for parametric insurance and resilience finance**

TEI THAILAND ENVIRONMENT INSTITUTE



Case Study Conclusion

Recent academic studies in Thailand show that flooding and air pollution (PM2.5) are by far the most prominent Planetary Boundary issues, driven by rapid urbanization, climate-induced rainfall variability, and severe health impacts.

Across these topics, one message is clear: Thailand faces escalating climate and environmental risks that require better data, stronger modelling, and sustained investment.

This creates a unique opportunity for the insurance industry. Insurers are the only sector with both the financial capacity and the risk-modelling expertise to support advanced climate analytics—such as satellite-based flood forecasting, microalgae development for alternative environment-friendly food and fuels, and risk modelling on OECM.

By investing in technical capacity, validation networks, and collaborative research, the insurance industry can play a central role in strengthening national resilience and enabling evidence-based climate adaptation in Thailand.

This is the end of the presentation.

Thank you for listening to my presentation.