Major Impacts and Vulnerabilities for Asia

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Transcending borders towards working solutions
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AIM
ASIA-PACIFIC INTEGRATED MODEL

NIES JAPAN

Contents

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2. Major Climate Change Impacts and Vulnerabilities for Asia
3. Toward New Paradigm of Adaptation
4. Conclusion

IPCC
Intergovernmental Panel on Climate Change

- Leading international body for the assessment of climate change.
- Established by the United Nations Environment Programme (**UNEP**) and the World Meteorological Organization (**WMO**) in **1988** to **provide the world with a clear scientific view on the current state of knowledge in climate change and its potential environmental and socio-economic impacts**. In the same year, the UN General Assembly endorsed the action by WMO and UNEP in jointly establishing the IPCC.
- Scientific body under the auspices of the United Nations (UN). It reviews and assesses the most recent scientific, technical and socio-economic information produced worldwide relevant to the understanding of climate change. It does not conduct any research nor does it monitor climate related data or parameters

IPCC
Intergovernmental Panel on Climate Change

- Intergovernmental body
  - Open to all member countries of the UN and WMO.
  - Members of the IPCC: Currently **195 countries**
  - **Governments participate in the review process and the plenary Sessions**, where main decisions about the IPCC work programme are taken and reports are accepted, adopted and approved. The IPCC Bureau Members, including the Chair, are also elected during the plenary Sessions.
- Because of its scientific and intergovernmental nature, the IPCC embodies a unique opportunity to **provide rigorous and balanced scientific information to decision makers**. By endorsing the IPCC reports, governments acknowledge the authority of their scientific content.
- The work of the organization is therefore **policy-relevant** and yet policy-neutral, **never policy-prescriptive**.

Fifth Assessment Report (AR5)

Targets — Anthropogenic climate change, impacts, adaptation, and mitigation

Points — Comprehensive assessment based on scientific, technological, and socio-economic perspective

WG I report	WG II report	WG III report
Assessment of **physical scientific aspects** of the climate system and climate change	Assessment of **vulnerability** of socio-economic and natural systems to climate change	Assessment of options for **mitigating** climate change

Synthesis report

http://www.ipcc.ch/organization/organization.shtml

IPCC Plenary

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The Physical Science Basis	Climate Change Impacts, Adaptation and Vulnerability	Mitigation of Climate Change	
TSU	TSU	TSU	TSU

Authors, Contributors, Reviewers

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ipcc
INTERGOVERNMENTAL PANEL ON climate change

CLIMATE CHANGE 2014:

IMPACTS, ADAPTATION, AND VULNERABILITY

Outline of IPCC WGII AR5

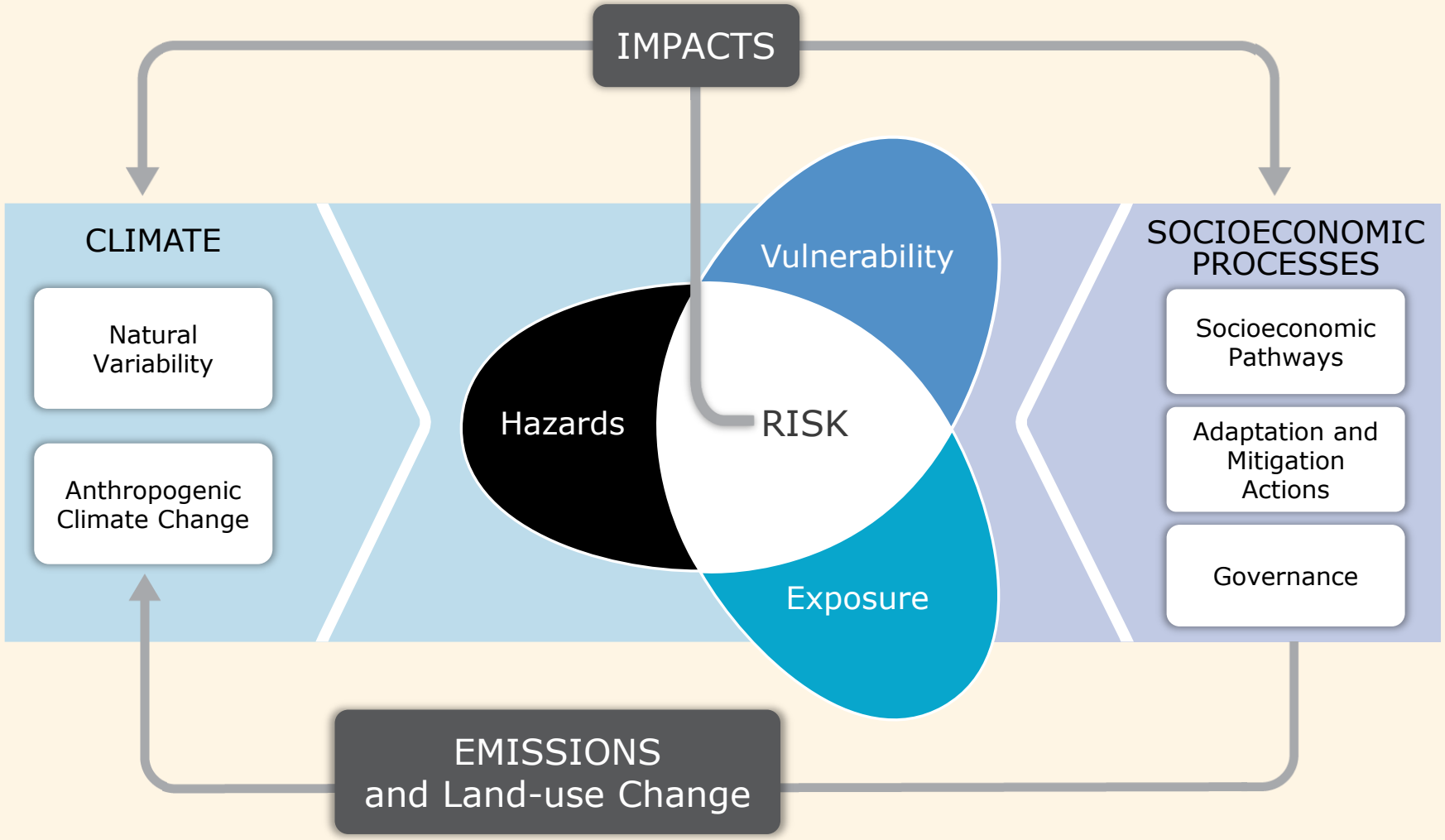
I. **Increase of authors and review comments**
   - 308 authors by 70 countries, 50492 review comments

II. **Expansion of research field**
   - Human Security, Ocean, etc.

III. **Adoption of risk management**
   - Arrangement and expansion based on the concept introduced by SREX (Special Report on Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation)

IV. **Systematic assessment of adaptation**
   - Necessity, Options, Plan, Implementation, Opportunity, Constraints, Limit, Costs

V. **Key risks** considering the extent of adaptation and mitigation
   - 2 & 4˚C, with and without adaptation


IMPACTS
CLIMATE
Natural Variability
Anthropogenic Climate Change
Vulnerability
Hazards
RISK
Exposure
SOCIOECONOMIC PROCESSES
Socioeconomic Pathways
Adaptation and Mitigation Actions
Governance
EMISSIONS and Land-use Change

Contents of IPCC WGII AR4

1. Assessment of observed changes and responses in natural and managed systems
2. New assessment methods and the characterisation of future conditions
3. Freshwater resources and their management
4. Ecosystem, their properties, goods and services
5. Food, fibre and forest products
6. Coastal systems and low-lying areas
7. Industry, settlement and society
8. Human health
9. Africa
10. Asia
11. Australia and New Zealand
12. Europe
13. Latin America
14. North America
15. Polar Regions (Arctic and Antarctic)
16. Small islands
17. **Assessment of adaptation practices, options, constraints and capacity**
18 .Inter-relationships between adaptation and mitigation
19. Assessing key vulnerabilities and the risk from climate change
20. Perspectives on climate change and sustainability

AIM ASIA-PACIFIC INTEGRATED MODEL

Contents of IPCC WGII AR5

PART A: GLOBAL AND SECTORAL ASPECTS

Context for the AR5

Ch. 1 Point of departure

Ch. 2 Foundations for decisionmaking

Natural and Managed Resources and Systems, and Their Uses

Ch. 3 Freshwater resources

Ch. 4 Terrestrial and inland water systems

Ch. 5 Coastal systems and low-lying areas

Ch. 6 Ocean systems

Ch. 7 Food production systems and food security,

Human Settlements, Industry, and Infrastructure

Ch. 8 Urban Areas

Ch. 9 Rural Areas

Ch. 10 Key economic sectors and services

Human Health, Well-Being, and Security

Ch. 11 — Human health

Ch. 12 — Human security

Ch. 13 — Livelihoods and poverty

Adaptation

Ch. 14 Adaptation needs and options

Ch. 15 Adaptation planning and implementation

Ch. 16 Adaptation opportunities, constraints, and limits

Ch. 17 Economics of adaptation

Multi-Sector Impacts, Risks, Vulnerabilities, and Opportunities

Ch. 18 — Detection and attribution of observed impacts

Ch. 19 — Emergent risks and key vulnerabilities

Ch. 20 — Climate-resilient pathways: adaptation, mitigation, and sustainable development

PART B: REGIONAL ASPECTS

Ch. 21 — Regional context

Regional Chapters

Ch. 22 Africa, Ch. 23 Europe, Ch. 24 Asia, Ch. 25 Australasia, Ch. 26 North America, Ch. 27 Central and South America, Ch. 28 Polar Regions, Ch. 29 Small Islands, Ch. 30 Open Oceans

Outline of IPCC WGII AR5

Observed Impacts, Vulnerability, and Adaptation in a Complex and Changing World

- **A-1: Observed Impacts, Vulnerability, and Exposure**
  - In recent decades, changes in climate have caused impacts on natural and human systems on all continents and across the oceans.
  - Evidence of climate-change impacts is strongest and most comprehensive for natural systems.
- **A-2: Adaptation Experience**
  - Adaptation is becoming embedded in some planning processes, with more limited implementation of responses.
- **A-3: The Decision-making Context**
  - Adaptation and mitigation choices in the near term will affect the risks of climate change throughout the 21st century

http://ipcc-wg2.gov/AR5/images/uploads/WG2AR5_SPM_FINAL.pdf

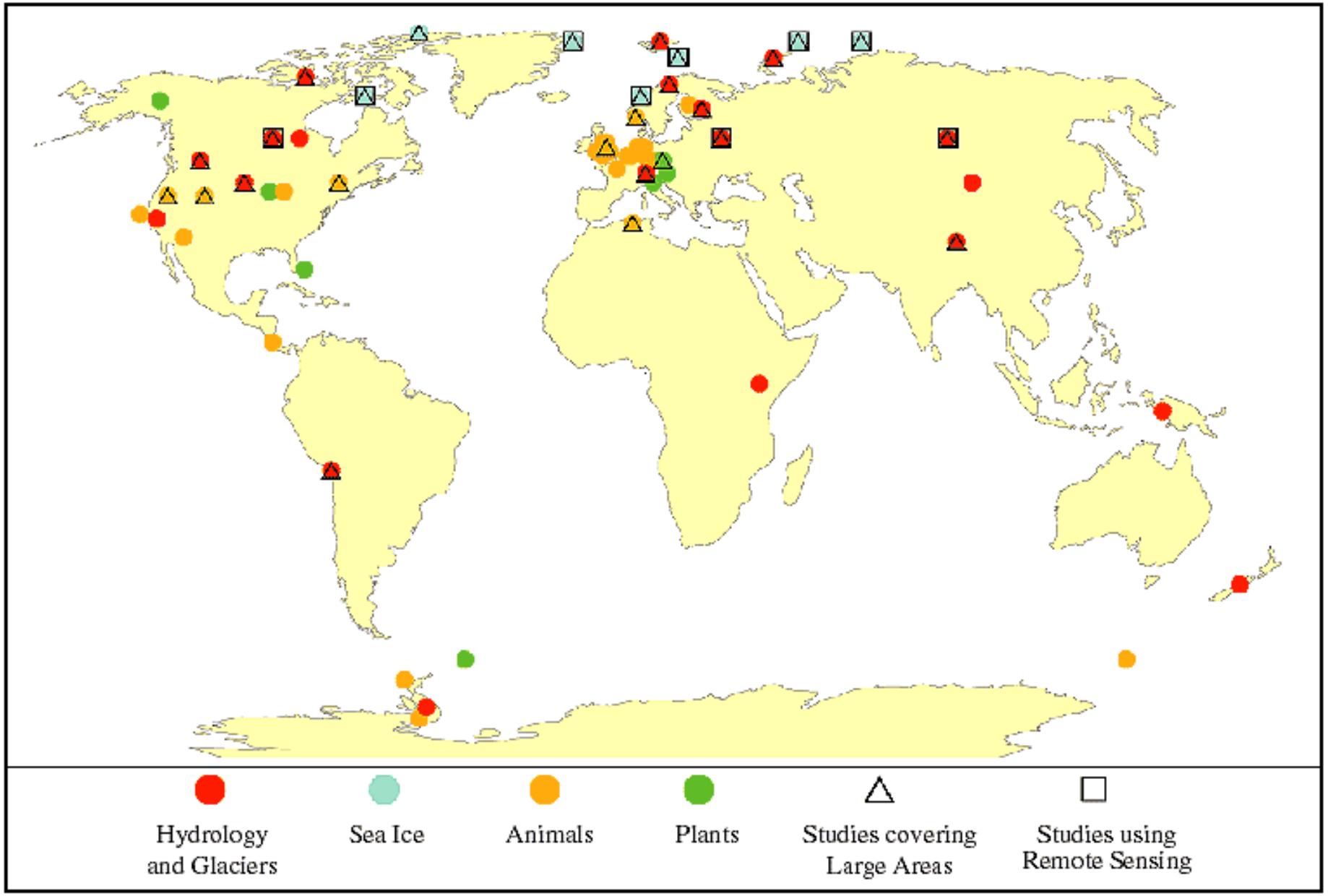
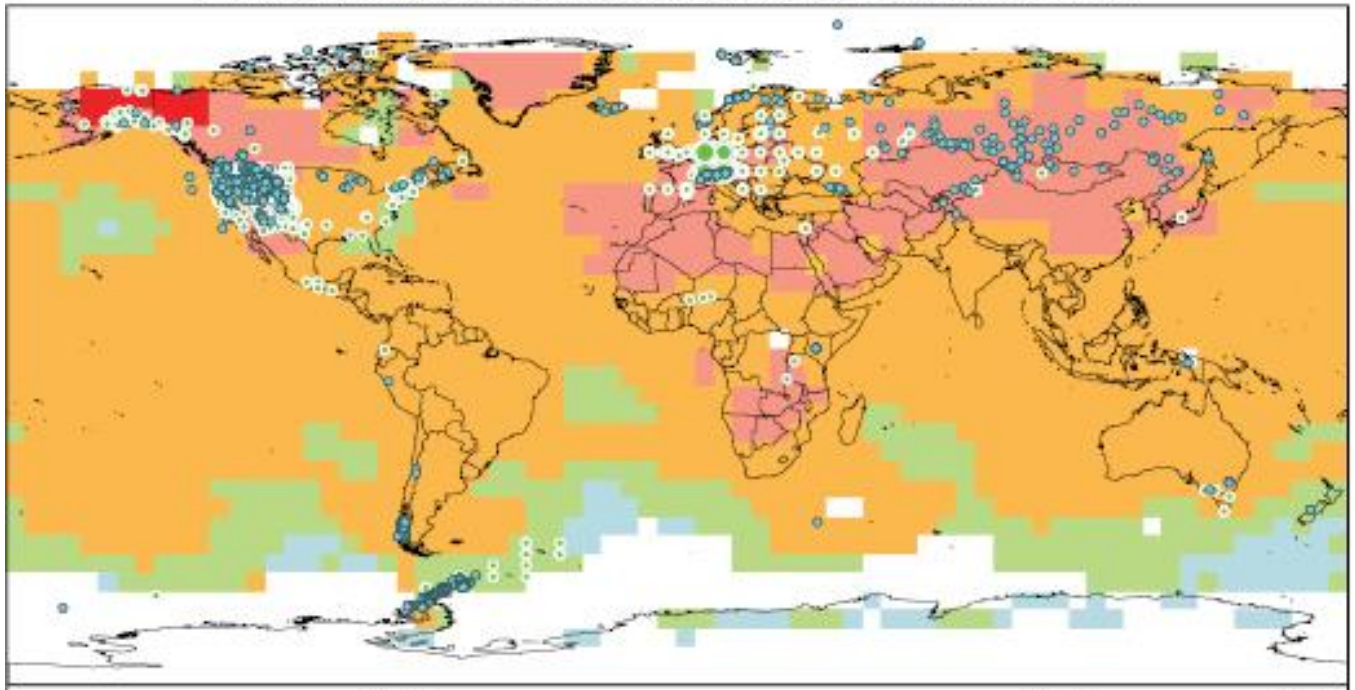


Figure SPM-1: Locations at which systematic long-term studies meet stringent criteria documenting recent temperature-related regional climate change impacts on physical and biological systems. Hydrology, glacial retreat, and sea-ice data represent decadal to century trends. Terrestrial and marine ecosystem data represent trends of at least 2 decades. Remote-sensing studies cover large areas. Data are for single or multiple impacts that are consistent with known mechanisms of physical/biological system responses to observed regional temperature-related changes. For reported impacts spanning large areas, a representative location on the map was selected.

http://www.grida.no/publications/other/ipcc_tar/?src=/climate/ipcc_tar/wg2/007.htm

Changes in physical and biological systems and surface temperature 1970-2004



	NAM		LA		EUR (28,115)		AFR		AS		ANZ		PR*		TER (28,586)		MFW**		GLO (28,671)	
	355	455	53	5	119		5	2	106	8	6	0	120	24	764		1	85	765	
	94%	92%	98%	100%	94%	89%	100%	100%	96%	100%	100%	–	91%	100%	94%	90%	100%	99%	94%	90%

Observed data series

- Physical systems (snow, ice and frozen ground; hydrology; coastal processes)
- Biological systems (terrestrial, marine, and freshwater)

Europe ***	
○	1-30
○	31-100
○	101-800
○	801-1,200
○	1,201 -7,500

Temperature change °C
1970-2004

-1.0 -0.2 0.2 1.0 2.0 3.5

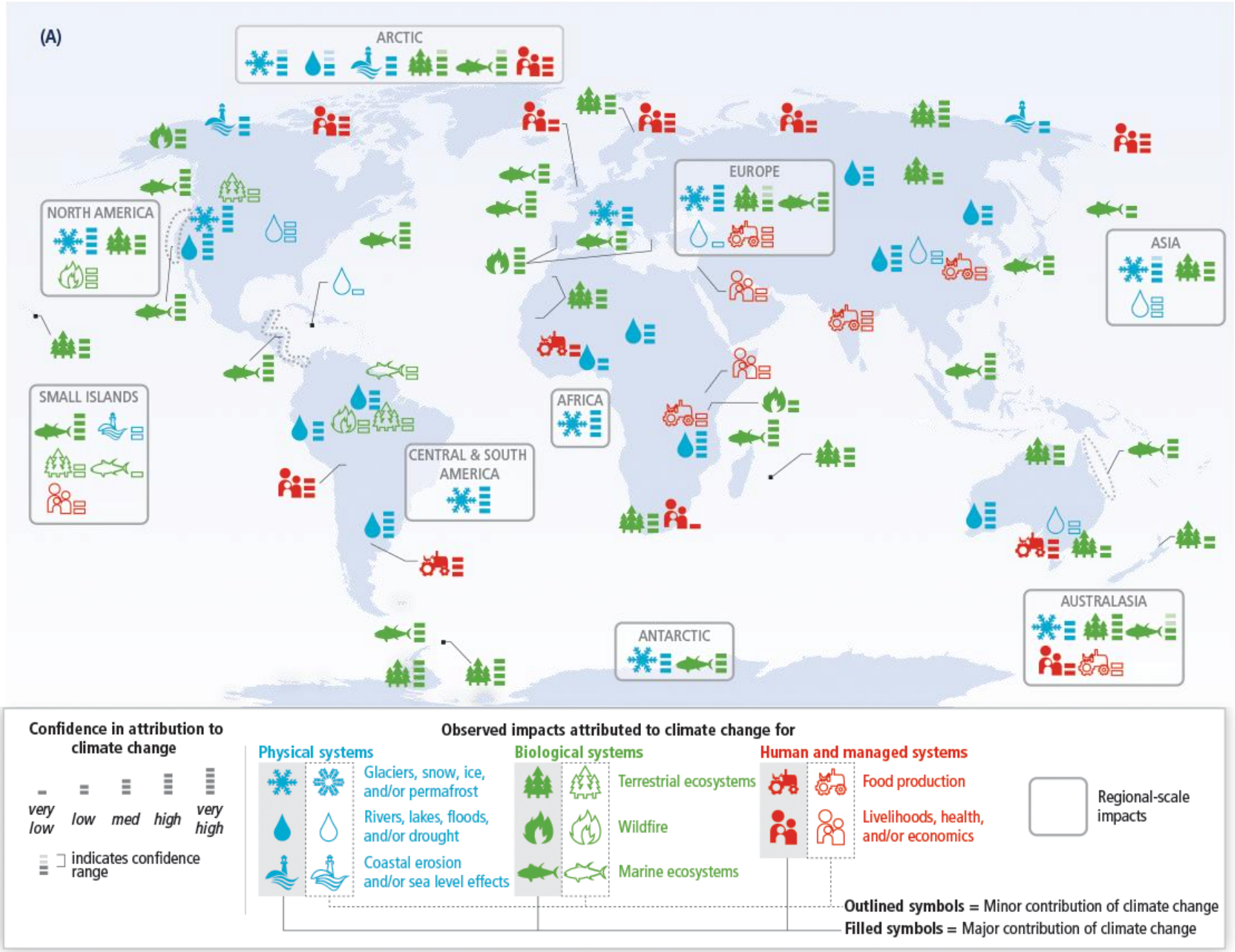
Physical	Biological
Number of significant observed changes	Number of significant observed changes
Percentage of significant changes consistent with warming	Percentage of significant changes consistent with warming

* Polar regions include also observed changes in marine and freshwater biological systems.

** Marine and freshwater includes observed changes at sites and large areas in oceans, small islands and continents. Locations of large-area marine changes are not shown on the map.

*** Circles in Europe represent 1 to 7,500 data series.

https://www.ipcc.ch/publications_and_data/ar4/wg2/en/spmsspm-b.html



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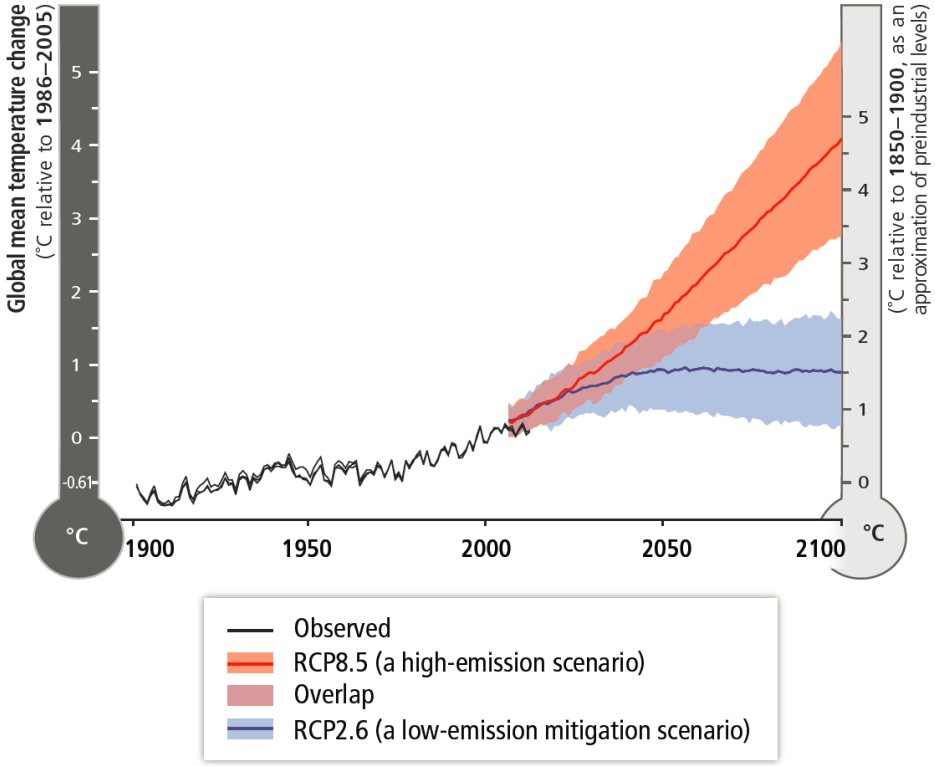
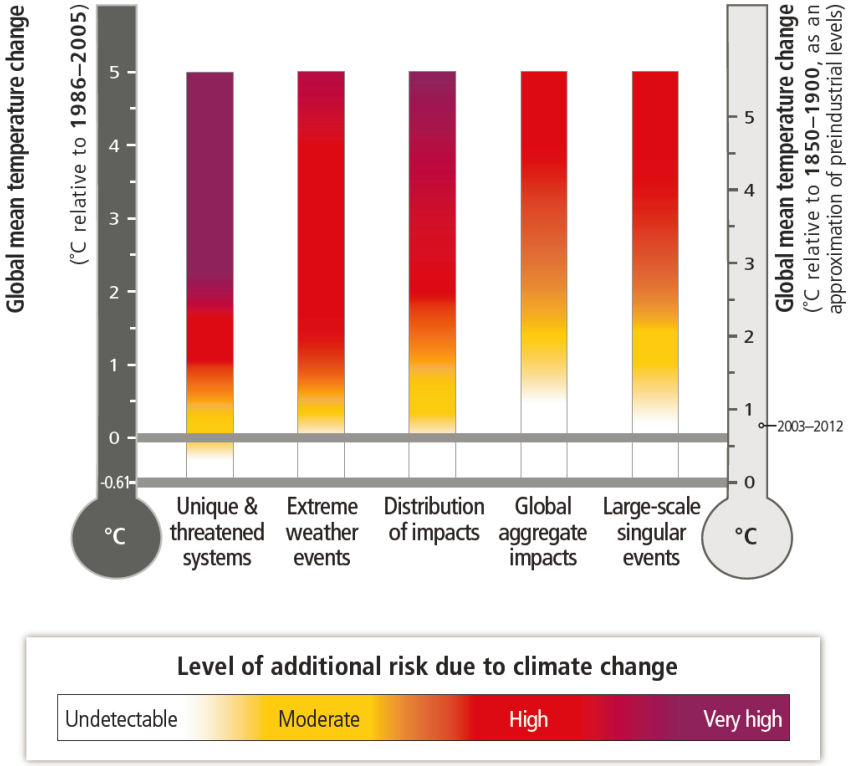
IPCC WGII AR5 SPM (Section B)

Future Risks and Opportunities for Adaptation

- **B-1: Key Risks across Sectors and Regions**
  - Key risks are potentially severe impacts relevant to Article 2 of the UNFCCC, which refers to “dangerous anthropogenic interference with the climate system”.
  - Eight key risks are integrated into five complementary and overarching reasons for concern (RFCs).
- **B-2: Sectoral Risks and Potential for Adaptation**
- **B-3: Regional Key Risks and Potential for Adaptation**
  - Key risks identified based on assessment of the relevant scientific, technical, and socioeconomic literature detailed in supporting chapter sections (expert judgment).
  - Three timeframes, Current adaptation and a hypothetical highly adapted state, identifying where current adaptation deficits exist.
  - Limited potential to reduce risks through adaptation or mitigation.

http://ipcc-wg2.gov/AR5/images/uploads/WG2AR5_SPM_FINAL.pdf





http://ipcc-wg2.gov/AR5/images/uploads/WG2AR5_SPM_FINAL.pdf

http://ipcc-wg2.gov/AR5/press-events/press-kit/

IPCC WGII AR5 SPM (Section C)

Managing Future Risks and Building Resilience

- Managing the risks of climate change involves adaptation and mitigation decisions with implications for future generations, economies, and environments.
- Evaluation of **adaptation** as a means to build resilience and to adjust to climate-change impacts considering limits to adaptation, climate-resilient pathways, and the role of transformation.

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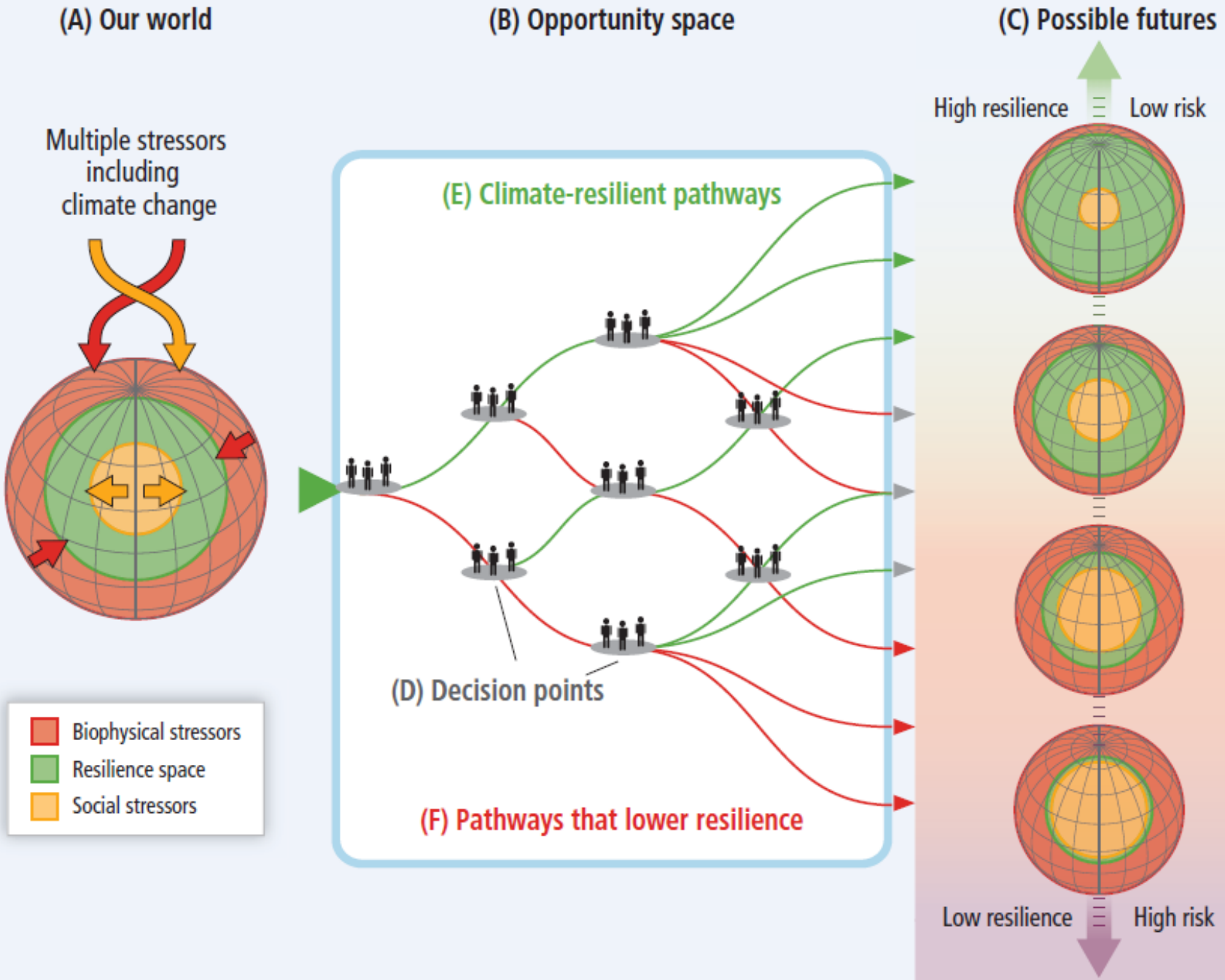

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Central Asia (5)

- Kazakhstan
- Kyrgyzstan
- Tajikistan
- Turkmenistan
- Uzbekistan

North Asia (2)

- Mongolia
- Russia (East of Urals)

East Asia (7)

- China, Hong Kong Special Administrative Region (Hong Kong SAR)
- China, Macao Special Administrative Region
- Japan
- North Korea
- People's Republic of China (China)
- South Korea
- Taiwan Province of China (Taiwan POC)

West Asia (17)

- Armenia
- Azerbaijan
- Bahrain
- Georgia
- Iran
- Iraq
- Israel
- Jordan
- Kuwait
- Lebanon
- Palestine
- Oman
- Qatar
- Saudi Arabia
- Syria
- United Arab Emirates
- Yemen

South Asia (8)

- Afghanistan
- Bangladesh
- Bhutan
- India
- Maldives
- Nepal
- Pakistan
- Sri Lanka

Southeast Asia (12)

- Brunei
- Indonesia
- Lao People's Democratic Republic
- Malaysia
- Myanmar
- Papua New Guinea
- The Philippines
- People's Republic of Cambodia
- Singapore
- Thailand
- Timor-Leste
- Vietnam

Climate Change Impact Assessment in Asia
-What's New on Asia in AR5?-

- Improved country coverage on observed and future impacts of climate change.
- Increase in the number of studies reflecting advances in research tools (e.g., more use of remote sensing and modeling of impacts), with an evaluation of detection and attribution where feasible.
- More conclusions with confidence statements, while confidence levels have changed in both directions since AR4.
- Expanded coverage of issues
  - Discussion of the Himalayas covering observed and projected impacts (Box 3-2) including those on tourism (10.6.2), Livelihood assets such as water and food (9.3.3.1, 13.3.1.1, 18.5.3, 19.6.3), Poverty (13.3.2.3), Culture (12.3.2), Flood risks (18.3.1.1, 24.2.1), Health risks (24.4.6.2), Ecosystems (24.4.2.2).

http://ipcc-wg2.gov/AR5/images/uploads/WGIIAR5-Chap24_FGDall.pdf

Climate Change Impact Assessment in Asia
-Executive Summary (1)-

- **Warming trends and increasing temperature extremes** have been observed across most of the Asian region over the past century (*high confidence*).
- **Water scarcity** is expected to be a major challenge for most of the region as a result of increased water demand and lack of good management (*medium confidence*)
- The impacts of climate change on **food production** and food security in Asia will **vary by region**, with many regions to experience a decline in productivity (*medium confidence*).

http://ipcc-wg2.gov/AR5/images/uploads/WGIIAR5-Chap24_FGDall.pdf

Climate Change Impact Assessment in Asia
-Executive Summary (2)-

- **Terrestrial systems** in many parts of Asia have **responded to recent climate change** with shifts in the phenologies, growth rates, and the distributions of plant species, and with permafrost degradation, and the projected changes in climate during the 21st century will increase these impacts (*high confidence*).
- **Coastal and marine systems** in Asia are under increasing **stress from both climatic and non-climatic drivers** (*high confidence*)

http://ipcc-wg2.gov/AR5/images/uploads/WGIIAR5-Chap24_FGDall.pdf

Climate Change Impact Assessment in Asia
-Executive Summary (3)-

- **Multiple stresses** caused by rapid urbanization, industrialization, and economic development will be compounded by climate change (*high confidence*).
- **Extreme climate events** will have an increasing impact on human health, security, livelihoods, and poverty, with the type and magnitude of impact varying across Asia (*high confidence*).
- **Studies** of observed climate changes and their impacts are **still inadequate** for many areas, particularly in **North**, **Central**, and **West Asia** (*high confidence*).

http://ipcc-wg2.gov/AR5/images/uploads/WGIIAR5-Chap24_FGDall.pdf

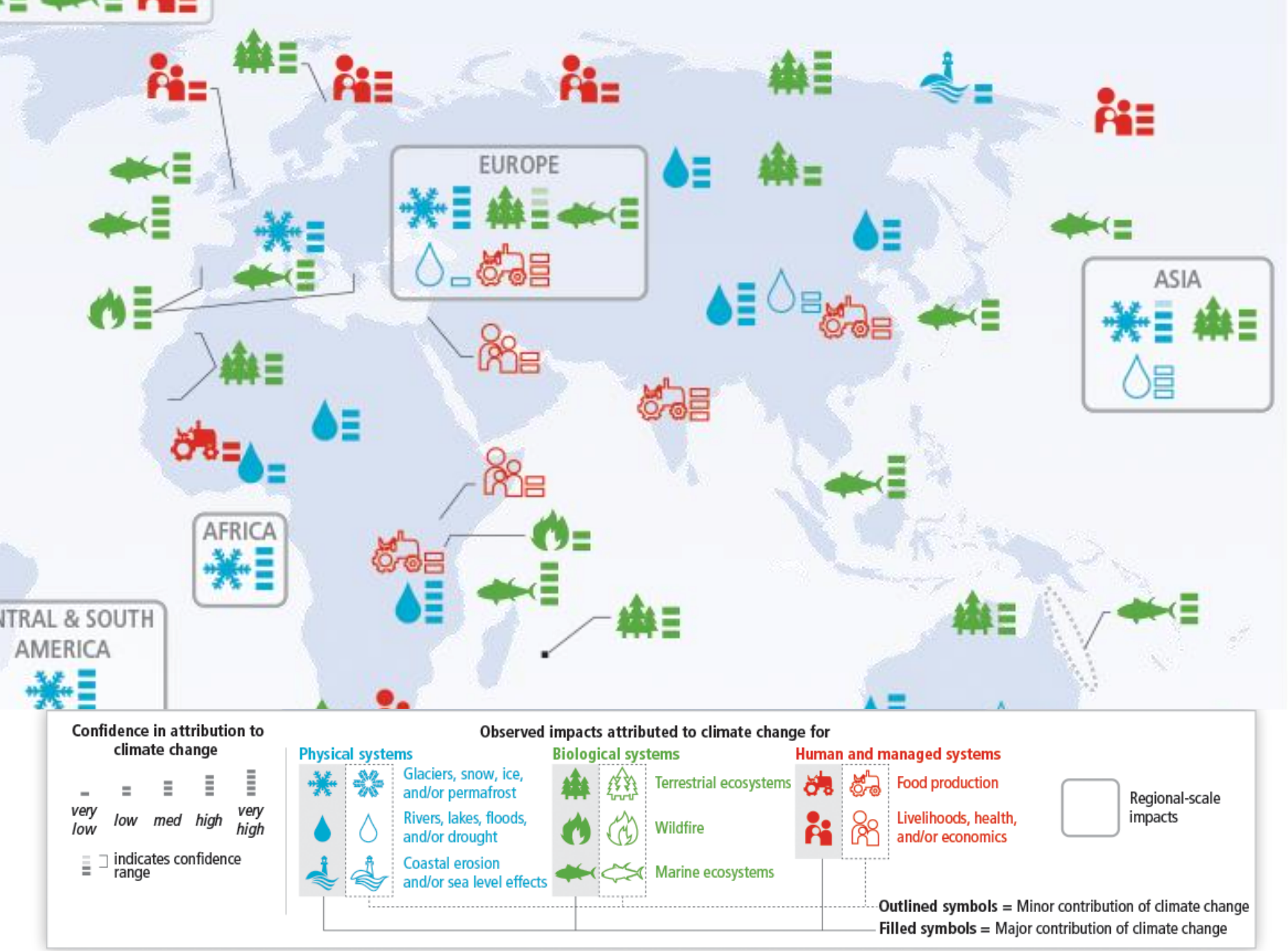
EUROPE
ASIA
AFRICA
NTRAL & SOUTH
AMERICA
Confidence in attribution to climate change
very low
low
med
high
very high
indicates confidence range
Observed impacts attributed to climate change for
Physical systems
Glaciers, snow, ice, and/or permafrost
Rivers, lakes, floods, and/or drought
Coastal erosion and/or sea level effects
Biological systems
Terrestrial ecosystems
Wildfire
Marine ecosystems
Human and managed systems
Food production
Livelihoods, health, and/or economics
Regional-scale impacts
Outlined symbols = Minor contribution of climate change
Filled symbols = Major contribution of climate change

Table SPM.A1 (Asia)

Observed impacts attributed to climate change reported in the scientific literature since the AR4

Snow & Ice, Rivers & Lakes, Floods & Drought	● Permafrost degradation in Siberia, Central Asia, and Tibetan Plateau (***HC***, Major C from CC) ● Shrinking mountain glaciers across most of Asia (***MC***, Major C from CC) ● Changed water availability in many Chinese rivers, beyond changes due to land use (***LC***, Minor C from CC) ● Increased flow in several rivers due to shrinking glaciers (***HC***, Major C from CC) ● Earlier timing of maximum spring flood in Russian rivers (***MC***, Major C from CC) ● Reduced soil moisture in north-central and northeast China (1950 – 2006) (***MC***, Major C from CC) ● Surface water degradation in parts of Asia, beyond changes due to land use (***MC***, Minor C from CC)
Terrestrial Ecosystems	● Changes in plant phenology and growth in many parts of Asia (earlier greening), particularly in the north and east (***MC***, Major C from CC) ● Distribution shifts of many plant and animal species upwards in elevation or polewards, particularly in the north of Asia (***MC***, Major C from CC) ● Invasion of Siberian larch forests by pine and spruce during recent decades (***LC***, Major C from CC) ● Advance of shrubs into the Siberian tundra (***HC***, Major C from CC)
Coastal Erosion & Marine Ecosystems	● Decline in coral reefs in tropical Asian waters, beyond decline due to human impacts (***HC***, Major C from CC) ● Northward range extension of corals in the East China Sea and western Pacific, and of a predatory fish in the Sea of Japan (***MC***, Major C from CC) ● Shift from sardines to anchovies in the western North Pacific, beyond fluctuations due to fisheries (***LC***, Major C from CC) ● Increased coastal erosion in Arctic Asia (***LC***, Major C from CC)
Food Production & Livelihoods	● Impacts on livelihoods of indigenous groups in Arctic Russia, beyond economic and sociopolitical changes (***LC***, Major C from CC) ● Negative impacts on aggregate wheat yields in South Asia, beyond increase due to improved technology (***MC***, Minor C from CC) ● Negative impacts on aggregate wheat and maize yields in China, beyond increase due to improved technology (***LC***, Minor C from CC) ● Increases in a water-borne disease in Israel (***LC***, Minor C from CC)

Table 24-1 | Key risks from climate change and the potential for risk reduction through mitigation and adaptation in Asia

I. Increased risk of crop failure and lower crop production could lead to food insecurity in Asia (*MC*)

II. Water shortage in arid areas of Asia (*MC*)

III. Increased riverine, coastal, and urban flooding leading to widespread damage to infrastructure, livelihoods, and settlements in Asia (*MC*)

IV. Increased risk of flood-related deaths, injuries, infectious diseases and mental disorders (*MC*)

V. Increased risk of heat-related mortality (*HC*)

VI. Increased risk of drought-related water and food shortage causing malnutrition (*HC*)

VII. Increased risk of water and vector-borne diseases (*MC*)

VIII. Exacerbated poverty, inequalities and new vulnerabilities (*HC*)

IX. Coral reef decline in Asia (*HC*)

X. Mountain-top extinctions in Asia (*HC*)

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http://ipcc-wg2.gov/AR5/images/uploads/WGIIAR5-Chap24_FGDall.pdf

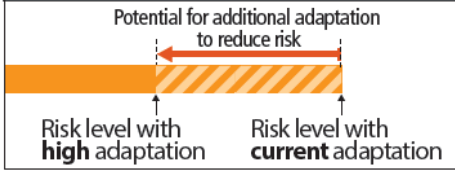
Assessment Box SPM.2 Table 1 (Asia)

Key regional risks from climate change and the potential for reducing risks through adaptation and mitigation

Climate-related drivers of impacts

Warming trend | Extreme temperature | Extreme precipitation | Drying trend | Damaging cyclone | Sea level | Ocean acidification

Level of risk & potential for adaptation



Asia

Key risk	Adaptation issues & prospects	Climatic drivers	Timeframe	Risk & potential for adaptation
Increased riverine, coastal, and urban flooding leading to widespread damage to infrastructure, livelihoods, and settlements in Asia (*medium confidence*) [24.4]	• Exposure reduction via structural and non-structural measures, effective land-use planning, and selective relocation • Reduction in the vulnerability of lifeline infrastructure and services (e.g., water, energy, waste management, food, biomass, mobility, local ecosystems, telecommunications) • Construction of monitoring and early warning systems; Measures to identify exposed areas, assist vulnerable areas and households, and diversify livelihoods • Economic diversification		Present Near term (2030–2040) Long term (2080–2100) 2°C / 4°C	Very low – Medium – Very high
Increased risk of heat-related mortality (*high confidence*) [24.4]	• Heat health warning systems • Urban planning to reduce heat islands; Improvement of the built environment; Development of sustainable cities • New work practices to avoid heat stress among outdoor workers		Present Near term (2030–2040) Long term (2080–2100) 2°C / 4°C	Very low – Medium – Very high
Increased risk of drought-related water and food shortage causing malnutrition (*high confidence*) [24.4]	• Disaster preparedness including early-warning systems and local coping strategies • Adaptive/integrated water resource management • Water infrastructure and reservoir development • Diversification of water sources including water re-use • More efficient use of water (e.g., improved agricultural practices, irrigation management, and resilient agriculture)		Present Near term (2030–2040) Long term (2080–2100) 2°C / 4°C	Very low – Medium – Very high

Table 24-2 | The amount of information supporting conclusions regarding observed and projected impacts in Asia.

Sector	Topics/issues	North Asia		East Asia		Southeast Asia		South Asia		Central Asia		West Asia	
	O = Observed impacts, P = Projected Impacts	O	P	O	P	O	P	O	P	O	P	O	P
Freshwater resources	Major river runoff	/	x	/	/	/	/	/	x	x	x	x	x
	Water supply	x	x	x	x	x	x	x	x	x	x	x	x
Terrestrial and inland water systems	Phenology and growth rates	/	/	/	/	x	x	x	x	x	x	x	x
	Distributions of species and biomes	/	/	/	/	x	x	x	/	x	x	x	x
	Permafrost	/	/	/	/	/	x	/	/	/	/	/	x
	Inland waters	x	x	/	x	x	x	x	x	x	x	x	x
Coastal systems and low-lying areas	Coral reefs	NR	NR	/	/	/	/	/	/	NR	NR	/	/
	Other coastal ecosystems	x	x	/	/	x	x	x	x	NR	NR	x	x
	Arctic coast erosion	/	/	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Food production systems and food security	Rice yield	x	x	/	/	x	/	x	/	x	x	X	/
	Wheat yield	x	x	x	x	x	x	x	/	x	x	/	/
	Corn yield	x	x	x	/	x	x	x	x	x	x	x	x
	Other crops (e.g., barley, potato)	x	x	/	/	x	x	x	x	x	X	/	/
	Vegetables	x	x	/	x	x	x	x	x	x	x	x	x
	Fruits	x	x	/	x	x	x	x	x	x	x	x	x
	Livestock	x	x	/	x	x	x	x	x	x	x	x	x
	Fisheries and aquaculture production	x	/	x	/	x	/	x	x	x	x	x	x
	Farming area	x	/	x	/	x	x	x	/	x	/	x	x
	Water demand for irrigation	x	/	x	/	x	x	x	/	x	x	x	x
	Pest and disease occurrence	x	x	x	x	x	x	x	/	x	x	x	x
Human settlements, industry, and infrastructure	Floodplains	x	x	/	/	/	/	/	/	x	x	x	x
	Coastal areas	x	x	/	/	/	/	/	/	NR	NR	x	x
	Population and assets	x	x	/	/	/	/	/	/	x	x	x	x
	Industry and infrastructure	x	x	/	/	/	/	/	/	x	x	x	x
Human health, security, livelihoods, and poverty	Health effects of floods	x	x	x	x	x	x	/	x	x	x	x	x
	Health effects of heat	x	x	/	x	x	x	x	x	x	x	x	x
	Health effects of drought	x	x	x	x	x	x	x	x	x	x	x	x
	Water-borne diseases	x	x	x	x	/	x	/	x	x	x	x	x
	Vector-borne diseases	x	x	x	x	/	x	/	x	x	x	x	x
	Livelihoods and poverty	x	x	/	x	x	x	/	x	x	x	x	x
	Economic valuation	x	x	x	x	/	/	/	/	x	x	x	x

Key:
/ = Relatively abundant/sufficient information; knowledge gaps need to be addressed but conclusions can be drawn based on existing information.
x = Limited information/no data; critical knowledge gaps, difficult to draw conclusions.
NR = Not relevant.

Adaptation Experience in Asia

- In Asia, adaptation is being facilitated in some areas through mainstreaming climate adaptation action into **subnational development planning**, **early warning systems**, **integrated water resources management**, **agroforestry**, and **coastal reforestation of mangroves**.

http://ipcc-wg2.gov/AR5/images/uploads/WGIIAR5-Chap24_FGDall.pdf

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Toward New Paradigm of Adaptation (1)

- Adaptation is **place- and context-specific**, with no single approach for reducing risks appropriate across all settings.
- Adaptation planning and implementation can be enhanced through **complementary actions** across levels, from individuals to governments.
- A **first step** towards adaptation to future climate change is **reducing vulnerability and exposure to present climate variability**. Strategies include actions with co-benefits for other objectives.
- Adaptation planning and implementation at all levels of governance are **contingent on societal values, objectives, and risk perceptions**. **Recognition** of diverse interests, circumstances, social-cultural contexts, and expectations can benefit decision-making processes.

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Toward New Paradigm of Adaptation (2)

- **Decision support** is most effective when it is sensitive to context and the diversity of decision types, decision processes, and constituencies.
- Existing and emerging **economic instruments** can foster adaptation by providing incentives for anticipating and reducing impacts.
- **Constraints** can interact to impede adaptation planning and implementation.
- Poor planning, overemphasizing short-term outcomes, or failing to sufficiently anticipate consequences can result in **maladaptation**.
- Limited evidence indicates a **gap** between global adaptation **needs** and the **funds** available for adaptation.

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Toward New Paradigm of Adaptation (3)

- **Significant co-benefits**, **synergies**, and **trade-offs** exist between mitigation and adaptation and among different adaptation responses; interactions occur both within and across regions.
- Prospects for **climate-resilient pathways** for sustainable development are related fundamentally to what the world accomplishes with **climate-change mitigation**.
- **Greater rates and magnitude of climate change** increase the likelihood of **exceeding adaptation limits**.
- **Transformations** in economic, social, technological, and political decisions and actions can enable climate-resilient pathways.

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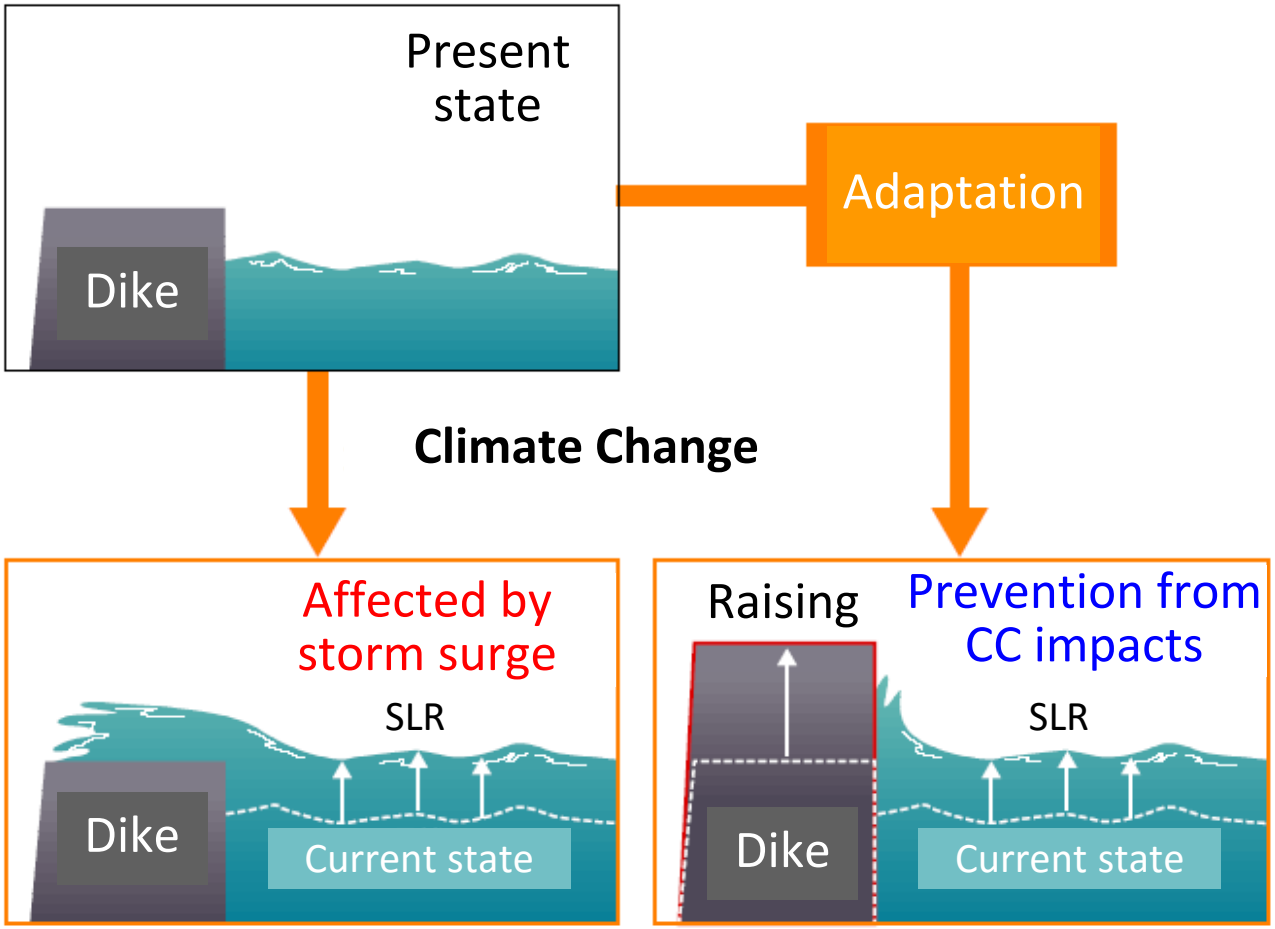
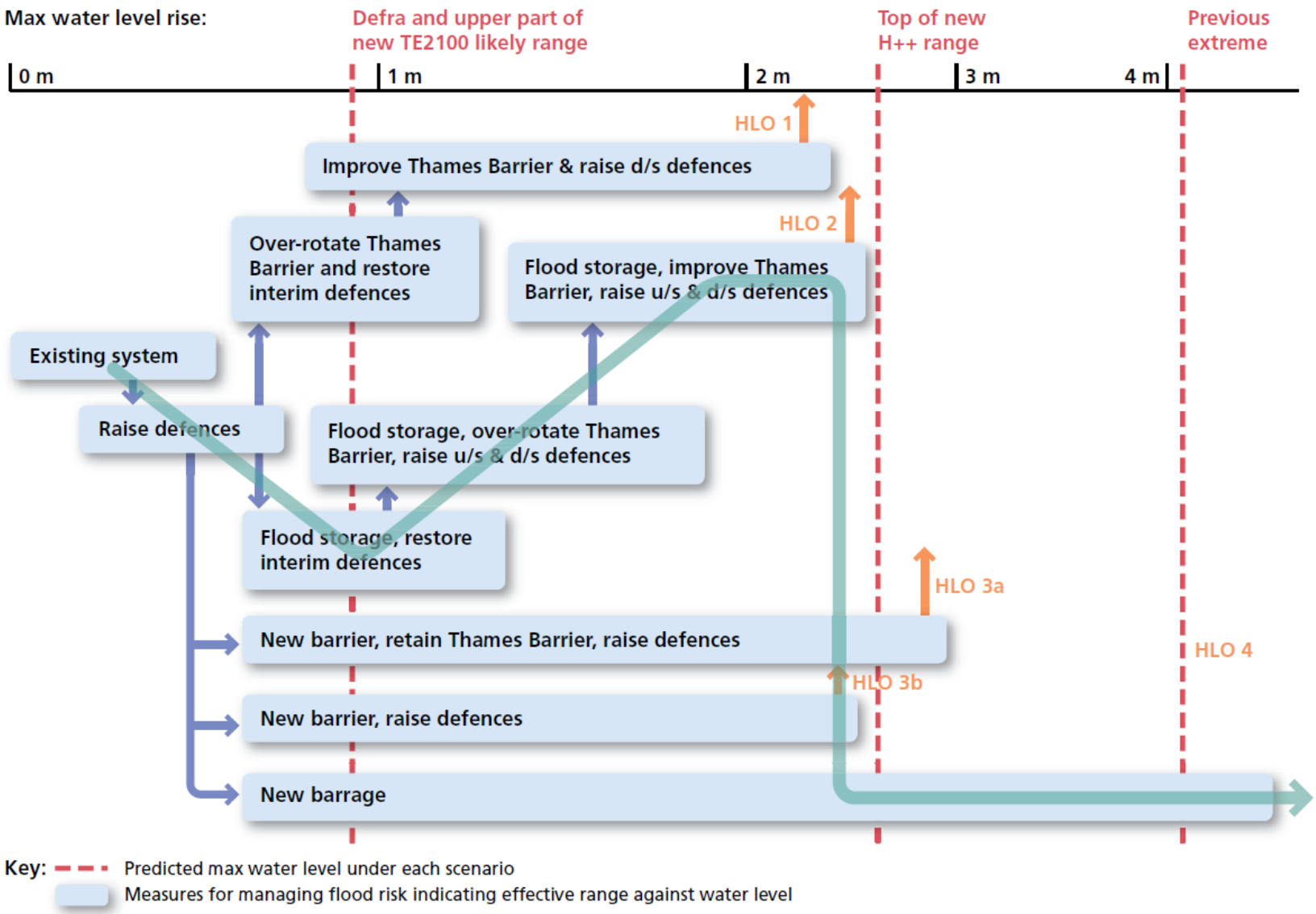
Example of adaptation (1)



Adaptation option for Sea Level Rise

Example of adaptation (2)
- Thames Barrier -

Example of adaptation (2)
- Thames Barrier -



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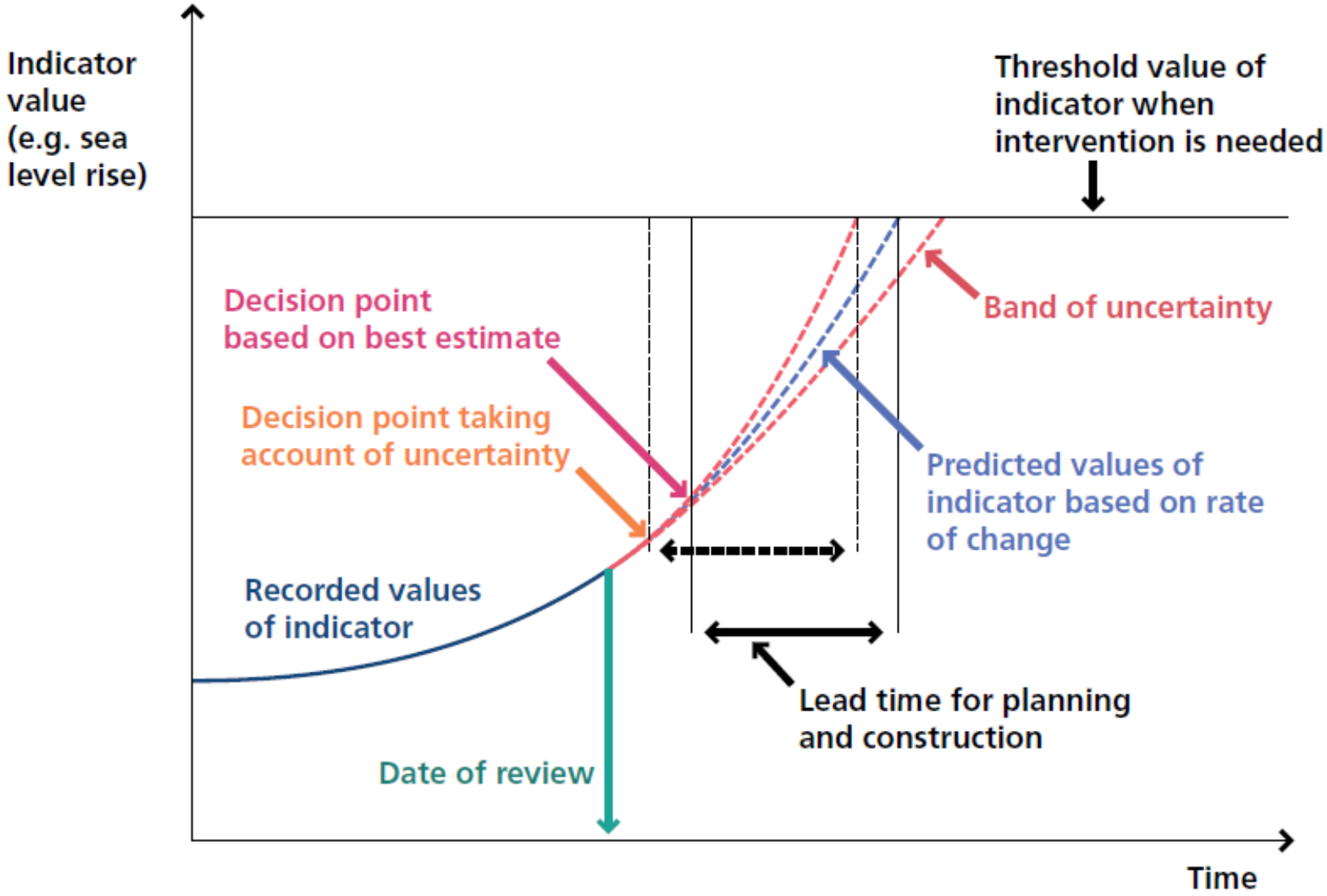
Example of adaptation (2)
- Thames Barrier -



http://ukclimateprojections.metoffice.gov.uk/media.jsp?mediaid=87898&filetype=pdf

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2. Major Climate Change Impacts and Vulnerabilities for Asia
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4. **Conclusion**

AIM
ASIA-PACIFIC INTEGRATED MODEL

Conclusions

- **Compared to past WGII reports, the WGII AR5 assesses a substantially larger knowledge base of relevant scientific, technical, and socioeconomic literature**.
  - Human interference with the climate system is occurring, and climate change poses risks for human and natural systems.
  - The assessment of IAV in the WG II contribution to the IPCC's AR5 evaluates how patterns of risks and potential benefits are shifting due to climate change.
  - Climate change involves complex interactions and changing likelihoods of diverse impacts.
- **Asia**
  - In recent decades, changes in climate have caused impacts on natural and human systems in Asian countries
  - Climate change without adaptation is projected to negatively cause impacts on various sectors and sub-regions in Asia
- **Climate-resilient pathways are sustainable-development trajectories that combine adaptation and mitigation to reduce climate change and its impacts. They include iterative processes to ensure that effective risk management can be implemented and sustained.**

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ご清聴ありがとうございました

Thank you for your attention