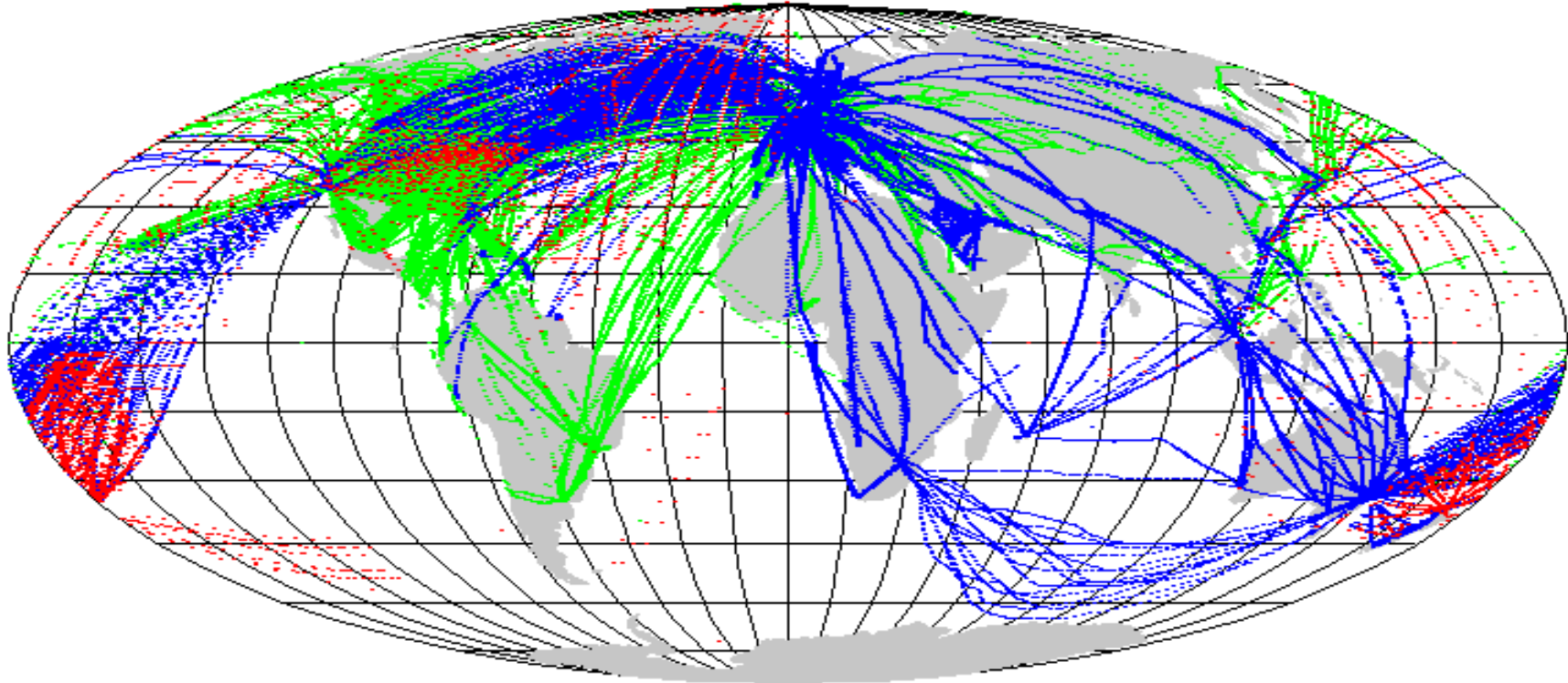

Water Diplomacy: The Missing Link in LEP?

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SMM 1-15/7/2004
AIREP, AMDAR and BUFR aircraft reports



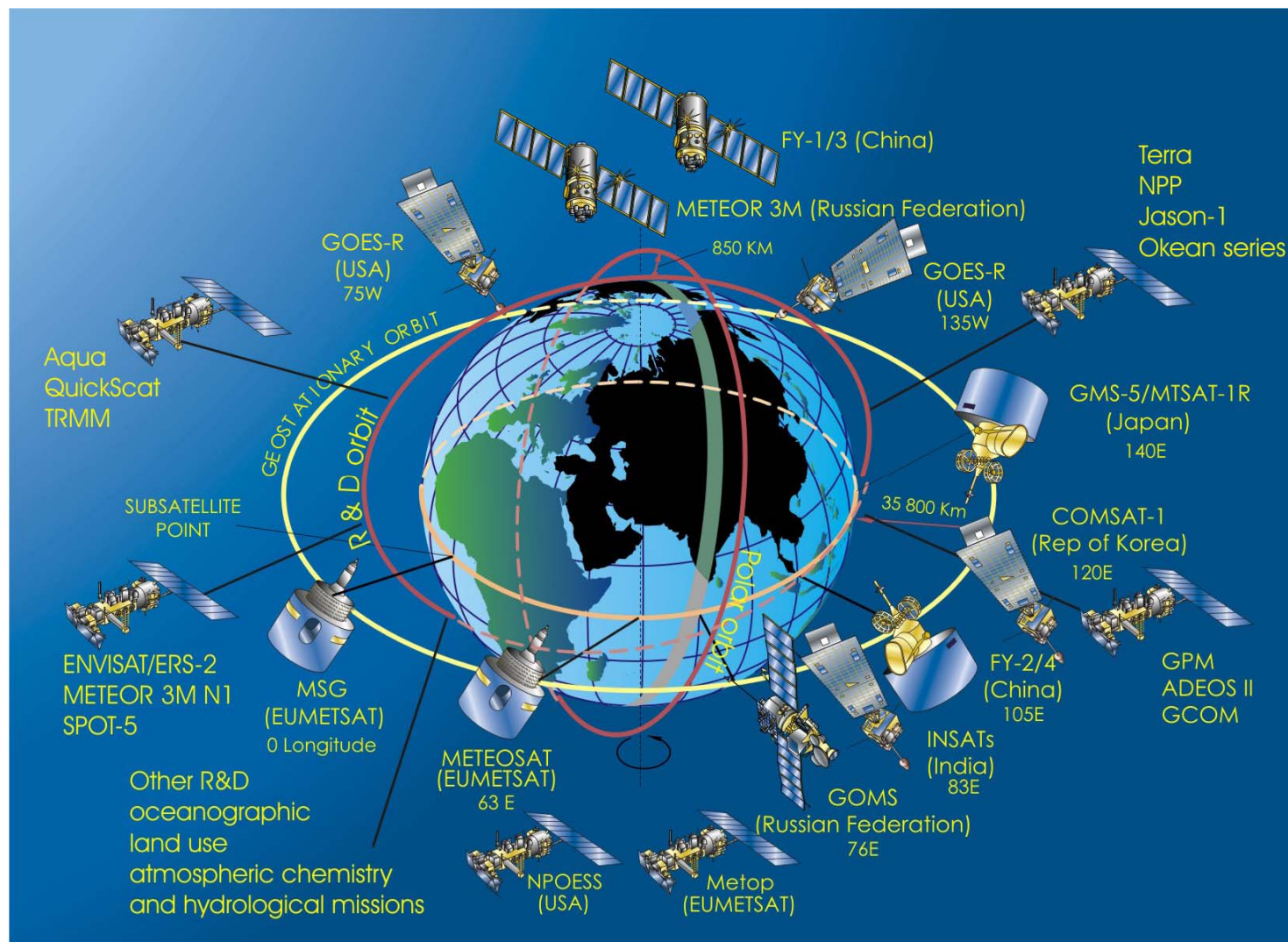
WMO Secretariat

- 4287 AIREP reports received on average each day
- 15101 AMDAR reports received on average each day
- 105117 BUFR aircraft reports received on average each day



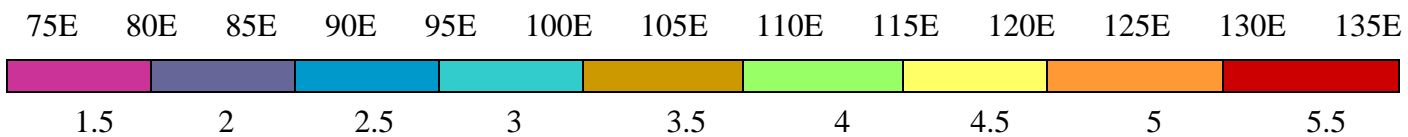
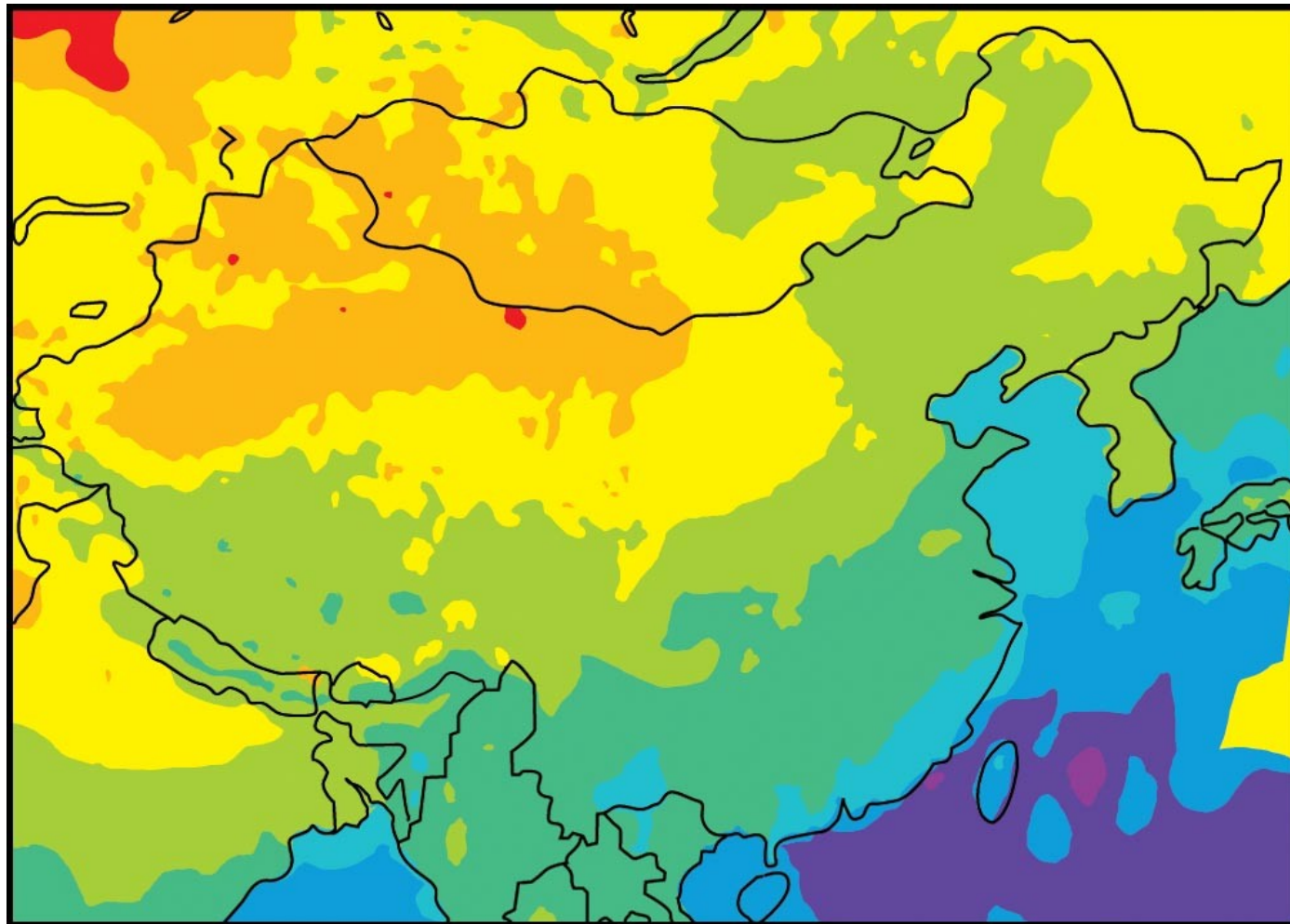
World Meteorological Organization

Weather - Climate - Water

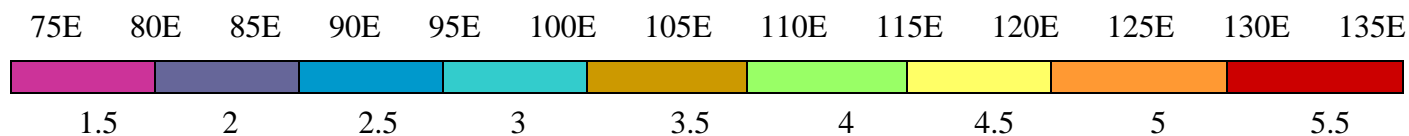
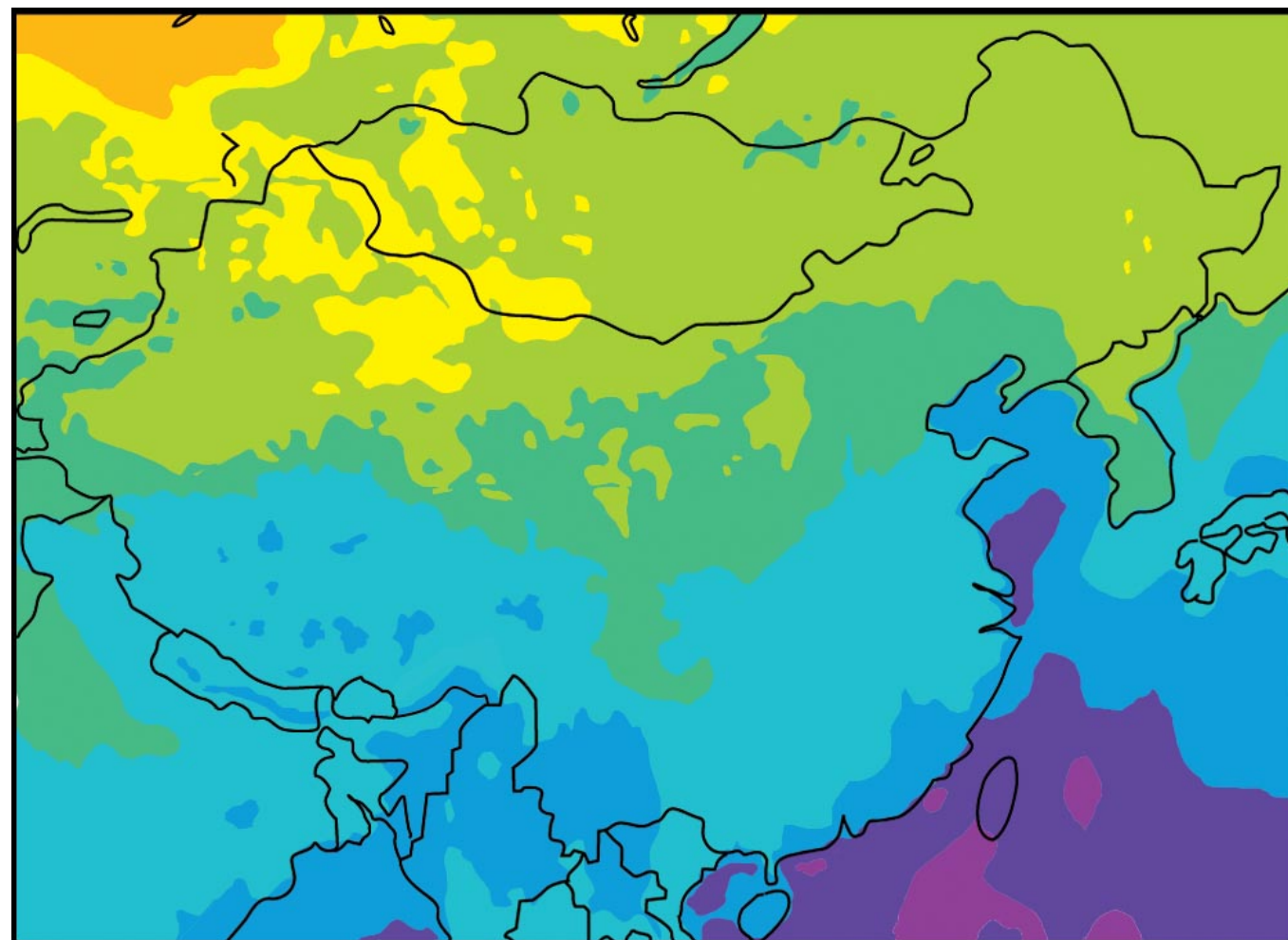


Climate Change Scenarios based on

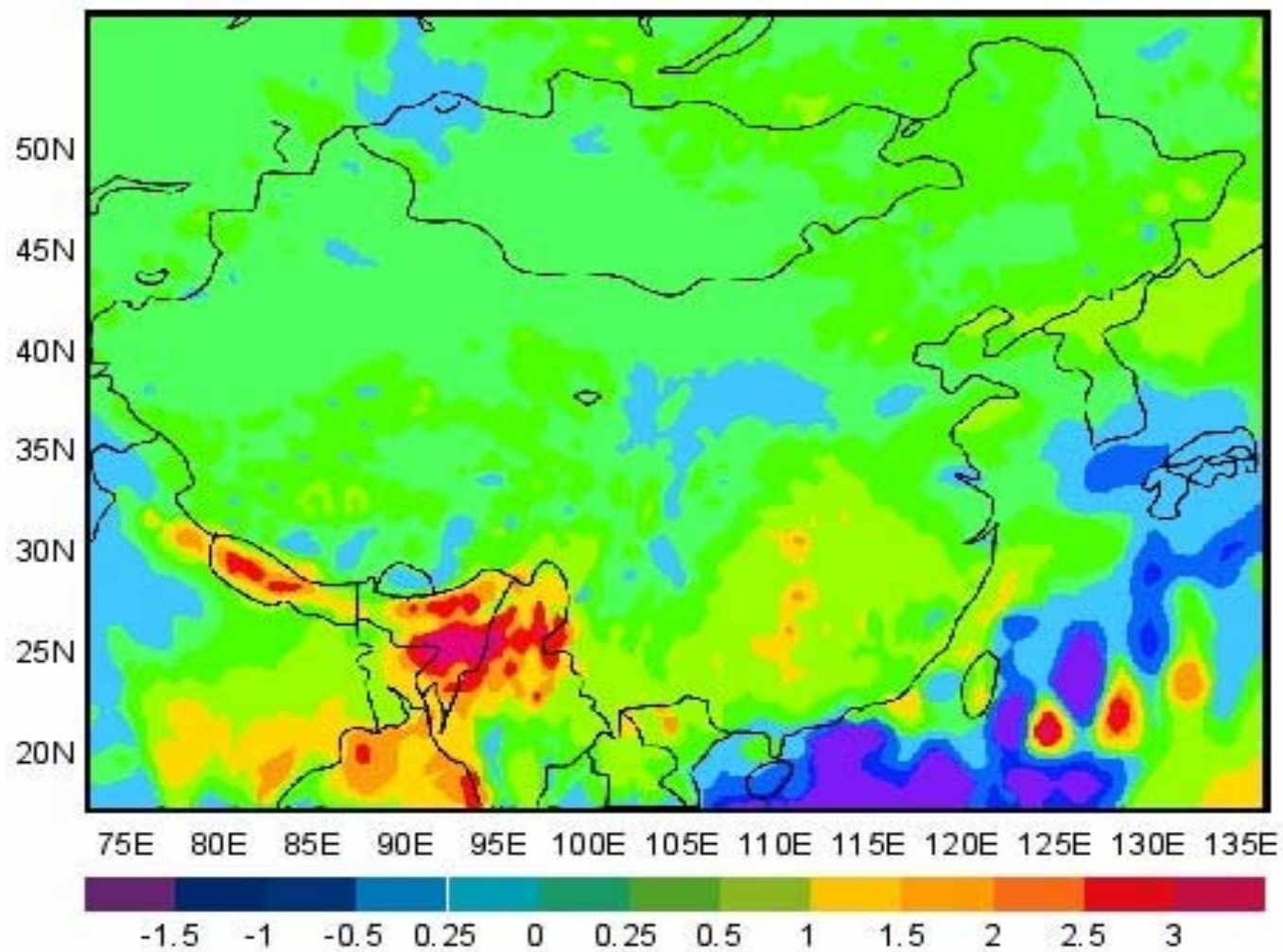
- A2 –globally inhomogeneous economic development, with a continuous increase in the world's population and a medium-high rise in greenhouse gas emissions.
 - B2 – regional sustainable development, with a slower (but continuous) increase in the world's population and a medium–low rise in greenhouse gas emissions.
-



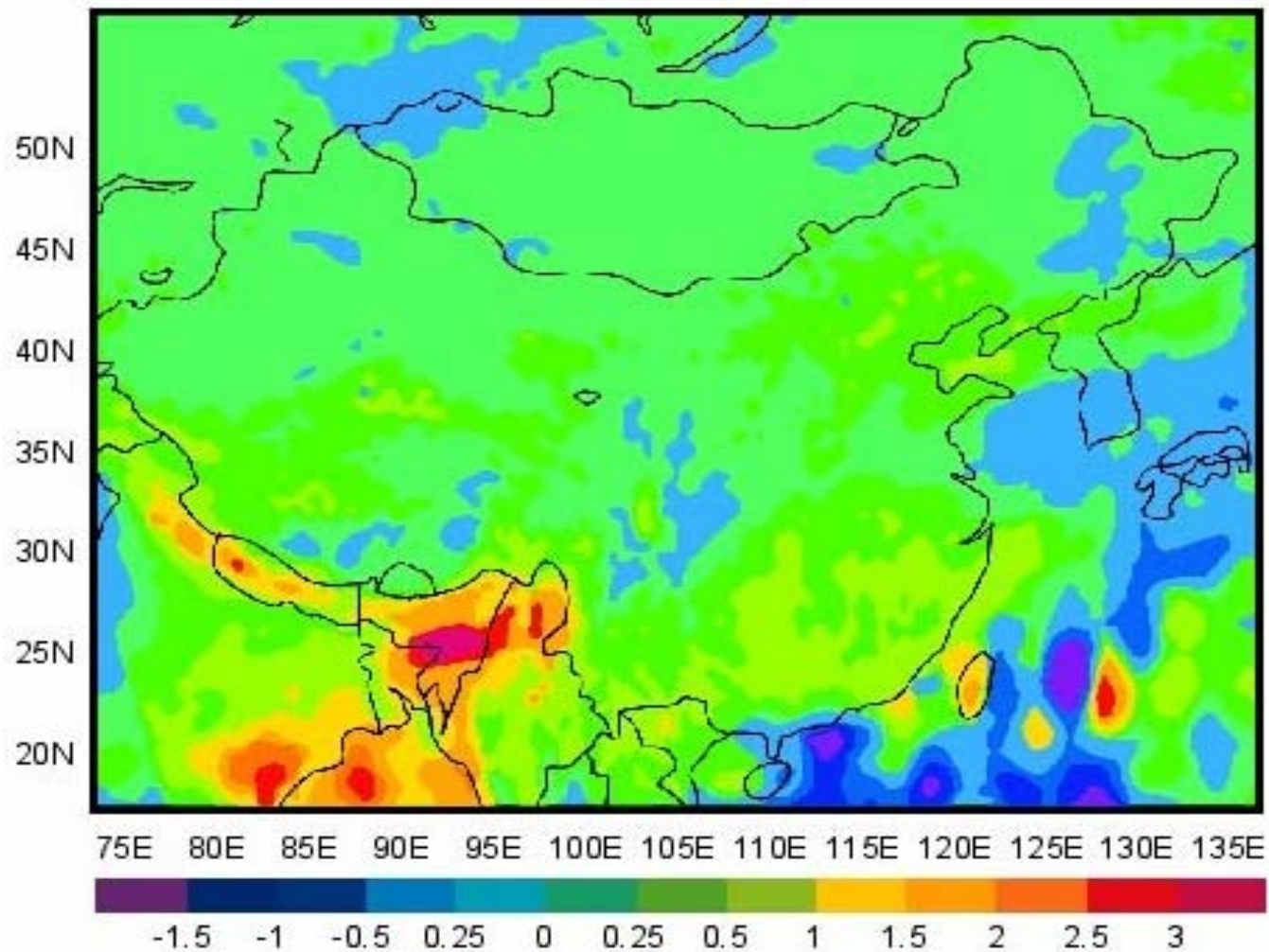
Simulated annual increase (°C) in mean temperature (Tmean) for 2071–2079 under SRES A2 scenarios from PRECIS relative to baseline (1961–1990)



Simulated annual increase (°C) in mean temperature (Tmean) for 2071–2079 under SRES B2 scenarios from PRECIS relative to baseline (1961–1990)



Simulated average change in rainfall (mm/day) for 2071–2079 under SRES A2 scenarios from PRECIS relative to baseline (1961–1990)



Simulated average change in rainfall (mm/day) for 2071–2079 under SRES B2 scenarios from PRECIS relative to baseline (1961–1990)

Climate Scenarios by PRECIS

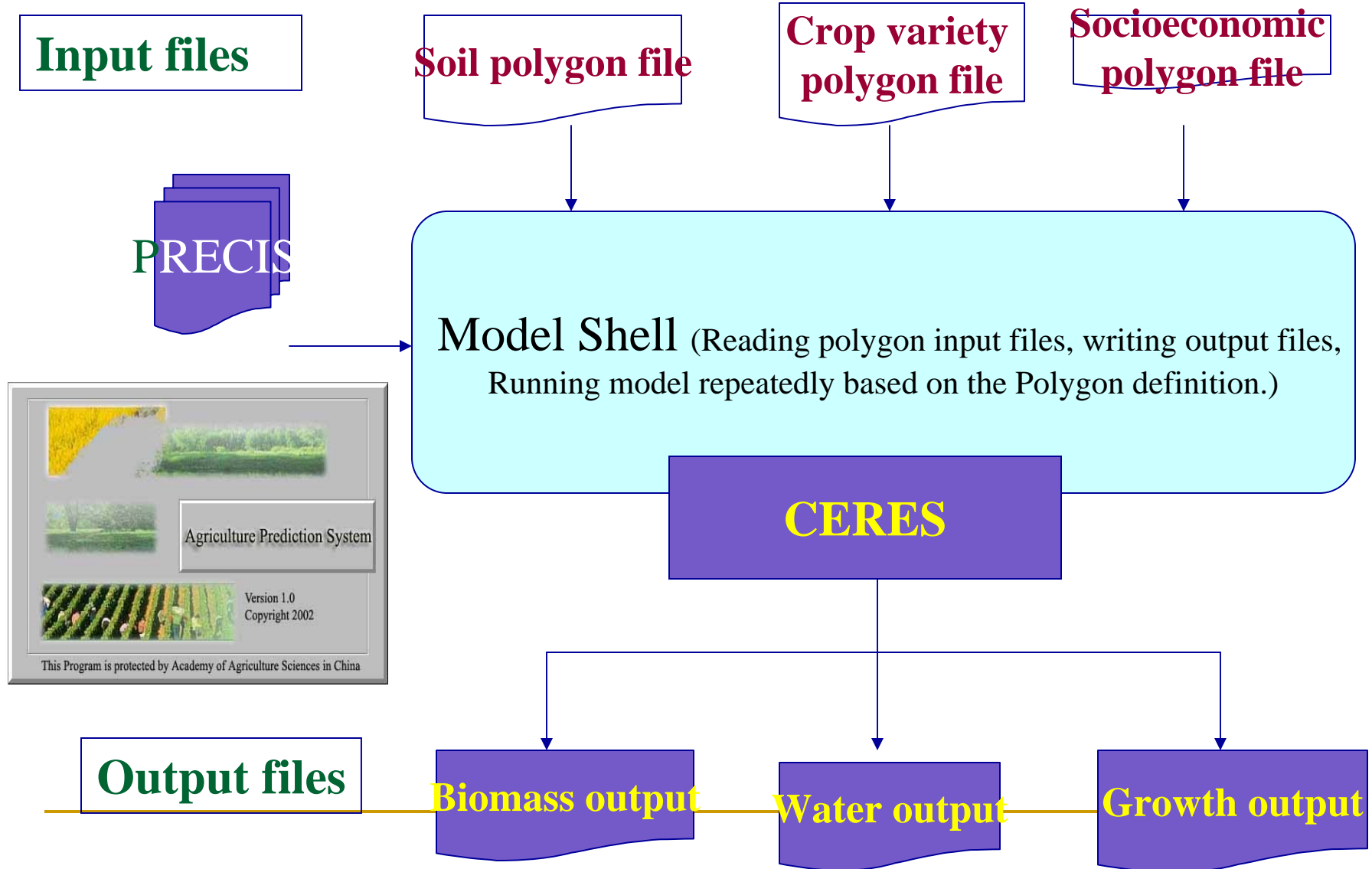
A2 (medium–high emissions)				B2 (medium–low emissions)		
Time period	Temperature increase (°C)	Rainfall increase (%)	CO ₂ (ppmv*)	Temperature increase (°C)	Rainfall increase (%)	CO ₂ (ppmv*)
2011~2020	1.00	3.3	440	1.16	3.7	429
2041~2050	2.11	7.0	559	2.20	7.0	492
2071~2080	3.89	12.9	721	3.20	10.2	561

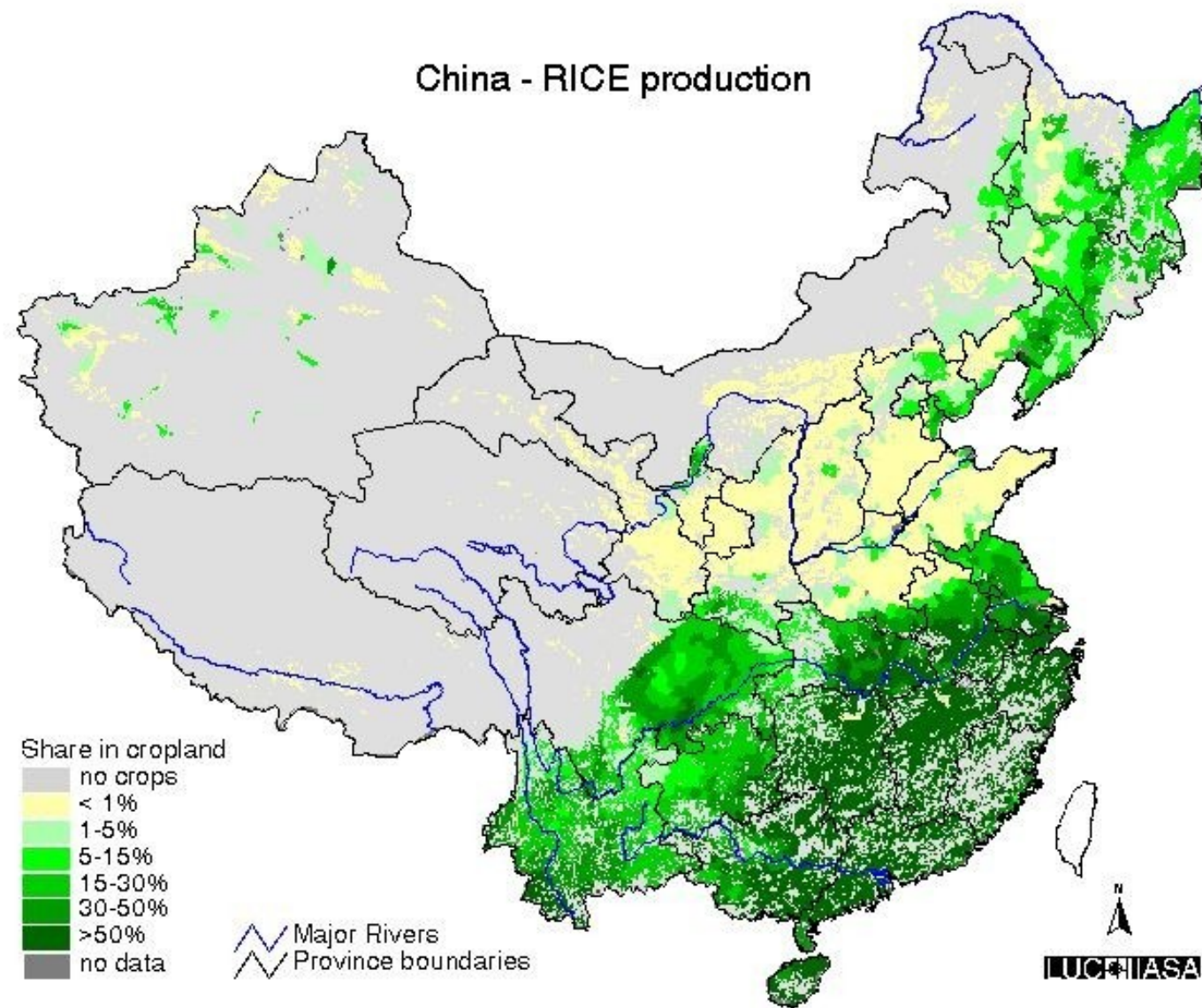
Progress

- A regional crop model is being developed.
- This has been linked to the climate model to predict changes in yield of Wheat, Rice, Corn and Cotton.

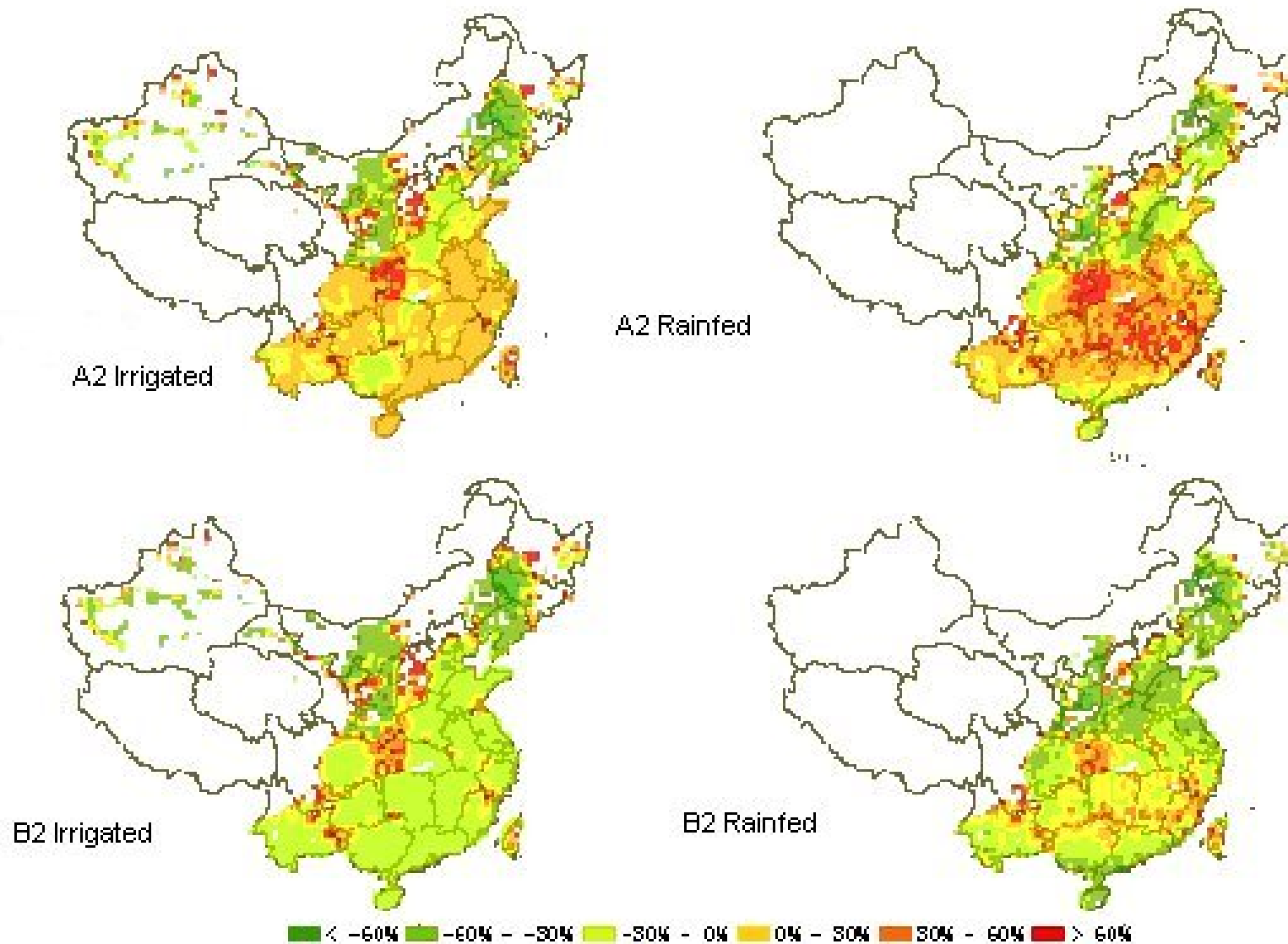


Regional Crop Model

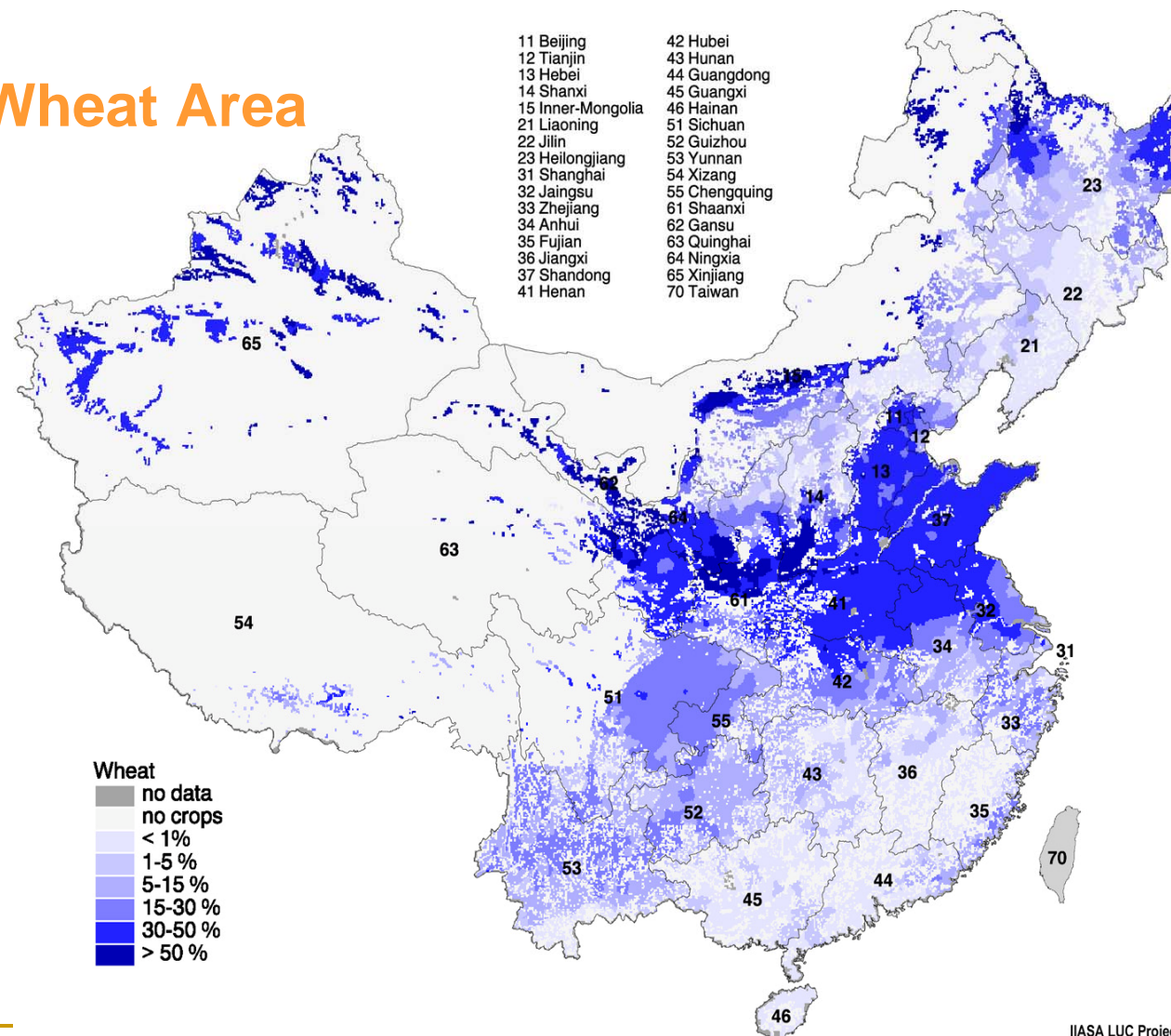




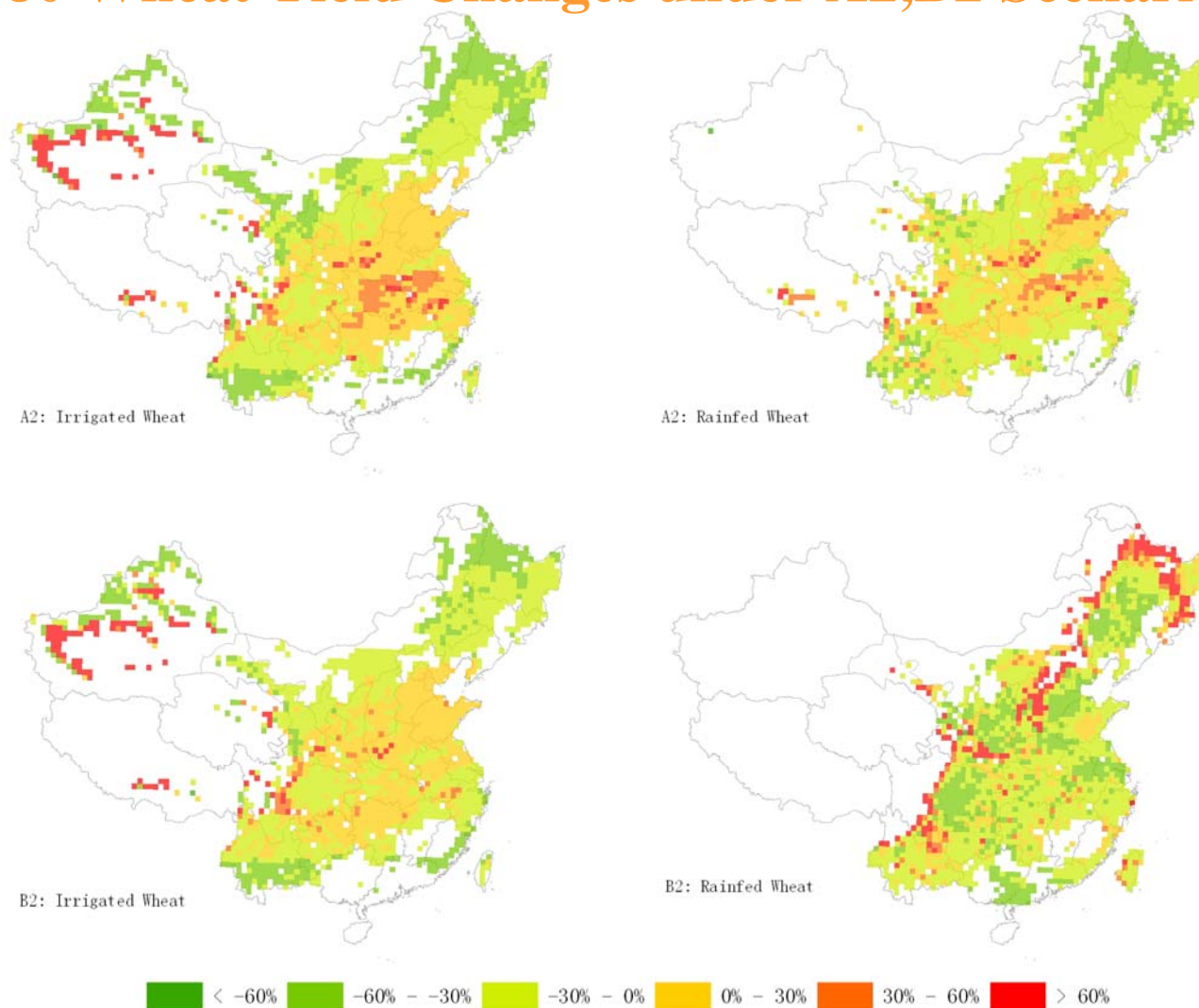
2080 Rice Yield Changes under A2,B2 Scenarios



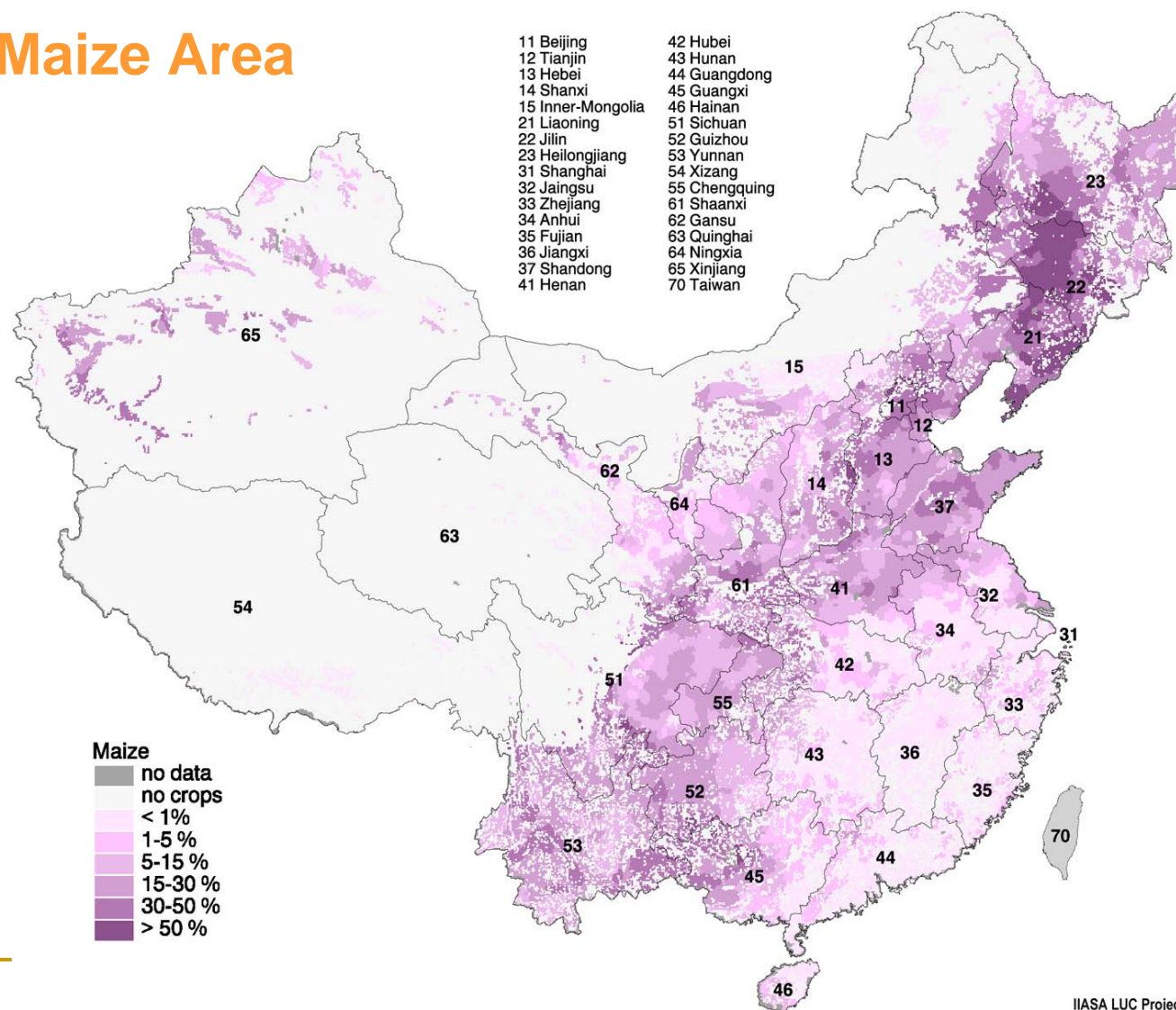
Current Wheat Area



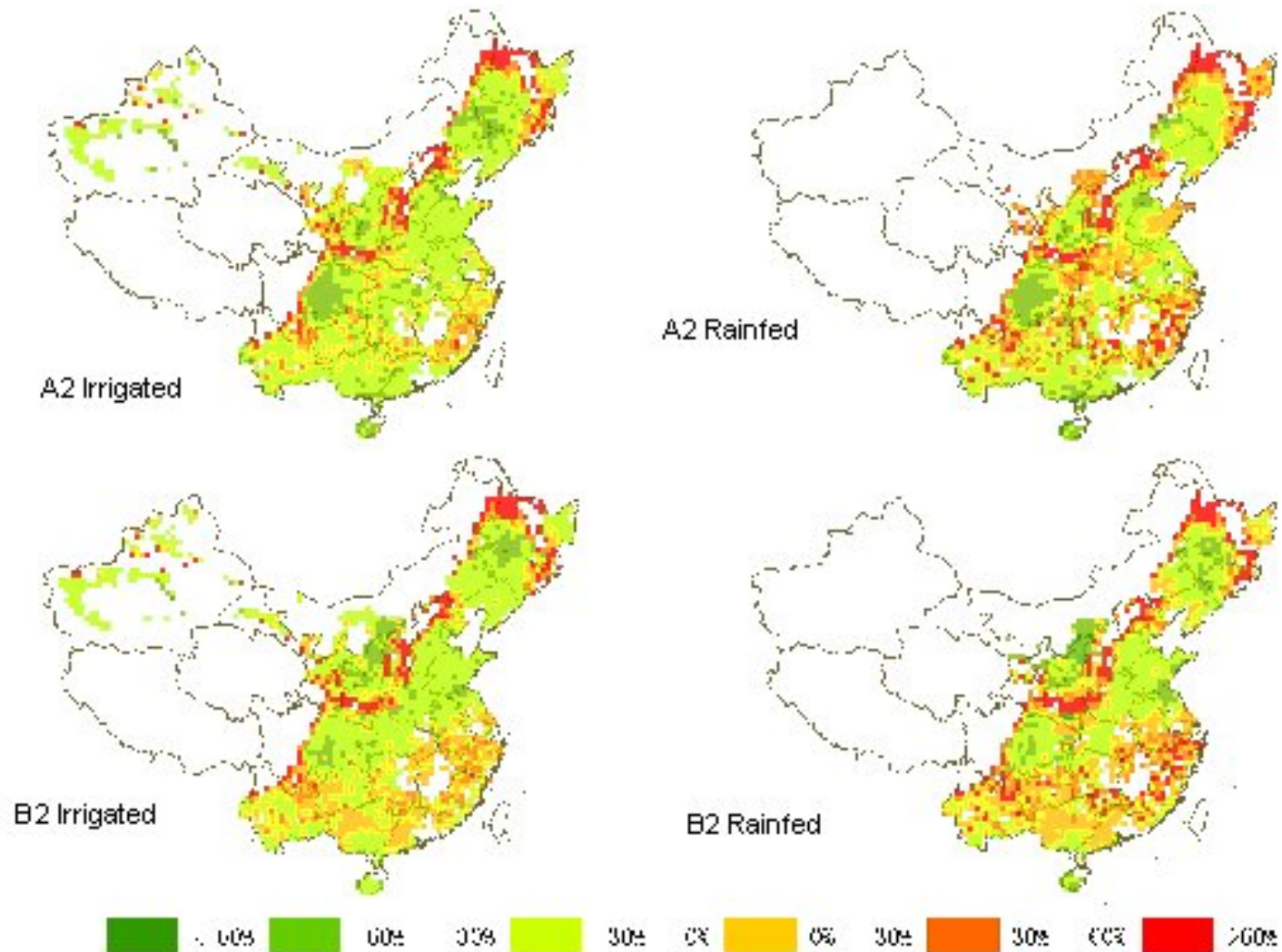
2080 Wheat Yield Changes under A2,B2 Scenarios

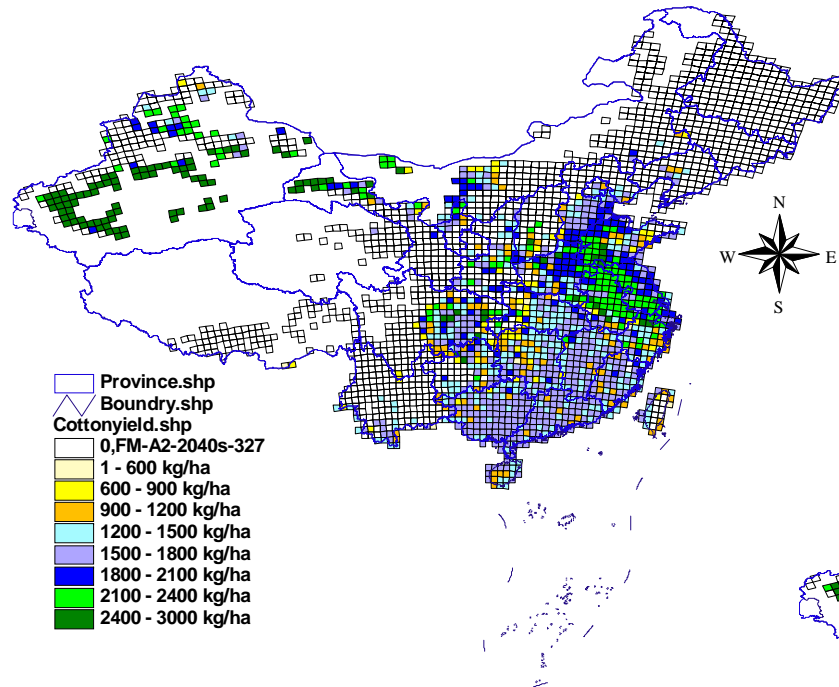


Current Maize Area

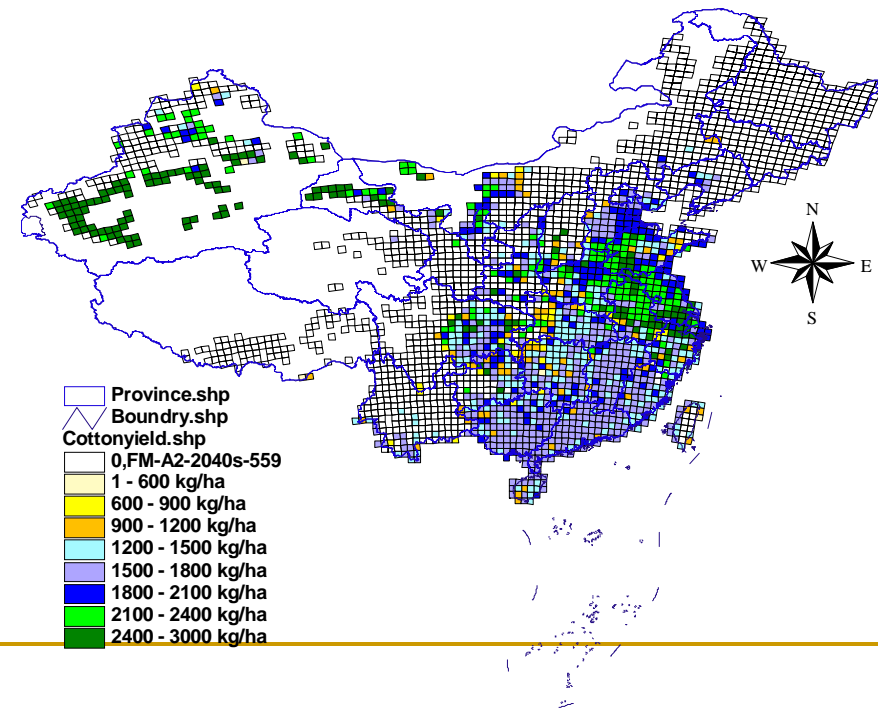


2080 Maize Yield Changes under A2,B2 Scenarios





2050 Cotton Yield Change under A2 Scenario



2050 Cotton Yield Change under B2 Scenario

Uncertainties of CO₂ fertilization and Water availability

	Change in average yield (%)*					
	With CO ₂ fertiliser effect			Without CO ₂ fertiliser effect		
	2020s	2050s	2080s	2020s	2050s	2080s
A2: rainfed	9.8	18.4	20.3	-10.3	-22.8	-36.4
A2: irrigated	-0.6	-2.2	-2.8	-5.3	-11.9	-14.4
B2: rainfed	1.1	8.5	10.4	-11.3	-14.5	-26.9
B2: irrigated	-0.1	-1.3	-2.2	0.2	-0.4	-3.8

Projected changes in average maize yield compared with yield under baseline (1961–1990)

Possible Adaptation for Agriculture

- Develop and promote use of CO₂ fertilizing varieties
- Promote irrigation and water-saving technologies
- Adopt heat-resistant crops, water-efficient cultivars with resistance to pests and diseases
- Adjust crop planting distribution based on getting warmer climate in the Brahmaputra Basin in next 20~30 years
- Recover vegetation of grassland and deforested areas to avoid desertification



Study on the Effect of CO₂ Fertilization on wheat production



Using a CO₂ Gradient Chamber to simulate the influence of the different raised CO₂ concentration with the warming climate.

Long term treatments of high level of CO₂ concentration on wheat, rice and maize generations

Interaction of 450, 550 and 650ppm CO₂ and 1-3°C warming represents positive or adverse effects on these crops



International Network on Water and Ecosystem in Paddy Fields (13 member countries)

- Cambodia
 - China
 - Indonesia
 - Japan
 - Lao People's Democratic Republic
 - Malaysia
 - Myanmar
 - Nepal
 - Philippines
 - Republic of Korea
 - Sri Lanka
 - Thailand
 - Viet Nam
-

International Environmental Regimes

- “ Environmental forces transcend borders and oceans to threaten directly the health prosperity and jobs of citizens...Addressing natural resource issues is frequently critical to achieving political and economic stability and to pursuing our strategic goals around the world”
US Secretary of State - Warren Christopher April 9 1996
 - There are now more than 180 environmental regimes or conventions now in operation. These increasingly set national environmental policy and provide the political context in which collective action by states is focused to solve international issues - from Climate Change to the flow of Rivers, from Biodiversity to the trade in endangered animals and rights to cut trees.
-

Political Players & Regime Formation

- **Epistemic (Knowledge) Communities** e.g. scientists and international scientific organisations, along with political activists linked to international NGO's
 - **The media**, and the ability of environmental activist groups and political lobbyists to use it to set the public debate and shape political agenda.
 - **The adoption of political positions** with the debate shifting from the media to the party system with the normal political process.
 - **The formation of political coalitions** of lead states to initiate international cooperation, and for opposed industrial groups to organise blocking processes.
 - **The impact of regime processes back on the states** with requirement for ratification of agreements and the harmonising of national legislation.
-

Case Studies of Environmental Regimes

- The Mediterranean Project.
 - Mekong Commission
 - Acid Rain in Europe and North America.
 - CFC's and the Montreal Protocols
 - The Climate Change Convention and the Kyoto Protocol
-

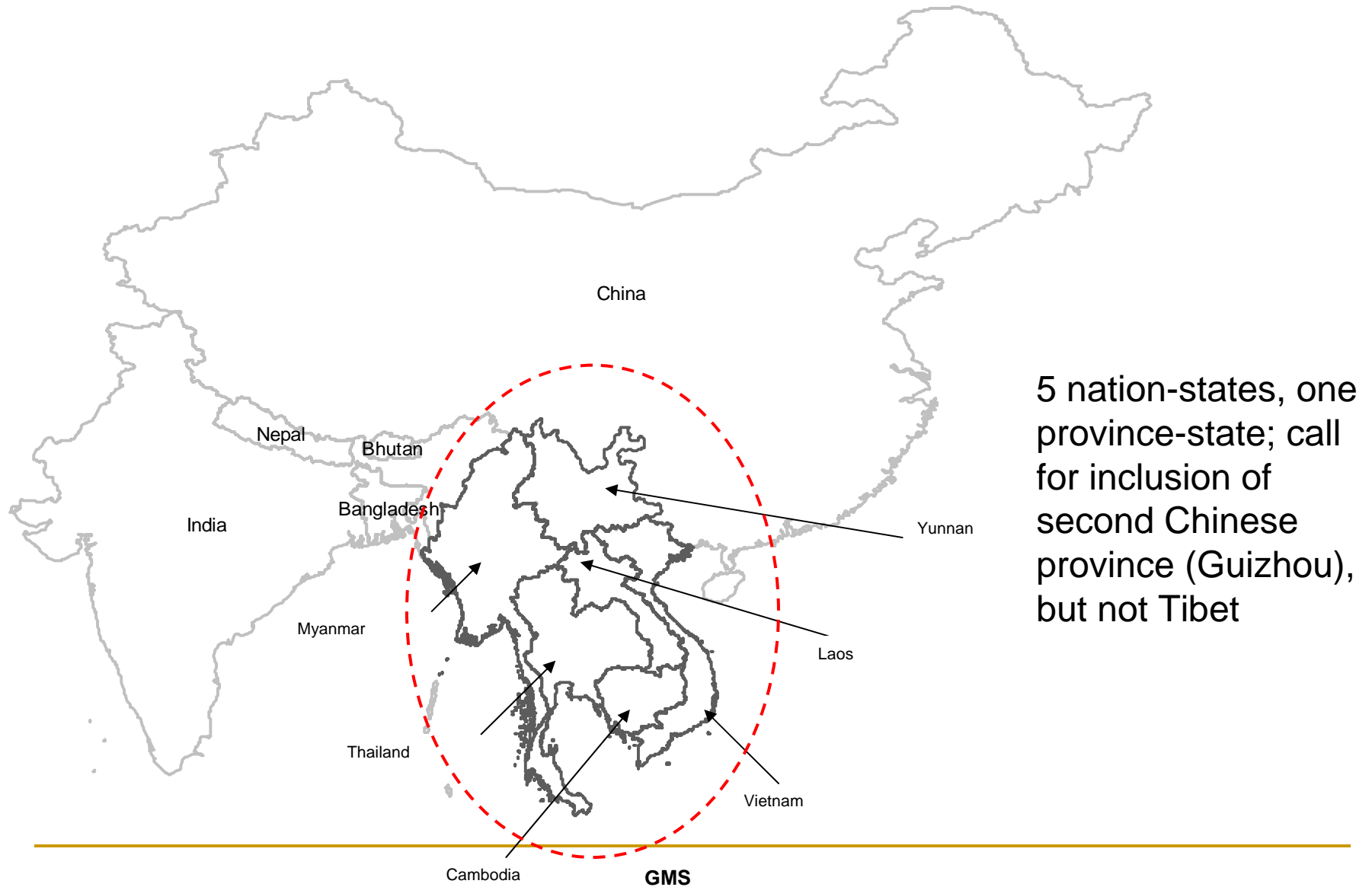
International Regimes - Rivers Systems

- The Nile, depends on water flows from the Blue and White Nile. Egypt 's massive Aswan Dam was completed in 1970. However 85% of the water of the Nile flows through Ethiopia and the Sudan who also have their own plans for dams, hydro power and irrigation.
 - The Jordan - Israel in the 1967 war bombed a Syrian Dam in the Golan Heights that took water from the Sea of Galilee. Further North Turkey plans to establish 13 dams on the headwater of the Tigris and Euphrates
 - The Ganges- Headwaters flows from Nepal, through India to the bay of Bengal at its delta in Bangladesh. Flooding has increased to unprecedented levels in recent years.
 - The Rhine - Switzerland, Germany, Holland. The source of much of the pollution for the North Sea and has damaged marine ecosystems.
-

Regional Development initiatives

- Mekong River Commission
 - ❑ Half-century history; re-established in 1995
 - ❑ Entrenched perception of “MRC vs China”
 - ❑ Little incentive for China to join, yet some recent progress in technical cooperation
 - Greater Mekong Subregion
 - ❑ Launched by Asian Development Bank in 1992
 - ❑ Seen as less of a political challenge than MRC
 - ASEAN
-

GMS: Naturalizing the Subregion



GMS Projects

- Agriculture
- Energy
- Environment
- Human Resources
- Investment
- Telecom
- Tourism
- Trade
- Transport
- Multisector



Second GMS Leaders Summit in Kunming,
July 2005

The Mekong River Basin is Rapidly Developing

- Need for Economic Growth
 - Need for Education
 - Need for Energy
 - Need for Technology
 - Need for Resource Management Tools and Systems
-

Water Resource Issues

- Public Health and Safe Drinking Water
 - Fisheries (inland fisheries for Laos)
 - Water Utilization
 - Hydropower Development
 - Agriculture
 - Navigation and Flood Management
-

The Mississippi/Mekong Partnership

- Initiated in 2003 with the support of USAID and CSG
 - To facilitate the planning and implementation of a Mekong River BDP
 - In partnership with the Mekong River Commission (MRC)
 - MRC member countries: Lao PDR, Cambodia, Vietnam and Thailand
 - China and Myanmar are official observers
-

Regional Context

- **Significant economic potential**

- strong economic growth and overall poverty reduction
- strong export performance
- enhanced cooperation can maximize development benefits

- **Significant challenges**

- uneven poverty reduction
 - uneven progress on social indicators
 - complexity of issues
 - need for strengthened institutions, infrastructure, policies, programs
-

Overview of Opportunities and Challenges

- Better management of water resources
 - Integrated system for power production and trade
 - Better physical linkages to underpin strong growth, cooperation, and connectivity
 - Expanding regional trade
 - Better framework for the flow of and development of human resources
 - Strengthened regional institutions
-

Mekong River: Opportunities and Challenges

- **Tremendous opportunities for each country**
 - Future development in hydropower, agriculture, flood mitigation, and navigation
 - Mekong and Brahmaputra are the least developed major river basins in the world
 - **Challenges to successful development of this vital regional resource**
 - Environmental, economic, political, and social risks to each of the countries, if they pursue development without cooperation
-

Other Areas for Potential Cooperation

■ **Environment and Forestry Sectors**

- management of forest resources
- establishing linkages between cross-border national protected areas through trans-boundary corridors
- improving enforcement and monitoring against poaching and illegal logging
- harmonizing cross-border custom practices to control timber and wildlife trade

■ **Health**

- HIV/AIDS, avian flu, SARS: cross border implications

■ **Capacity Building**

IWRM and Regional Water Cooperation- perspectives

- Regional water cooperation should increase, building on the principles of IWRM
 - Regional water cooperation is an entry point to address water resources management and governance at international, national and local level
 - Conflict resolution, climate adaptation, and disaster mitigation are interlinked and should be addressed as an element of regional water cooperation
 - Comparative analysis, good practices and sharing of experience across basins adds value and could be a effective contribution to regional Water Cooperation processes.
-

Strategic considerations for future Support to regional water activities of Eastsouth Asia and Southeast Asia

- Community projects applying IWRM principles for water management
 - Integration of water management into local area development planning and management
 - Civil society/NGO participation in water management at community and higher levels
 - Research and awareness activities of best practices at community level to inform policy and management decisions at local, national and transboundary level
 - Community resilience to water related disasters
-

Monsoon Asia Integrated Regional Study (MAIRS)

Key questions

- Is the Asian monsoon system resilient to human transformation of land, water and air?
 - Are societies in the region becoming more, or less, vulnerable to changes in Asian monsoon?
 - At the same time rapid economic and social development, which drive environmental changes, may also be helping to reduce the vulnerability?
 - What are the likely consequences of changes in monsoon Asia on the global climate system?
 - How and how much the regional and global environmental systems are coupled?
-

The MAIRS program will interact with and take into consideration relevant ongoing and substantive activities under various international, regional and national agencies.

- APN: Asian Pacific Network for Global Change Research
 - CGIAR: Consultative Group on International agricultural Research
 - CLIVAR: WCRP Climate Variability and Predictability Research Programme
 - CMAP: Climate Modeling, Analysis and Prediction
 - DIVERSITAS: An integrated Programme of Biodiversity Science
 - ESSP: Earth System Science Programme
 - GECAFS: Global Environmental Change and Food System
 - GECHS: Global Environmental Change and Human Security
-

-
- IGBP: International Biosphere Geosphere Programme
 - IHDP: International Human Dimension Programme
 - iLEAPS: Integrated Land-Ecosystem Atmosphere process Study
 - IMBER: IGBP Integrated Marine Biogeochemistry and Ecosystem Research
 - LOICZ: Land Ocean Interactions in the Coastal Zones
 - MAHASRI: Monsoon Asian Hydro-Atmosphere Scientific Research and prediction Initiative
 - MRI: Mountain Research Initiative
 - REIMS: Regional Environmental Integrated Modeling System
 - SARCS: Southeast Asia Regional Committee for START
 - SASCOM: START South Asia Regional Committee
 - SOLAS: Surface Ocean Lower Atmosphere Study
 - UN-ESCAP: United Nations Economic and Social Commission for Asia and the Pacific
 - U-TURN: Urban Transformation and Urbanization Research Network
 - WCRP: World Climate Research Programme
-

Northeast: India's Powershed?

- Northeast: aspirations to make it the “battery” of India
 - Analogy to watershed; space over which a resource is collected/concentrated
 - Underscores the fact that Brahmaputra hydro is not simply a Northeast issue,
 - Opens door for simultaneous examination of political-economic power relations
-

Commission for Brahmaputra

- Advisory activity in hydrology and water resources including the measurement of basic variables characterizing the quantity and quality of water and sediment in the hydrological cycle;
 - Promoting and facilitating the international exchange of experience, transfer of technology, research uptake, education, and training and development to meet the needs of national requirements or other organizations fulfilling the functions of such Services including programme management and public awareness
 - Promoting and facilitating the international exchange and dissemination of information, terminology, data, standards, forecasts and warnings;
-

-
- Promoting the collaboration and linkages among operational hydrology, meteorology, and environmental management;
 - Raising awareness in the wider community of the social, economic and environmental significance of water, and promoting the role of hydrology in the mitigation of hydrological hazards and in the development and management of water;
 - Supporting cooperation between WMO, IHP of UNESCO, IAHS and other governmental and non-governmental organizations on matters related to hydrology and water resources;
 - Supporting and, where appropriate, taking the lead in, coordinating within partner organizations, terrestrial water-related matters, including the activities of the regional associations' working group on hydrology.
-

Links to other institutions/ international basin organizations

- **Non-governmental organizations (ISO, IAHS, IAHR...)**
 - **World Water Council (WWC)**
 - **Global Water Partnership (GWP)**
 - **African Ministerial Conference on Water (AMCOW)**
 - **African Water Task Force**
 - **ECE Convention on Transboundary Rivers**
 - **Danube Commission**
 - **Permanent Joint Technical Commission for Nile Waters**
 - **Lake Chad Basin Commission**
 - **(Niger Basin Authority)**
 - **La Plata Basin Intergovernmental Coordination Committee**
 - **Mekong River Commission**
 - **(International Commission for the Hydrology of the Rhine Basin and others)**
 - **(Amazon Treaty)**
-

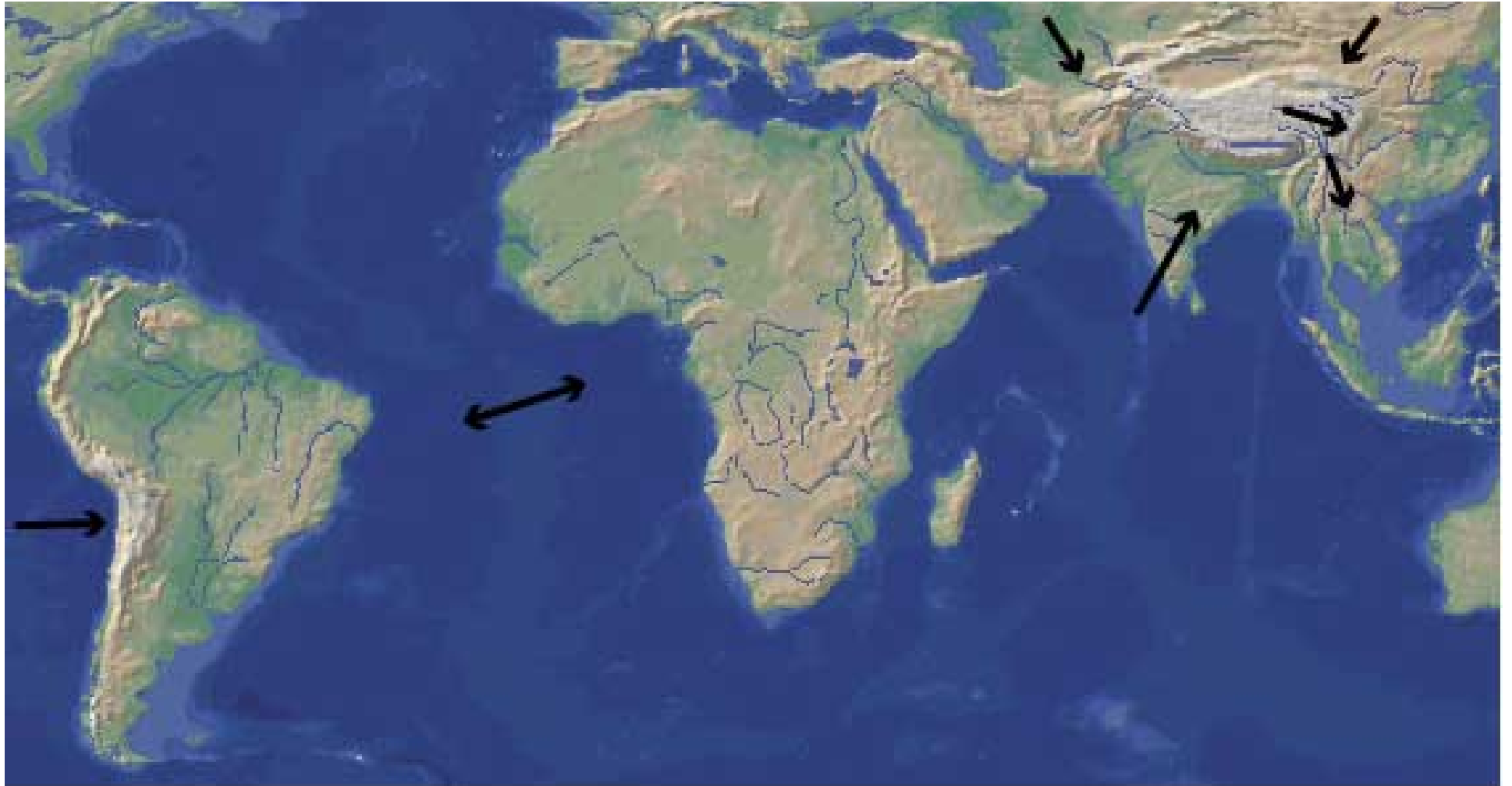
Six priority research areas

- Hydrology and water availability
 - Ecosystem and biodiversity
 - Agriculture, forestry and food security
 - Energy
 - Natural disaster management
 - Air quality and human health
-

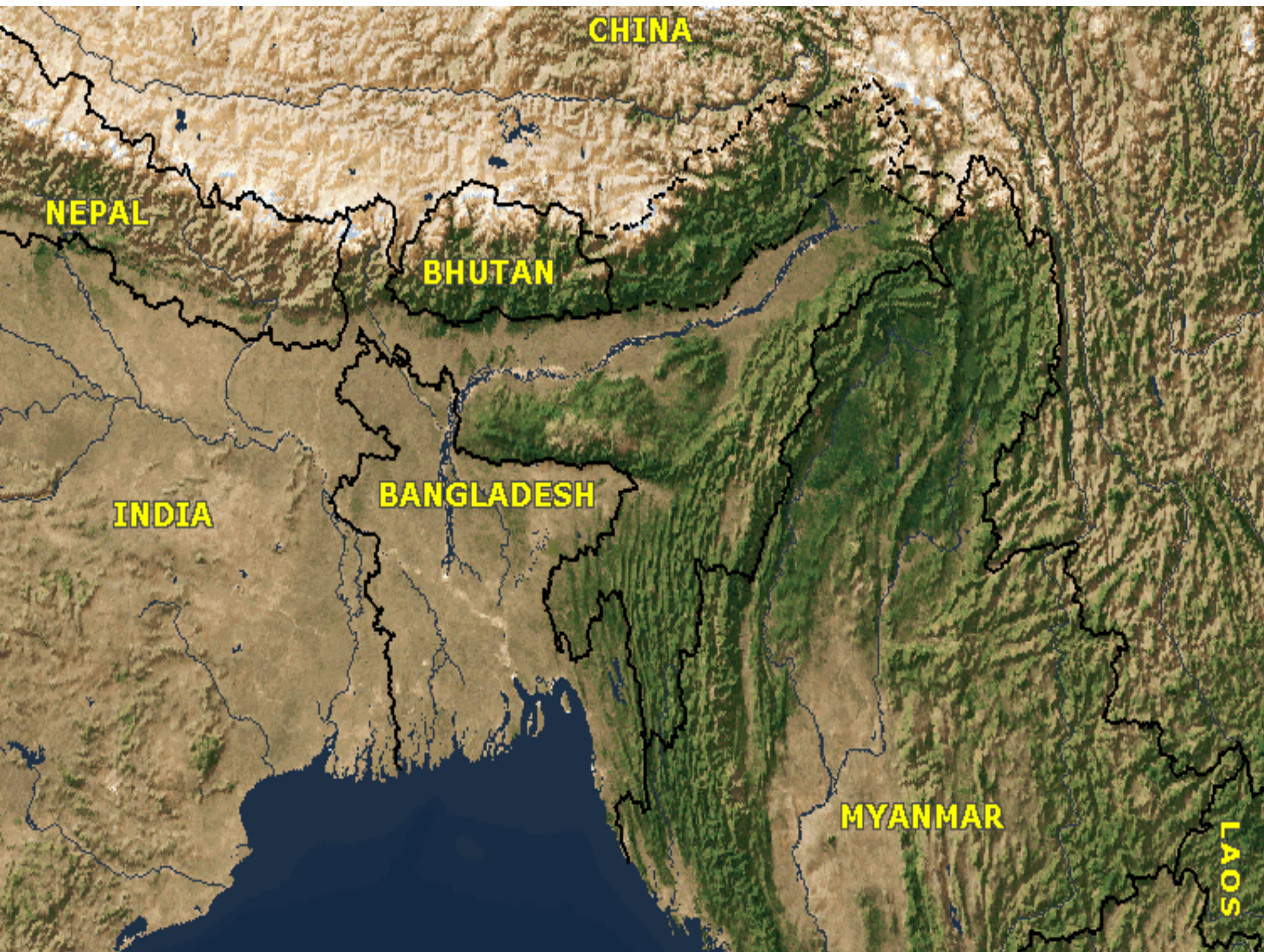
The main challenges requires consideration of:

- The major demographic, socio-economic and institutional drivers for change, including the development of scenarios for changes related to urbanization and industrialization, energy production and biomass burning, land-use/cover change and water resource harvesting, including dam construction
 - The effects of these drivers on regional air quality, water quality and availability, coastal resources and natural land-based ecosystems and biodiversity
 - The impacts on biogeochemical cycles and the physical climate system, including its variability at different scales
 - The impacts of global and other feedback effects on the regional biospheric life-support system, including food systems, water resources and health
 - The possible effects of these regional drivers on the global system
-











Lancang (Mekong) River



Nu (Salween) River



Xiaowan Dam Site

- 292 m tall
- ~ \$3B US



-
- Early signs of global changes will appear earlier in the places of most sensitive nature – places like the Brahmaputra basin, since it is located at the transitional zones between different climatic regions and different distinct ecosystems, such as that of the cold dry climate of the Tibetan plateau and the warm tropical climate of Assam & Bangladesh plains, where temperature contrast will occur earlier than other regions.
-

-
- However, even in the backdrop of such growing uncertainties and complexities, both South Asia and Southeast Asia must seek to manage their water and environmental resources for the obvious benefit of addressing the fundamental problems of under-development and environmental degradation including those of water shortage, flood and rural poverty.
-

-
- The natural resource development plans so far projected only national perception making little provision to the concerns of neighbouring countries. There has been little appreciation that trade-off might achieve greater benefits for all. Distribution of the transboundary resources has been perceived as potentially providing advantage to one side while depriving the other. Not surprisingly, co-operation has been elusive.
-

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- In this scenario, opening discussions on a mutual benefit approach beyond national governments to include institutions, local governments and non-governmental organizations, may lead to new possibilities with far reaching implications for entire South Asia and Southeast Asia.
-

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- A multilateral exchange incorporating private economic actors and a new form of regional resource policy of shared-management, linking institutions with national decision making, would facilitate significant progress in transforming the human living conditions in one of the most densely populated impoverished regions of the world.
-