



Economic Information Sharing Mechanism of the Asia-Pacific (EiSMAP)

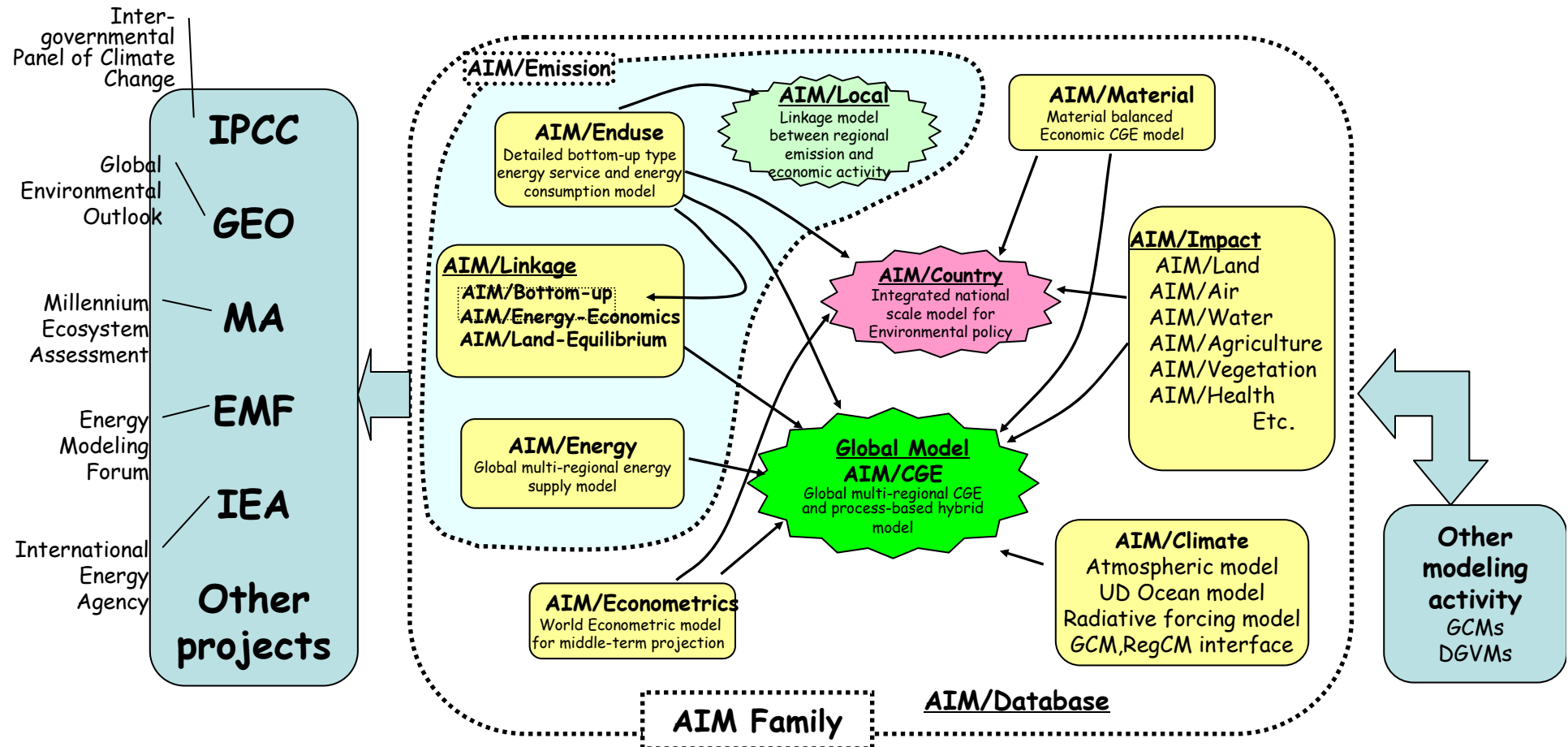
Projection of Environmental Risks in Asia-Pacific Region

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1. Impacts of Climate Change
2. Projection of environmental risks
3. Final remarks

Model family of Asia Pacific Integrated Models (AIM)



1. Scenario analysis of GHGs emission, Climate Change, and its Impacts
2. Scenario analysis of environment change caused by anthropogenic intervention
3. Identify feasible and efficient counter-measures for environment protection

Four Scenarios to explore Future environmental risk (adopted in Global Environmental Outlook 3)

Market First scenario (MK): Market-driven developments coverage on the values and expectations that prevail in industrialized countries

Policy First scenario (PO): Strong actions are undertaken by governments in an attempt to reach specific social and environmental goals

Security First scenario (SC): Disparities, inequality and conflict are not improved, which are brought about by socio-economic and environmental stresses

Sustainability First scenario (SF): A world in which a new development paradigm emerges in response to the challenge of sustainability, supported by new, more equitable values and institutions.

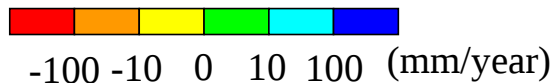
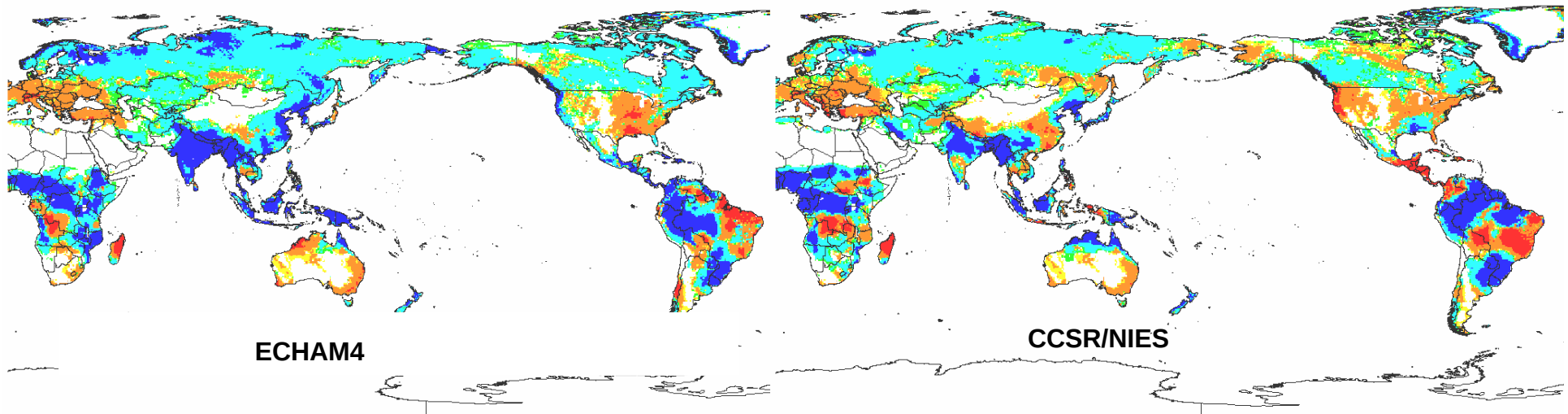
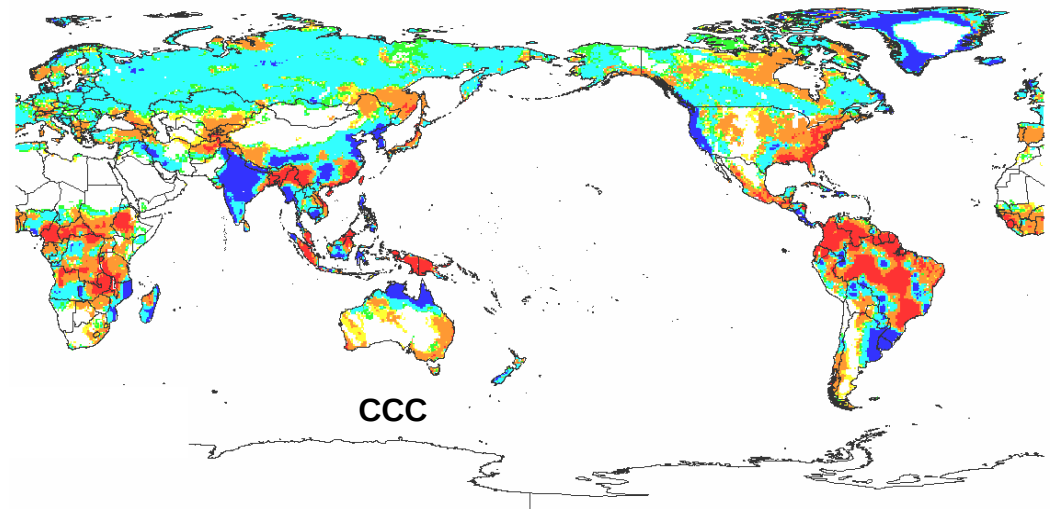
**Major parameters in B2 scenario
In Asia Pacific region (except Japan)**



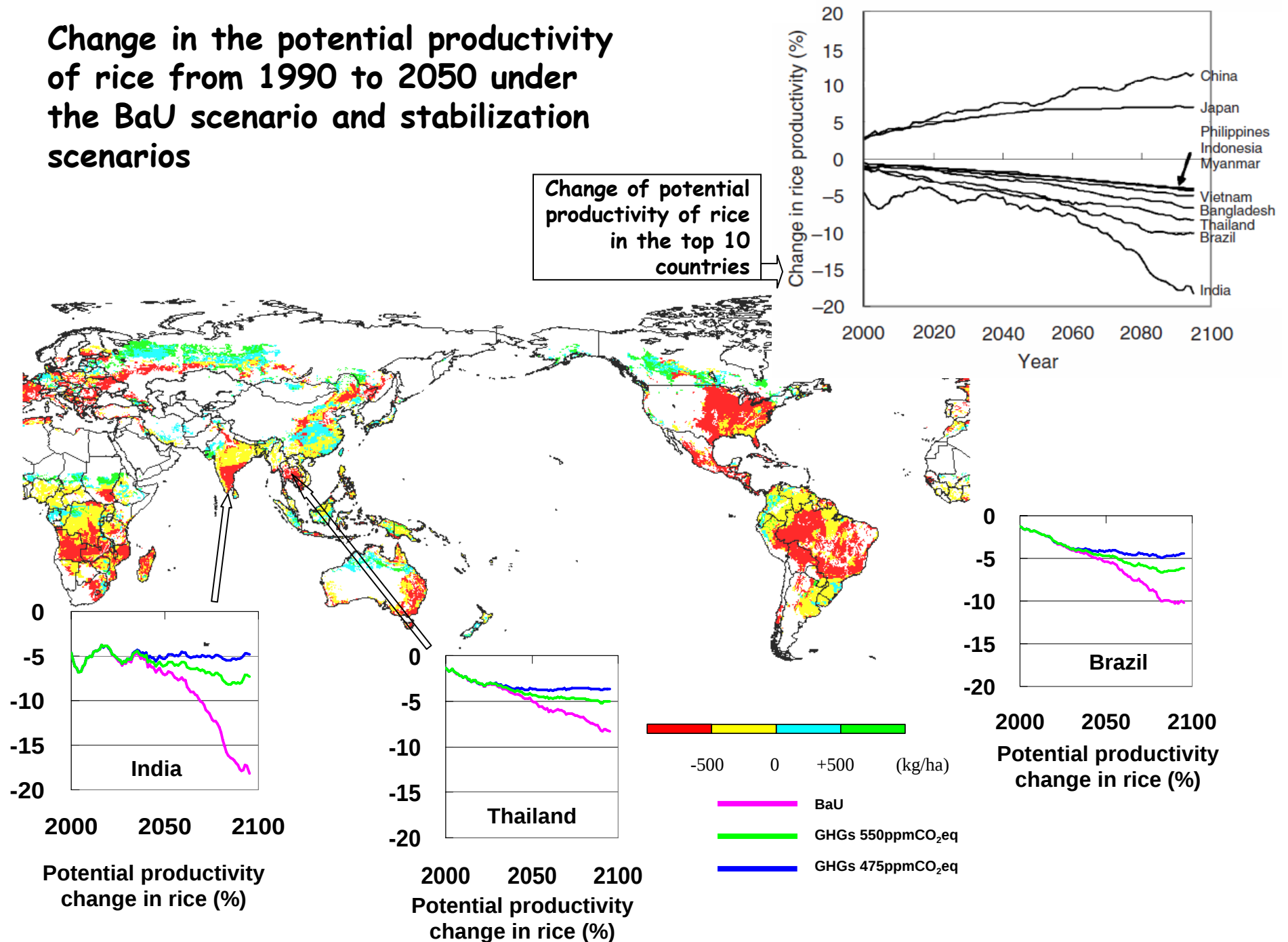
	1990	2020	2050
Population in Million	2798	4008	4696
GNP/GDP(mex) in Trillion US\$90	1.5	13.2	41.8
GNP/GDP(ppp) in Trillion (1990 prices)	5.3	22.4	49.3
Final Energy by Fuel in EJ			
Non-commercial	24.2	13.2	6.7
Solids	18.5	27.8	16.7
Liquids	12.6	59.8	112.0
Gas	1.5	8.7	22.0
Electricity	4.1	24.1	69.8
Other (e.g H ₂)	0.6	10.2	24.8
Total	61.5	143.8	252.0
Primary Energy by Fuel			
Coal	29.8	47.4	47.7
Oil	15.3	62.6	92.8
Gas	2.8	30.9	55.4
Nuclear	0.3	3.7	20.9
Biomass	24.3	28.0	46.1
Other Renewables	1.1	12.3	42.6
Synfuel Trade	0	0	13.5
Total	73.6	184.9	319.0
Cumulative Resource Use in ZJ			
Coal	0.0	1.2	2.7
Oil	0.0	1.0	3.3
Gas	0.0	0.3	1.5
Anthropogenic Emissions			
CO ₂ (as C) in GtC	1.2	3.1	4.2
Other CO ₂ (as C) in GtC	0.3	0.3	-0.1
Total CO ₂ (as C) in GtC	1.5	3.4	4.1
CH ₄ total (as CH ₄) in Mt CH ₄	127.1	222.6	265.9
N ₂ O total (as N) in Mt N ₂ O-N	2.3	2.7	2.4
SOx total (as S) in MtS	17.3	31.3	24.4
CO (as CO) in Mt CO	276.5	422.3	550.9
VOC _s in Mt	47.8	75.3	92.2
NOx (as N) in MtN	6.2	15.6	23.0

Changes in runoff calculated under BaU scenario

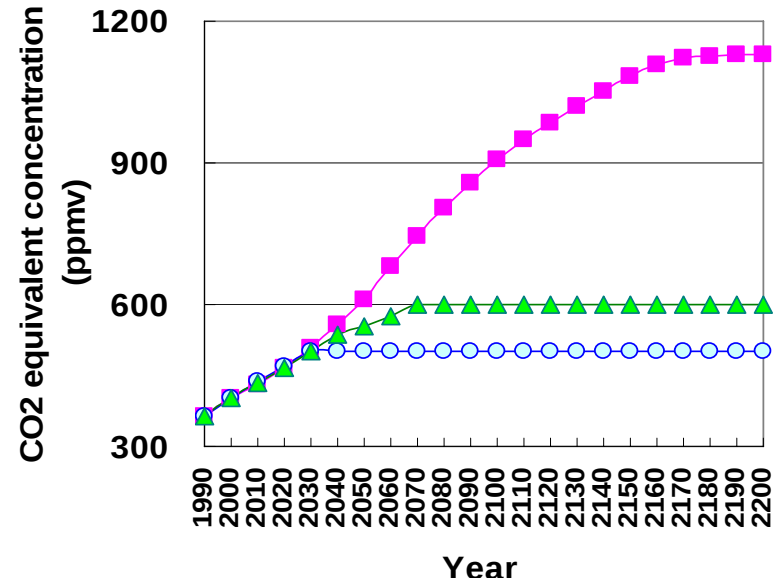
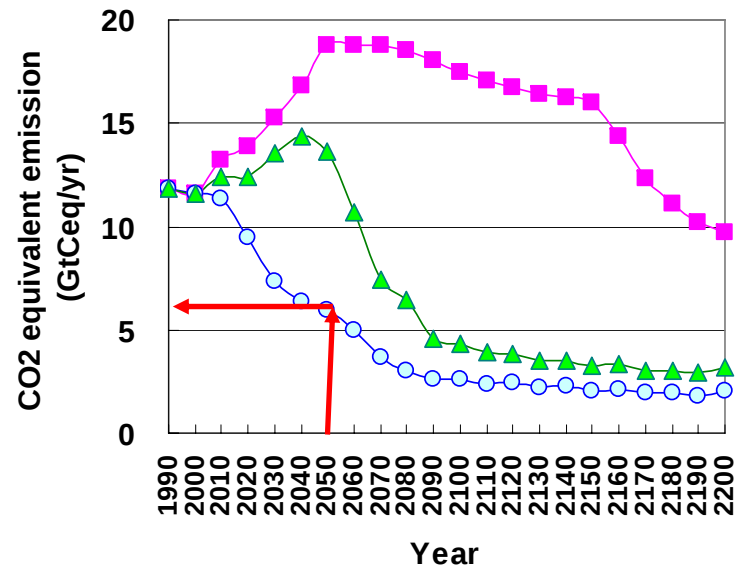
- Increase in northern high latitude region, Indian continent, and Bengal bay
- Confused results in mid-China
- Decrease in South Europe, Central plain and Brazilian Plat.



Change in the potential productivity of rice from 1990 to 2050 under the BaU scenario and stabilization scenarios

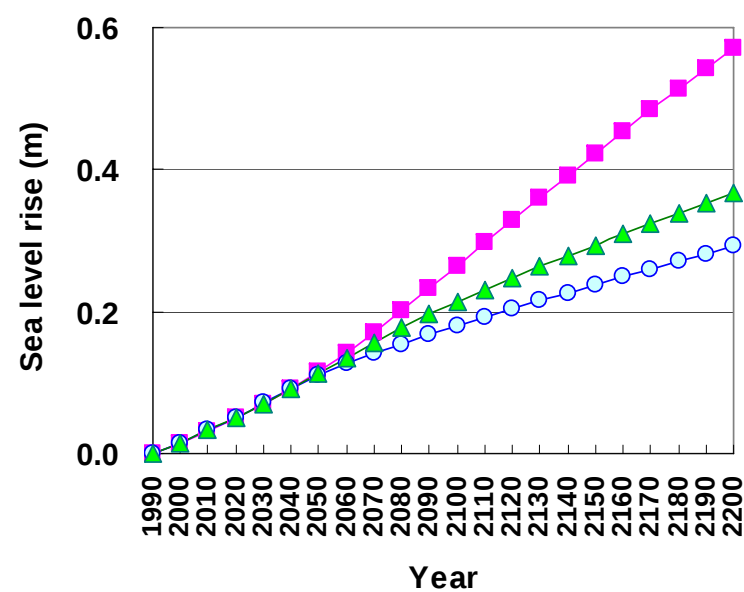
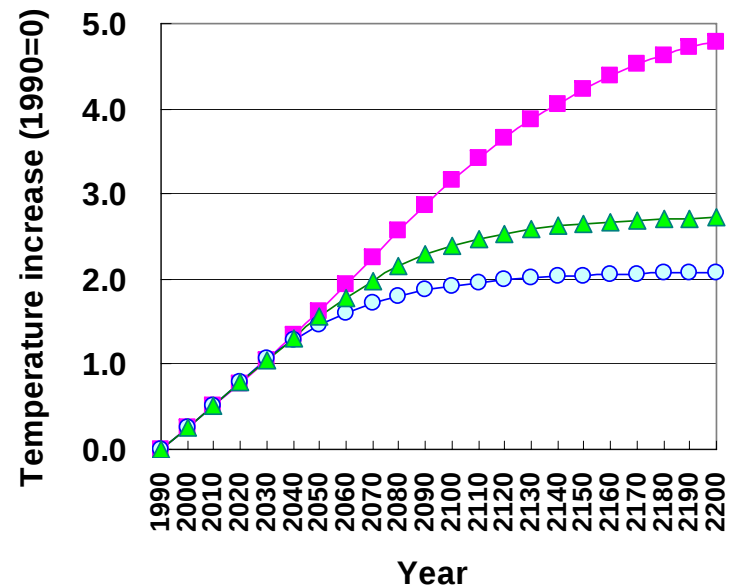


Mitigation of climate change, not to exceed 2 °C from present



■ BaU(SF) ○ GHG-500ppmv ▲ GHG-600ppmv

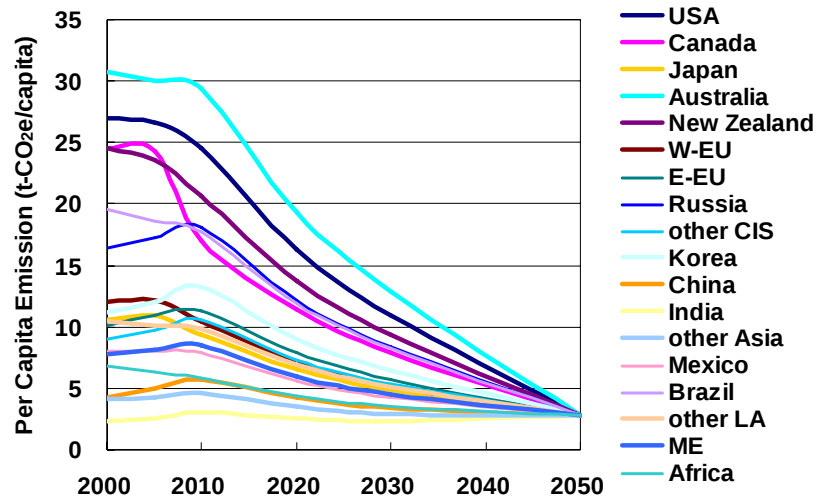
■ BaU(SF) ○ GHG-500ppmv ▲ GHG-600ppmv



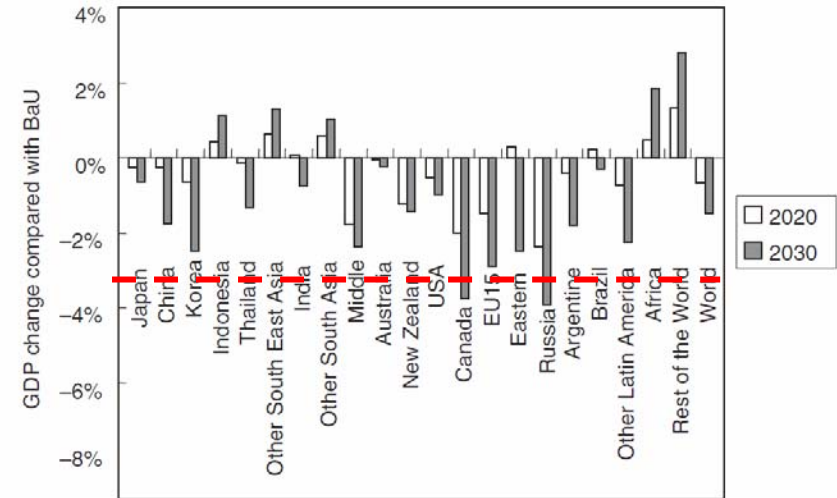
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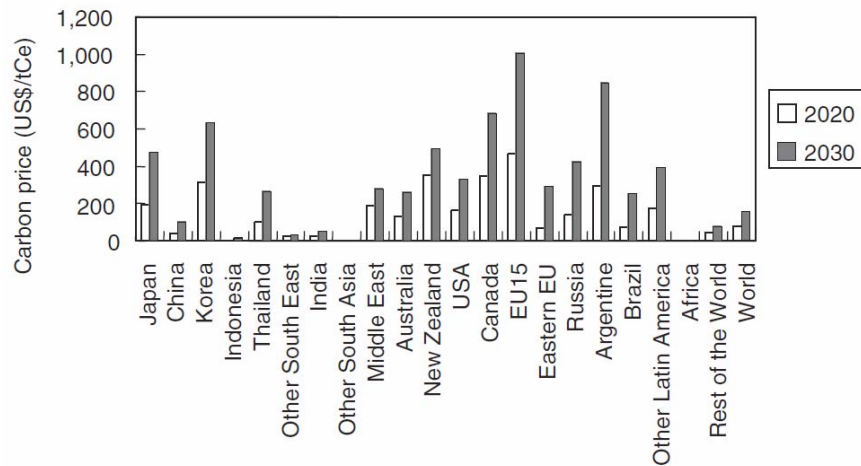
Economic impacts of GHG-500ppm under C&C scheme



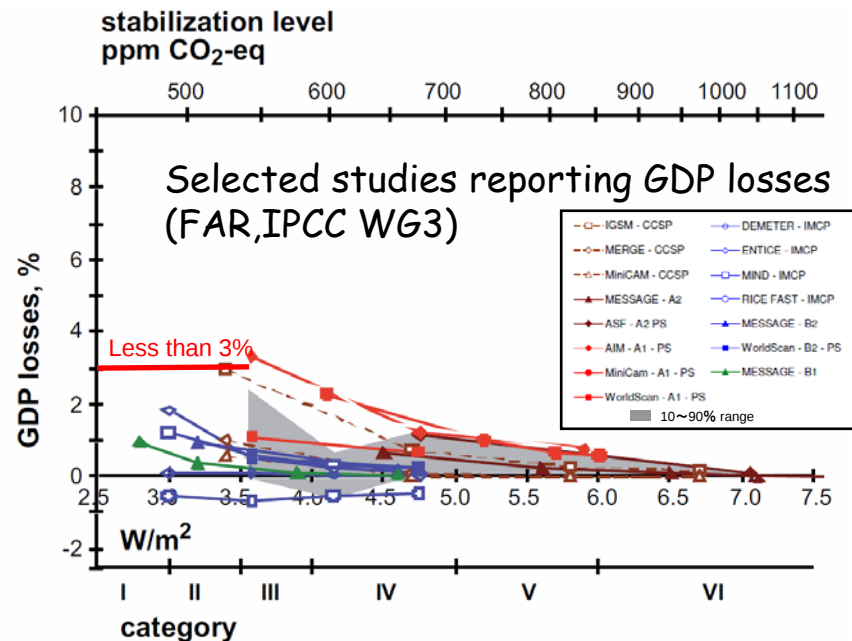
Regional allocation cap using C&C scheme under the GHG-500ppm case



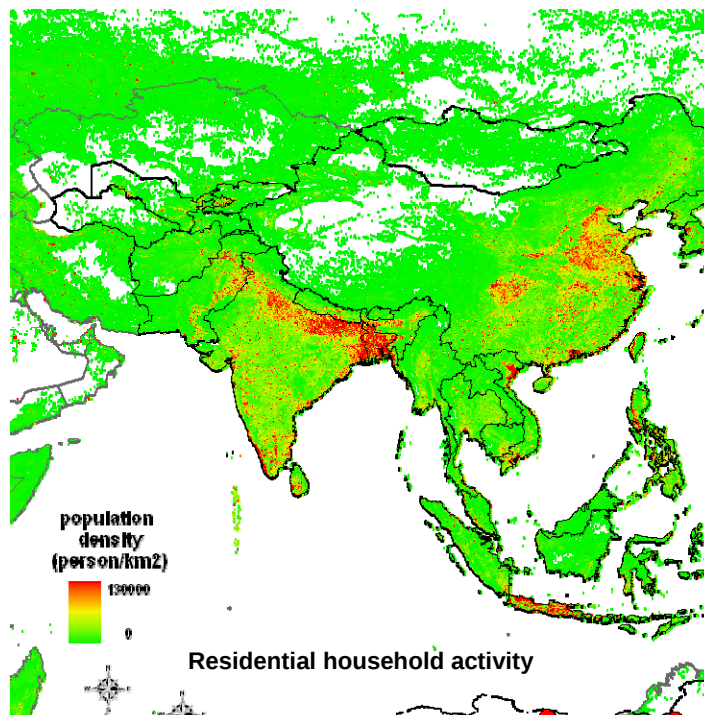
Change without trading under C&C cap constraint with GHG-500ppm, as compared with the BaU



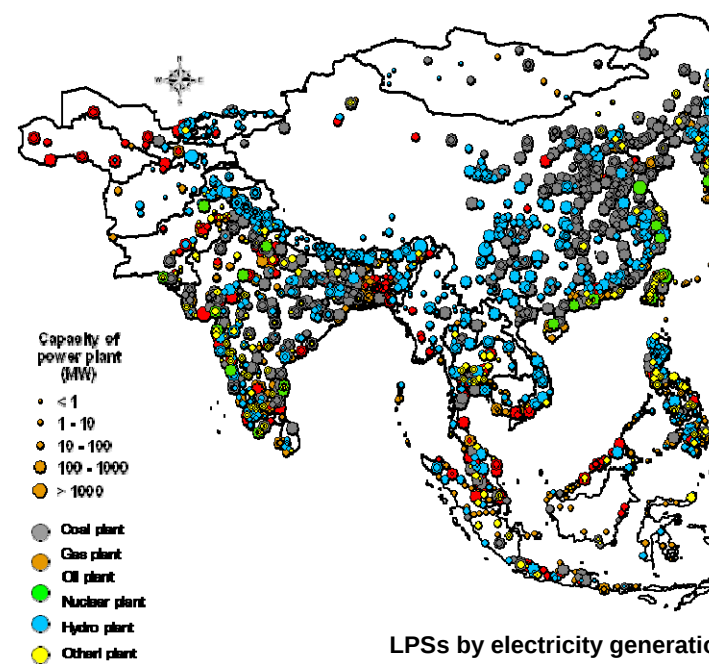
Carbon price without trading under C&C cap constraint with GHG-500ppm, as compared with the BaU



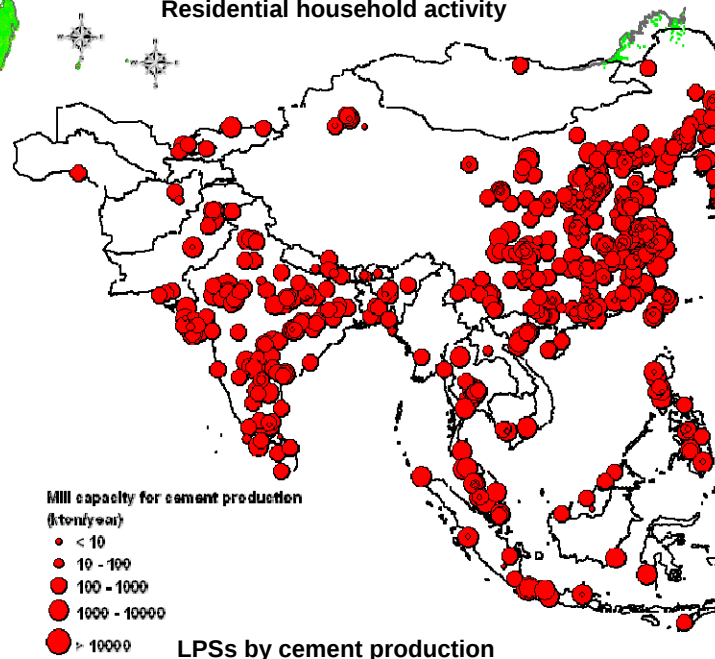
- Up to now, I talked about climate change impacts. However it is only a part of concerns from the point of whole Asian environmental risks.
- Besides climate change, risks by unsafe water and sanitation, urban air pollution, and also indoor air pollution from household use of solid fuels are now suffering people's health.
- Coupling socio-economic scenarios used in climate change projection, and environmental/health impact assessment models in AIM model family, we projected future changes of these risks.
- In order to conduct such assessment work, we need spatially detailed information, e.g. polluters spatial distributions, pollutant transport processes and so on.



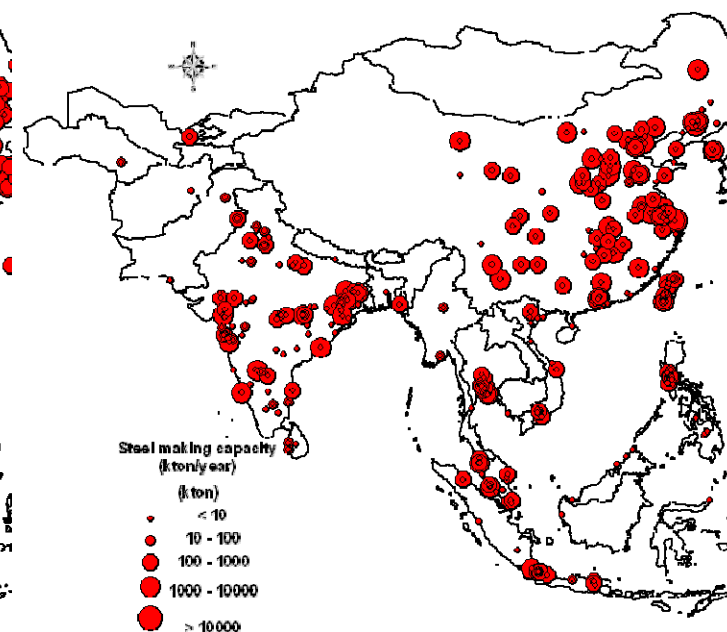
Residential household activity



LPSs by electricity generation



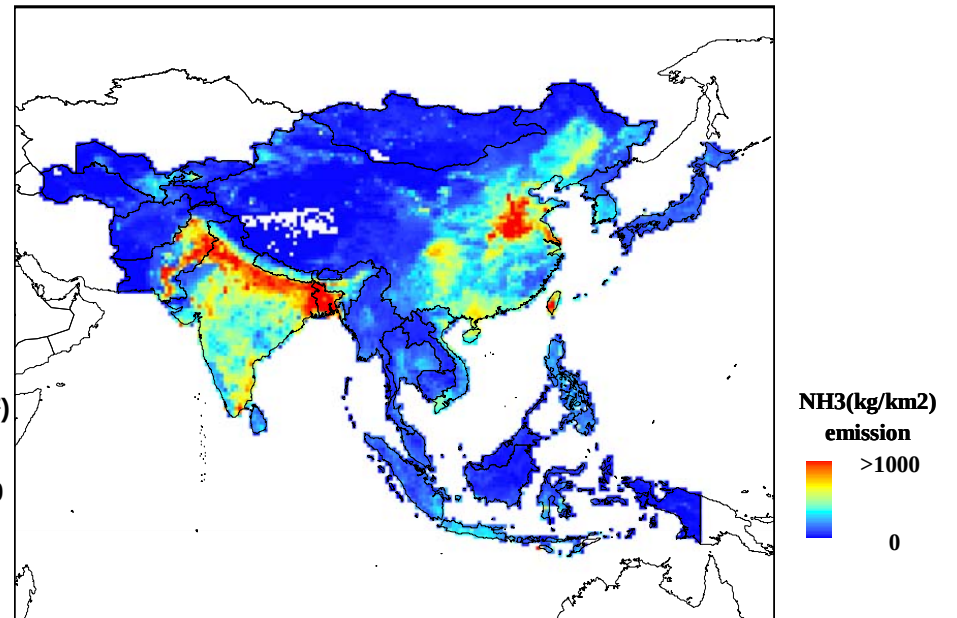
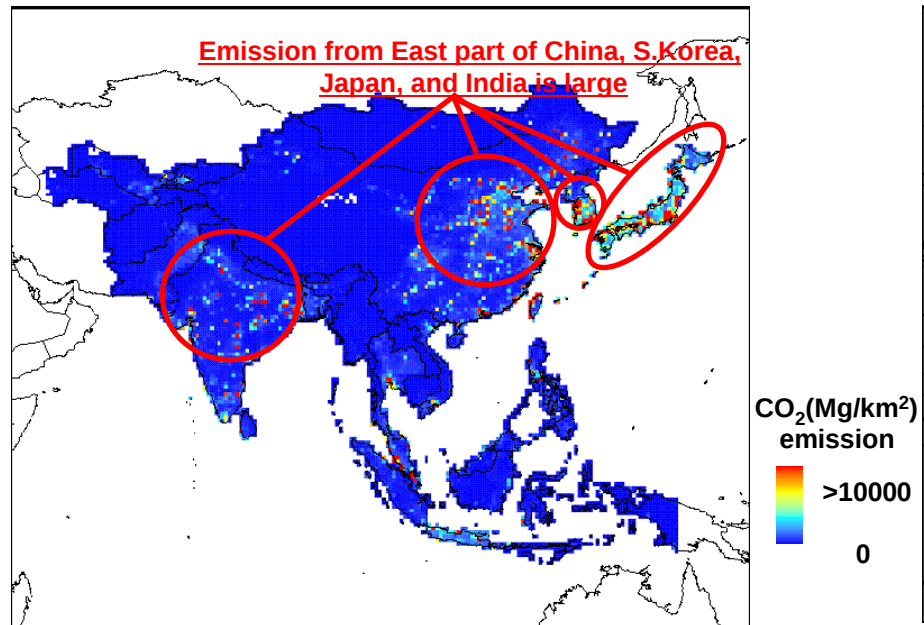
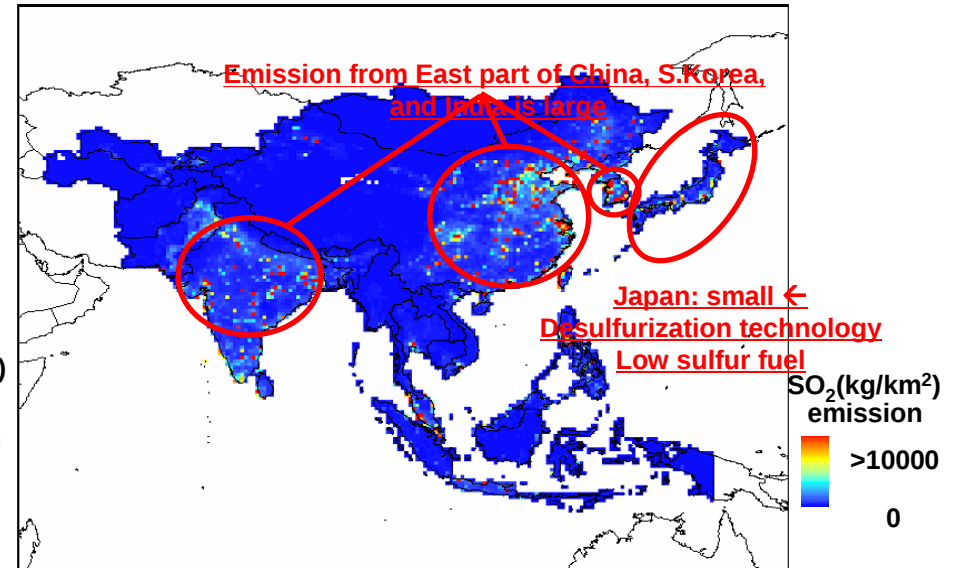
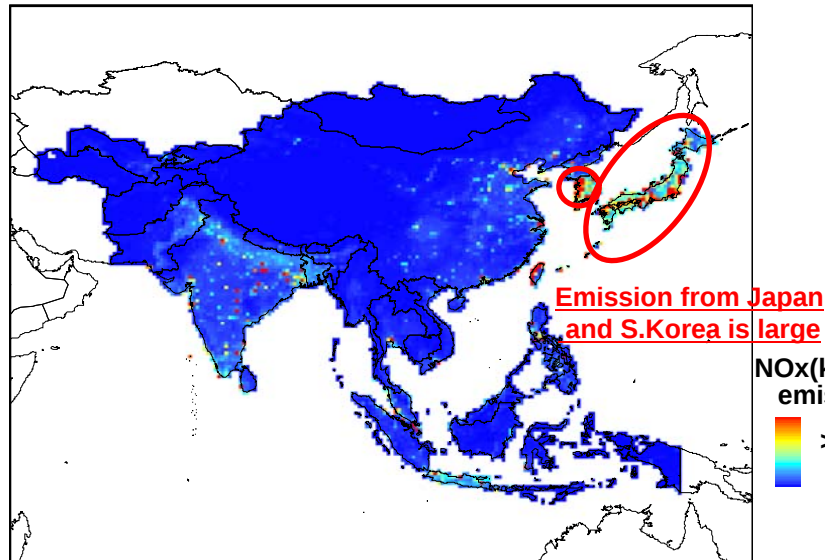
LPSs by cement production



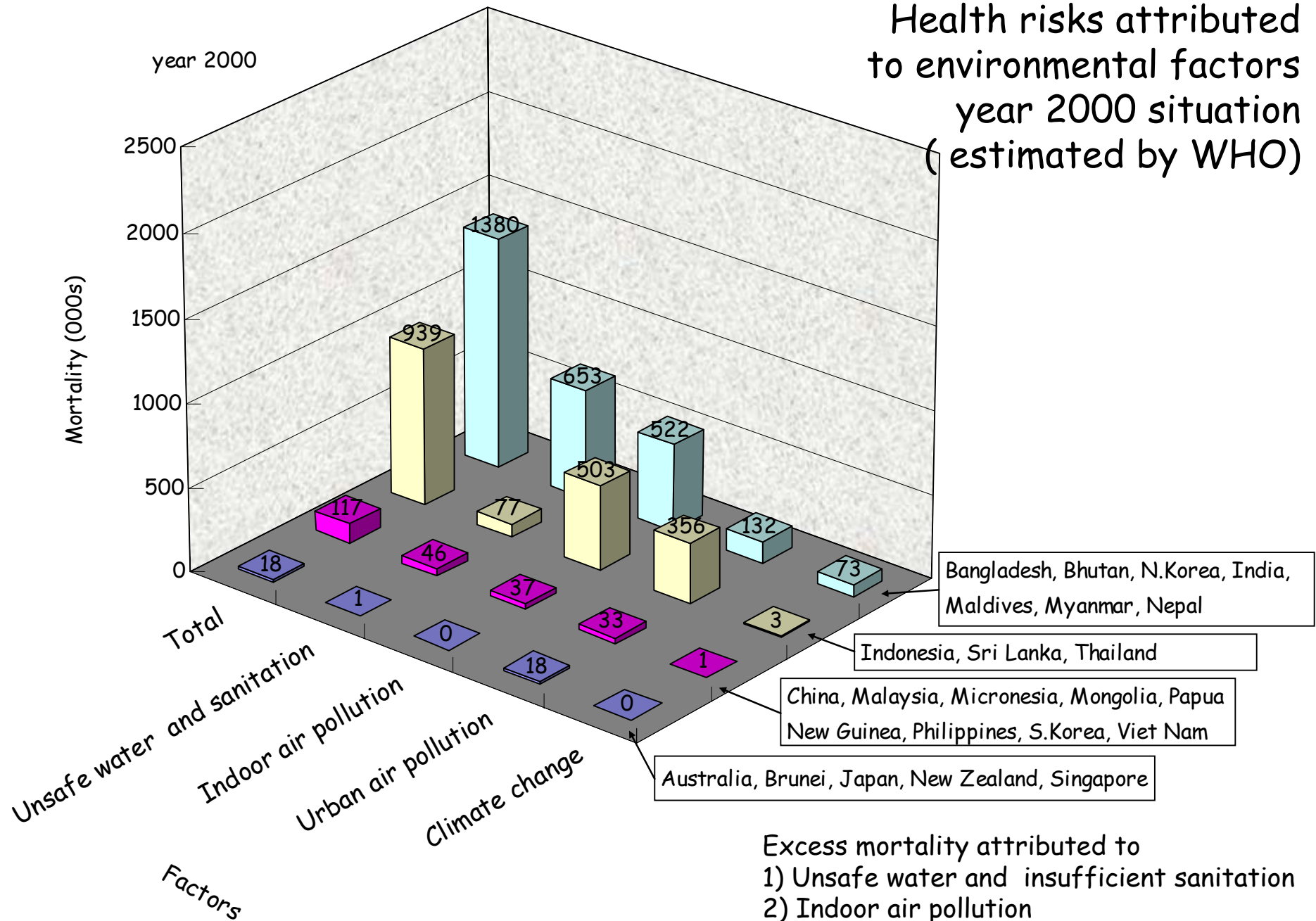
LPSs by steel production

Air pollutant emission sources in year 2000

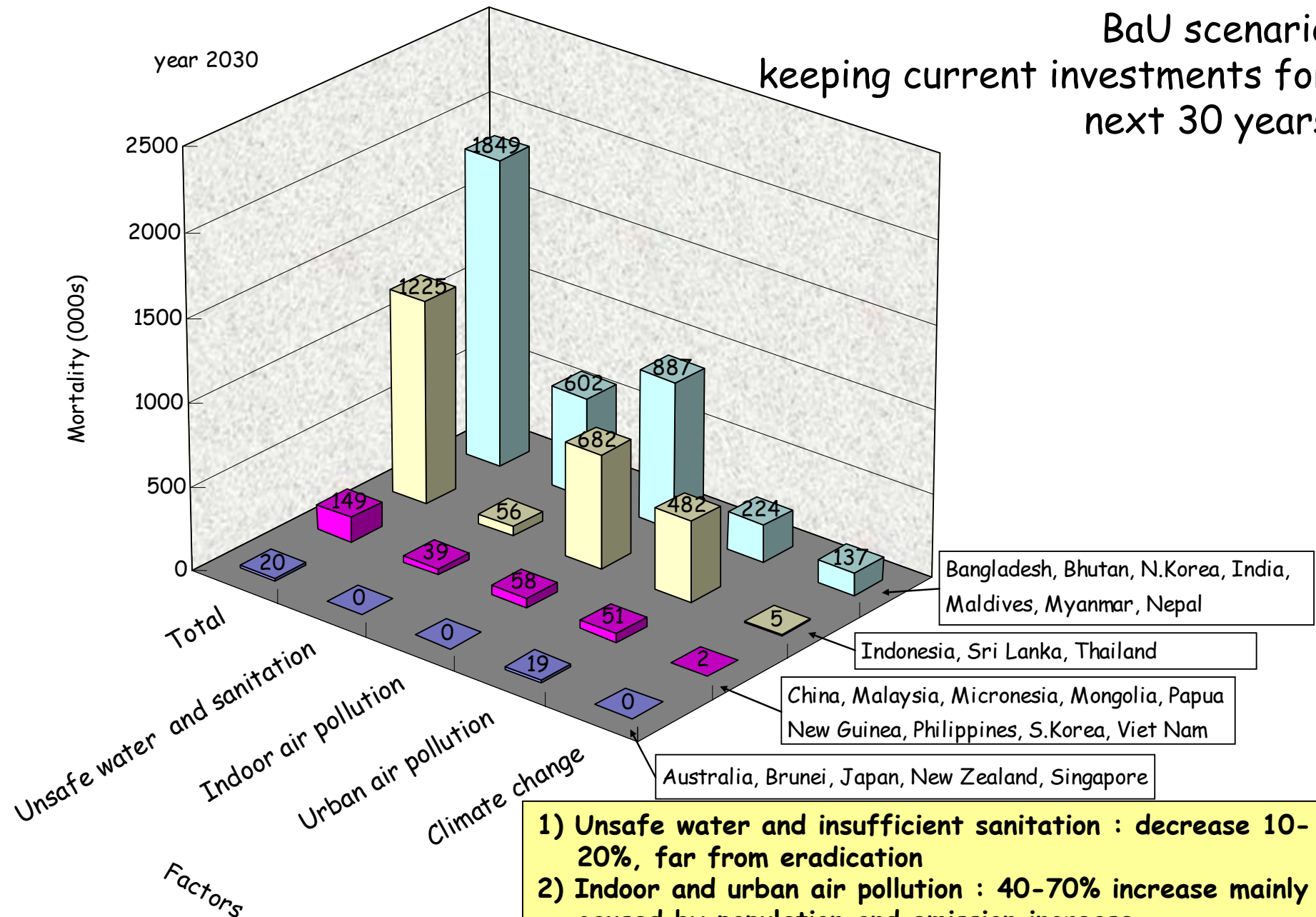
Emission inventories in year 2000



Health risks attributed to environmental factors year 2000 situation (estimated by WHO)



BaU scenario
keeping current investments for
next 30 years



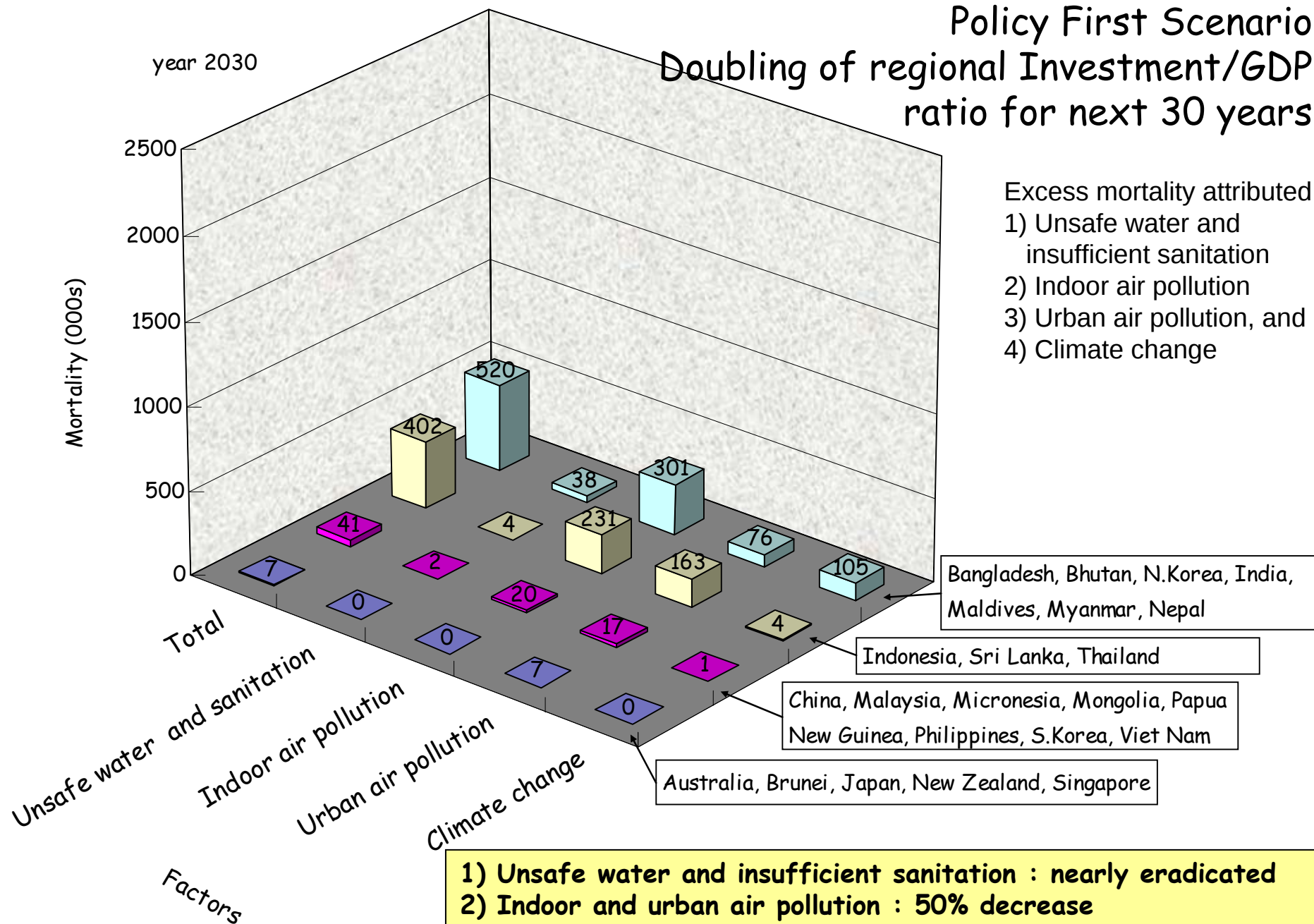
- 1) Unsafe water and insufficient sanitation : decrease 10-20%, far from eradication
- 2) Indoor and urban air pollution : 40-70% increase mainly caused by population and emission increase
- 3) Climate change : 50-90% increase caused by the escalation of climate change

Policy First Scenario

Doubling of regional Investment/GDP ratio for next 30 years

Excess mortality attributed to

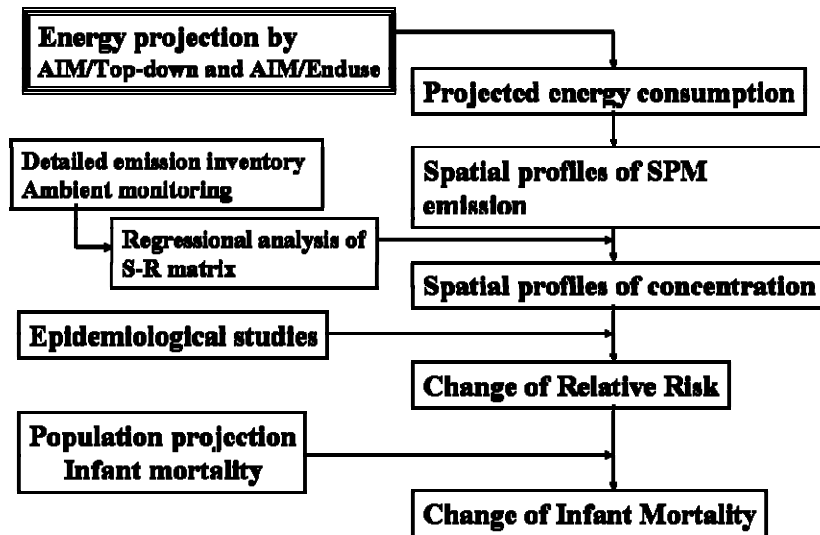
- 1) Unsafe water and insufficient sanitation
- 2) Indoor air pollution
- 3) Urban air pollution, and
- 4) Climate change



- 1) Unsafe water and insufficient sanitation : nearly eradicated
- 2) Indoor and urban air pollution : 50% decrease
- 3) Climate change : intensive adaptation suppresses increase by 10-40%

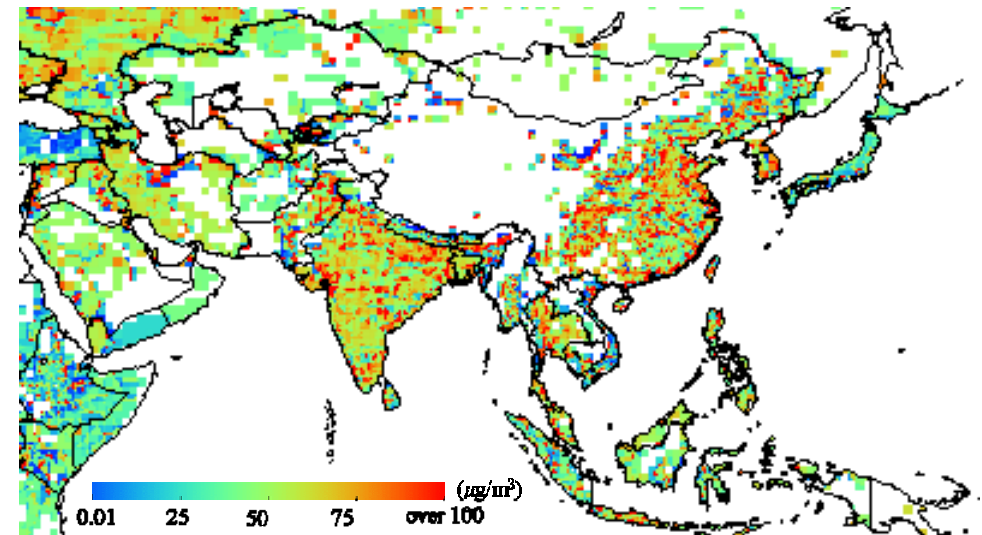
Effects of CO₂ emission reduction to infant mortality changes

An example of co-benefit to air pollution

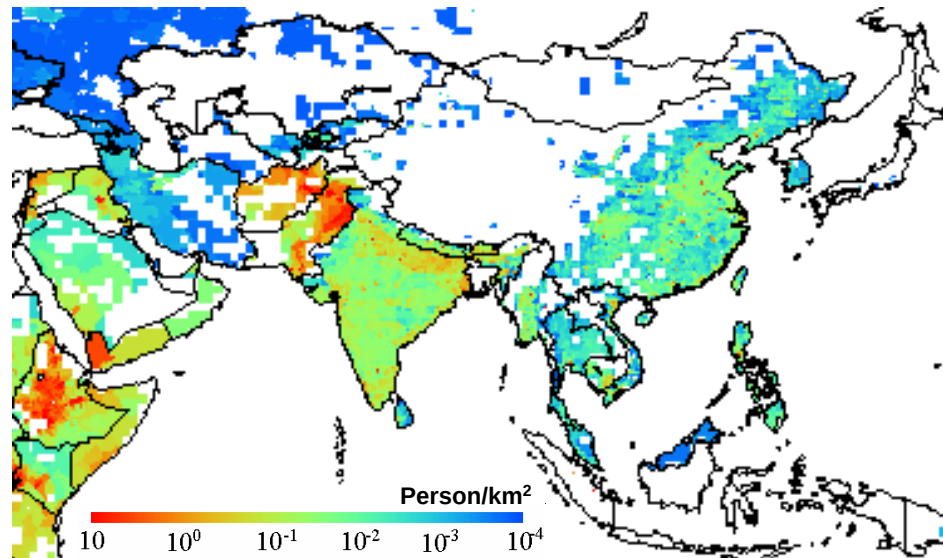


Projection scheme

No countermeasure assumed except CO₂ emission reduction measures



PM concentration in ambient air in 2020 (Security First scenario)



Increase of infant mortality by PM between 1990 and 2020 (Security First scenario)

Infant mortality by PM

	Market First (MK)		Policy First (P0)		BaU Security First	
	2020	2050	2020	2050	2020	2050
Cambodia	3,211	4,848	2,166	3,017	4,081	6,559
Vietnam	3,620	5,820	1,794	2,251	5,107	8,325
Laos	294	452	150	190	389	637
China	29,630	44,949	14,477	19,482	40,071	63,610
Afghanistan	64,867	26,896	62,693	24,117	66,601	29,307
India	117,494	191,781	79,017	112,248	156,290	289,783
Thai	1,547	2,259	1,097	1,491	1,944	2,927
Nepal	3,131	4,586	2,252	3,039	3,941	5,985
Pakistan	135,107	149,503	126,227	134,248	142,914	163,305
Philippine	6,478	9,819	4,468	6,218	8,310	13,237
Bhutan	2,715	2,964	2,556	2,685	2,845	3,213
Malaysia	281	397	203	272	345	509
Korea, S	1,631	2,623	1,091	1,559	2,161	3,756
Taiwan	1,556	2,367	1,072	1,404	2,000	2,905
Total	371,562	449,264	299,262	312,310	436,998	594,360

Global and local policy linkages and their co-benefits

Linking and integrating environmental measures at both the local and global levels often provides advantages and co-benefits not only for the developing, but also for developed countries.

Examples of such linkages are;

		Global/Regional/Subregional Policies						
		Global Warming Abatement	Acid Rain Abatement	Eco-tourism Development	World Nature Conservation	World Resource Development	World Resource Recycling	Marine Pollution Control
Country/Local Policies	Air Pollution Control	×	×					
	Biodiversity Conservation	×		×	×			
	Reforestation	×		×	×	×	Natural Resource Recovery link	
	Soil Recovery			×		×		
	Food Production					×		
	Recycling	×				×	×	Water pollution Prevention link
	Waste Management	×				×	×	
	Water Pollution Control	Air pollution link						×
	Water Resource Management						×	

Final remarks

- Climate change will impact on water runoff, health, and crop productivity in Asia-Pacific region by 2050.
- Health impacts caused by climate change increase 50-90% in 2030, and half of it can be reduced by adaptation.
- In order to restrict global temperature change less than 2 C, stabilization of GHG 500ppm is necessary. It requires 50% reduction of global emission by 2050. GDP changes caused by this reduction are less than 2% in 2020, and less than 4% in 2030, even if no carbon trade.
- Health risk of indoor and outdoor air pollution will be doubled under BaU countermeasures in Asia-Pacific region by 2030.
- Doubling of regional investment per GDP will halve air pollution risk, and nearly eradicate unsafe water and sanitation problems by 2030.
- Suitable policy linkages may benefit for local and global environmental problems