

Climate Change Adaptation Networking

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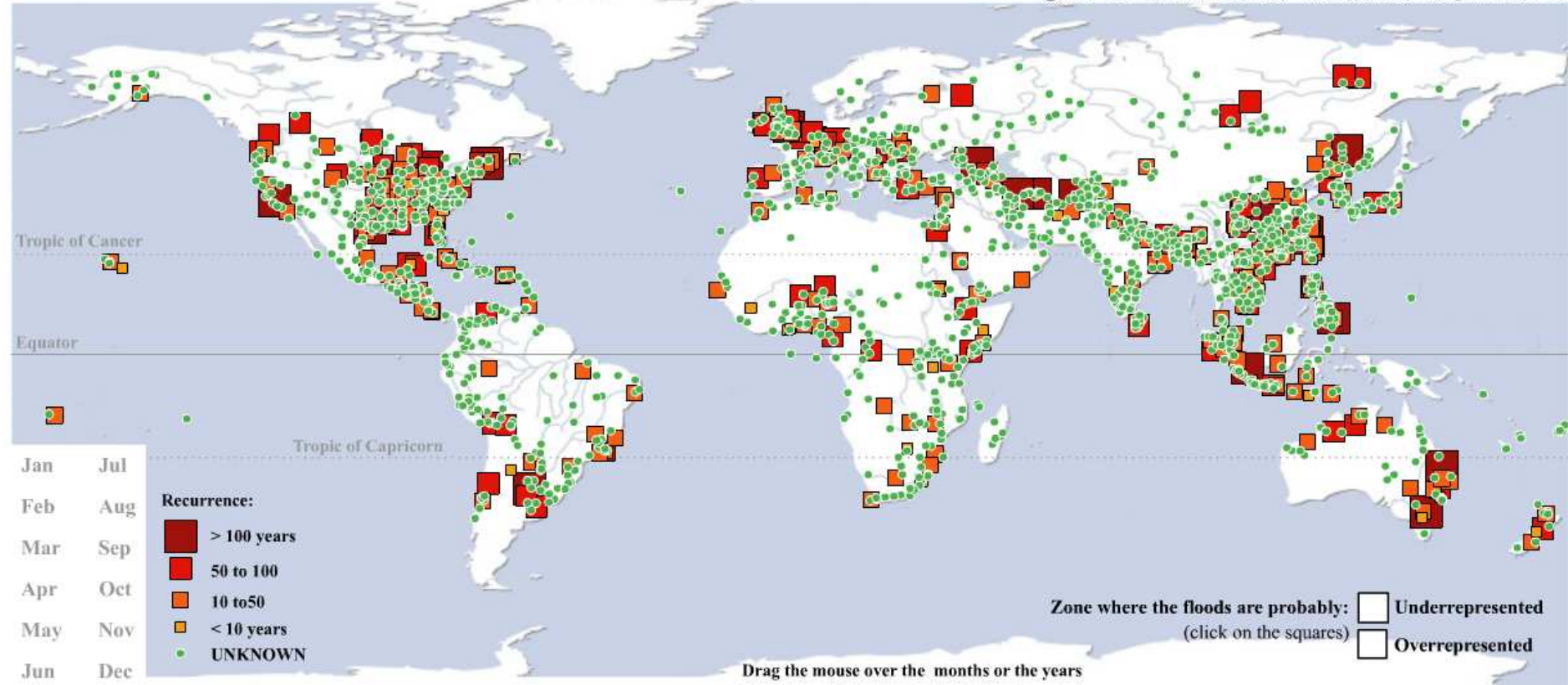
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- 1. Climate Change**
 - 2. Responding to Climate Change**
 - 3. Korea's Choice: KACCC**
 - 4. Climate Change Adaptation Networking**



The aftermath of Hurricane Katrina in Gulfport, Mississippi. Katrina was the costliest tropical hurricane in United States history.

Recurrence interval anecdotal of the floods (since 1985)

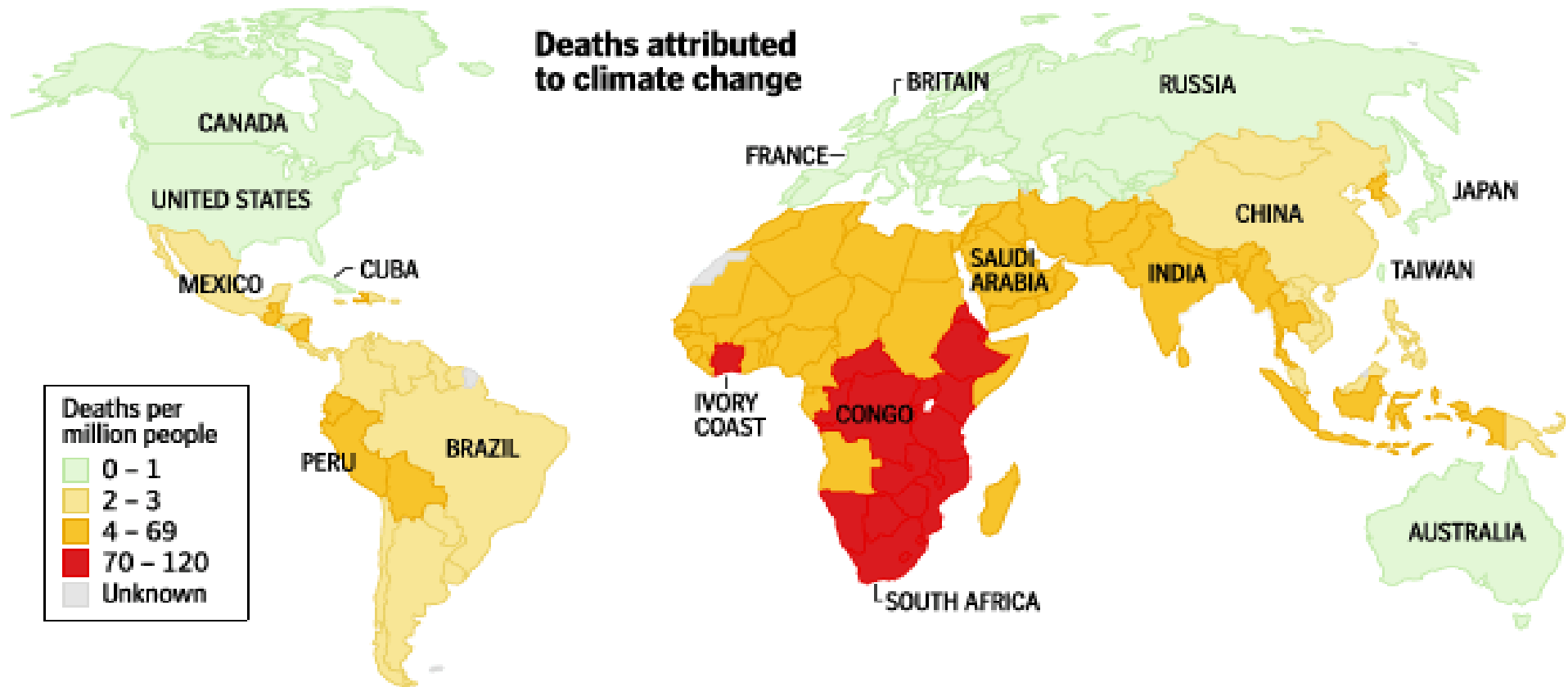
© 2003 - Dartmouth Flood Observatory - Work supported by NASA grant NAG5-9470



Recurrence interval of floods since 1985-2003

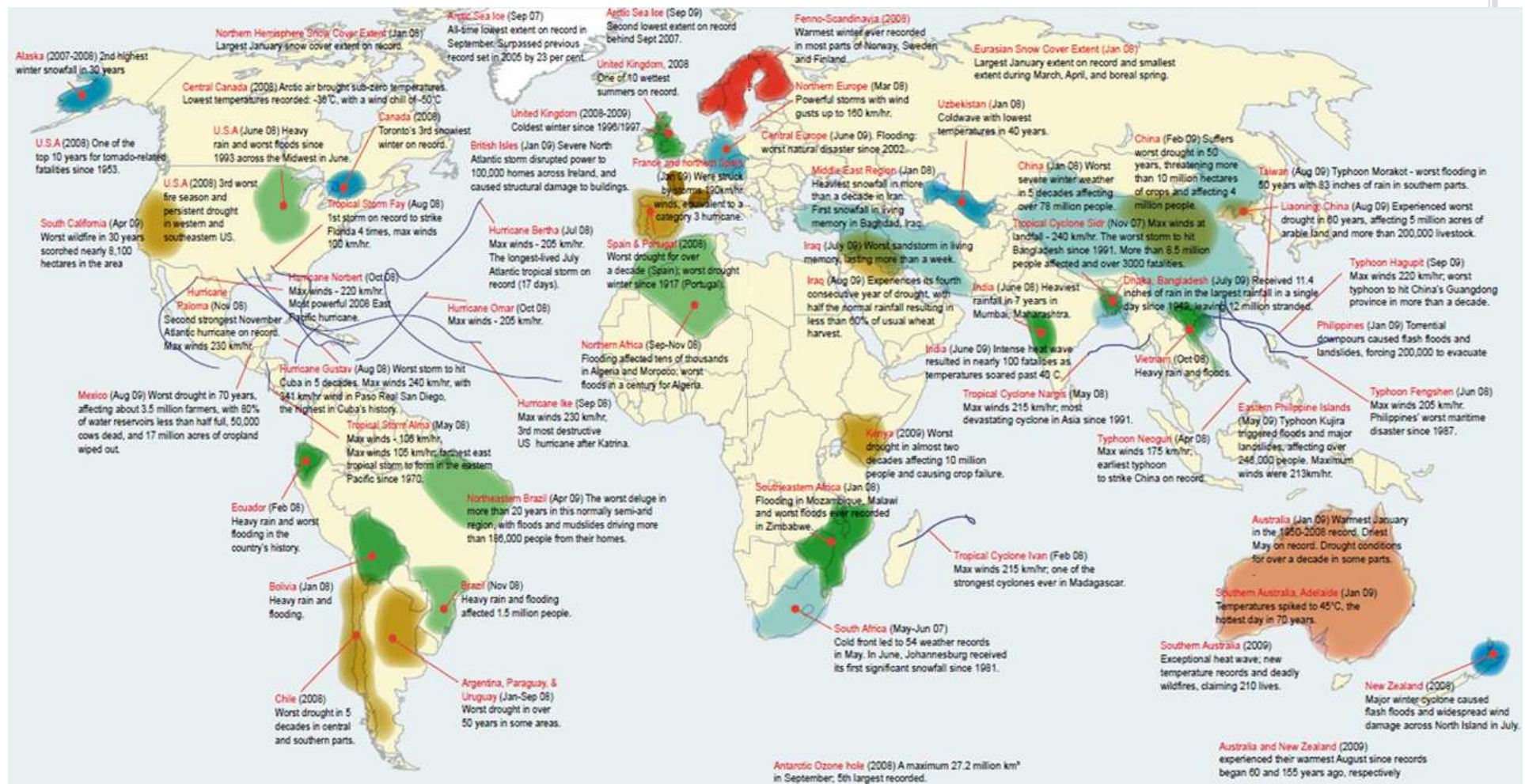
Deaths Attributed to Climate Change NOW

~~150,000~~ per year
300,000



Patz, Jonathan, et. al (November, 2005). Impact of regional climate change on human health. *Nature*, Vol. 438

Global Humanitarian Forum (May 2009). Human Impact Report, Climate Change

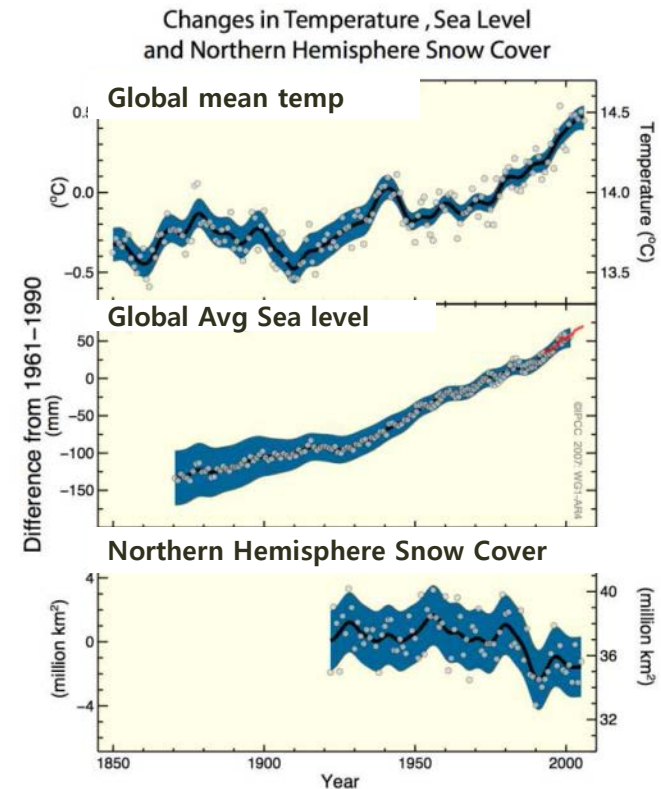
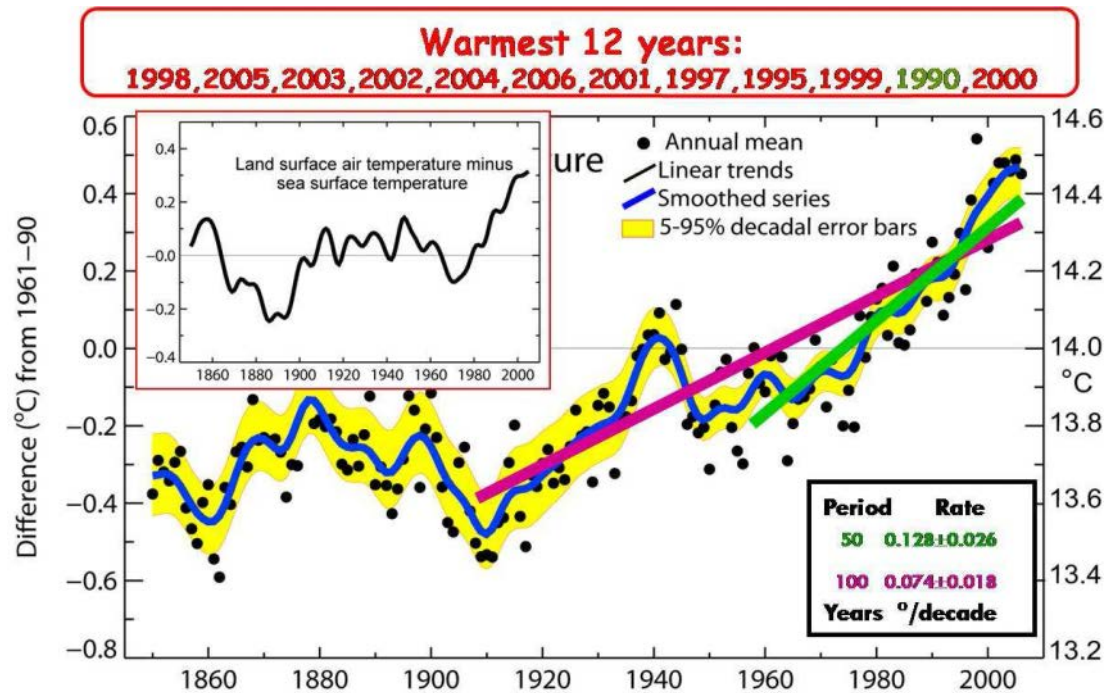


Significant climate anomalies from 2008/2009 (UNEP 2009)

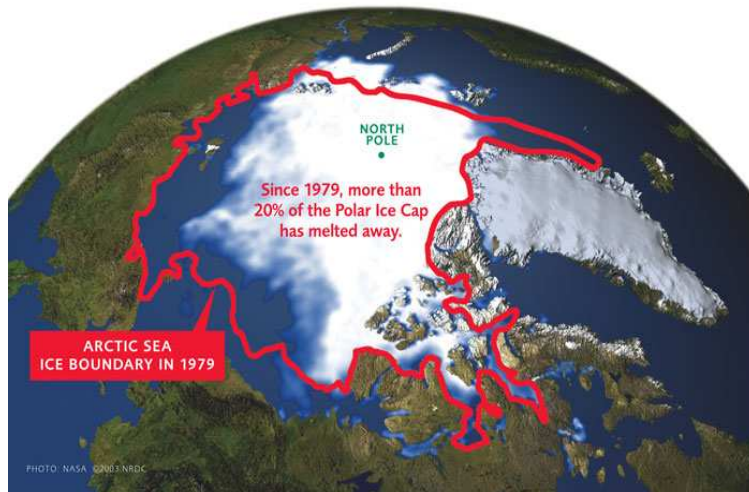
Extreme Weather Events vs Climate Change

Global Warming vs CO₂ Conc.

- **Global Warming** of the climate system is **unequivocal**
- **Global Warming** is **accelerating**



IPCC (2007)

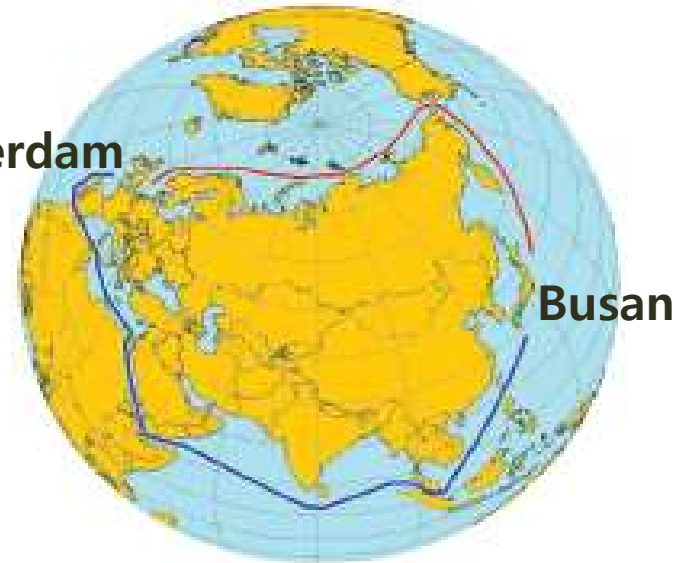


2100→2050→2013 ?



North Pole Route

Rotterdam



Busan

Busan KOR-Rotterdam NETH

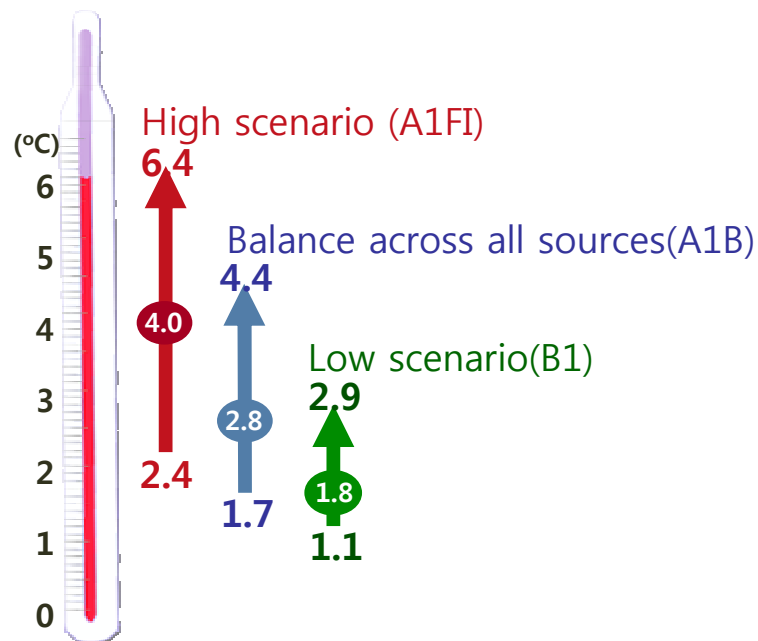
➡ 20100 Km (24 days)

➡ 12700 Km (14 days)

IPCC SRES Scenarios

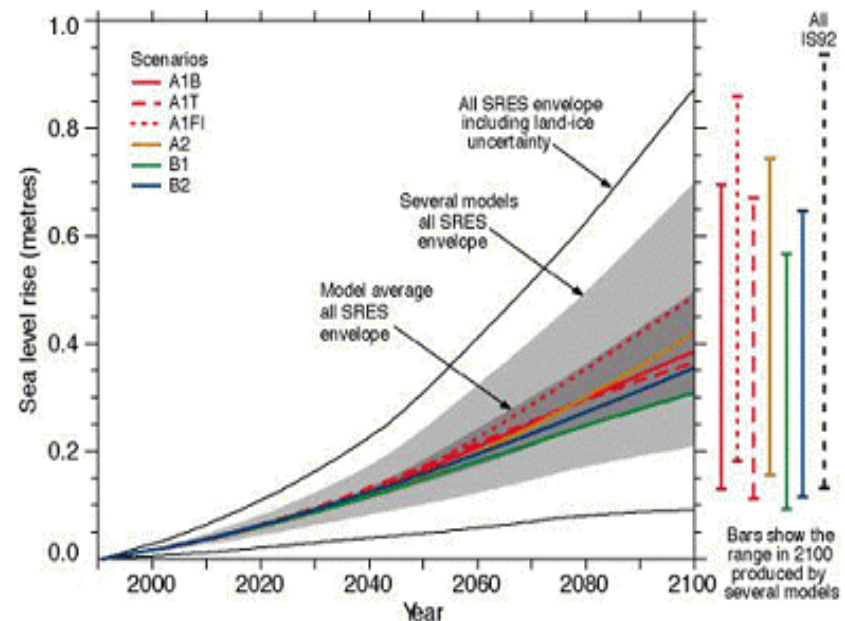
- Temperature change in 21C

Projection of 1.1 - 6.4°C rise



- Sea level rise at the end of 21C

Projection of 18 - 59cm rise



- Average temperature increased 0.45°C in the last 25 years,
- while it did 0.74°C in the last 100 years

Temp rise (°C)	Water	Food	Health	Land	Environment	Abrupt and Large-Scale Impacts
1°C	Small glaciers in the Andes disappear completely, threatening water supplies for 50 million people	Modest increases in cereal yields in temperate regions	At least 300,000 people each year die from climate-related diseases (predominantly diarrhoea, malaria, and malnutrition) Reduction in winter mortality in higher latitudes (Northern Europe, USA)	Permafrost thawing damages buildings and roads in parts of Canada and Russia	At least 10% of land species facing extinction (according to one estimate) 80% bleaching of coral reefs, including Great Barrier Reef	Atlantic Thermohaline Circulation starts to weaken
2°C	Potentially 20 - 30% decrease in water availability in some vulnerable regions, e.g. Southern Africa and Mediterranean	Sharp declines in crop yield in tropical regions (5 - 10% in Africa)	40 - 60 million more people exposed to malaria in Africa	Up to 10 million more people affected by coastal flooding each year	15 - 40% of species facing extinction (according to one estimate) High risk of extinction of Arctic species, including polar bear and caribou	Potential for Greenland ice sheet to begin melting irreversibly, accelerating sea level rise and committing world to an eventual 7 m sea level rise
3°C	In Southern Europe, serious droughts occur once every 10 years 1 - 4 billion more people suffer water shortages, while 1 - 5 billion gain water, which may increase flood risk	150 - 550 additional millions at risk of hunger (if carbon fertilisation weak) Agricultural yields in higher latitudes likely to peak	1 - 3 million more people die from malnutrition (if carbon fertilisation weak)	1 - 170 million more people affected by coastal flooding each year	20 - 50% of species facing extinction (according to one estimate), including 25 - 60% mammals, 30 - 40% birds and 15 - 70% butterflies in South Africa Collapse of Amazon rainforest (according to some models)	Rising risk of abrupt changes to atmospheric circulations, e.g. the monsoon Rising risk of collapse of West Antarctic Ice Sheet Rising risk of collapse of Atlantic Thermohaline Circulation
4°C	Potentially 30 - 50% decrease in water availability in Southern Africa and Mediterranean	Agricultural yields decline by 15 - 35% in Africa, and entire regions out of production (e.g. parts of Australia)	Up to 80 million more people exposed to malaria in Africa	7 - 300 million more people affected by coastal flooding each year	Loss of around half Arctic tundra Around half of all the world's nature reserves cannot fulfill objectives	
5°C	Possible disappearance of large glaciers in Himalayas, affecting one-quarter of China's population and hundreds of millions in India	Continued increase in ocean acidity seriously disrupting marine ecosystems and possibly fish stocks		Sea level rise threatens small islands, low-lying coastal areas (Florida) and major world cities such as New York, London and Tokyo		
More than 5°C	The latest science suggests that the Earth's average temperature will rise by even more than 5 or 6°C if emissions continue to grow and positive feedbacks amplify the warming effect of greenhouse gases (e.g. release of carbon dioxide from soils or methane from permafrost). This level of global temperature rise would be equivalent to the amount of warming that occurred between the last age and today - and is likely to lead to major disruption and large-scale movement of population. Such "socially contingent" effects could be catastrophic, but are currently very hard to capture with current models as temperatures would be so far outside human experience.					

Note: This table shows illustrative impacts at different degrees of warming. Some of the uncertainty is captured in the ranges shown, but there will be additional uncertainties about the exact size of impacts (more detail in Box 3.2). Temperatures represent increases relative to pre-industrial levels. At each temperature, the impacts are expressed for a 1°C band around the central temperature, e.g. 1°C represents the range 0.5 - 1.5°C etc. Numbers of people affected at different temperatures assume population and GDP scenarios for the 2080s from the Intergovernmental Panel on Climate Change (IPCC). Figures generally assume adaptation at the level of an individual or firm, but not economy-wide adaptations due to policy intervention (covered in Part V).

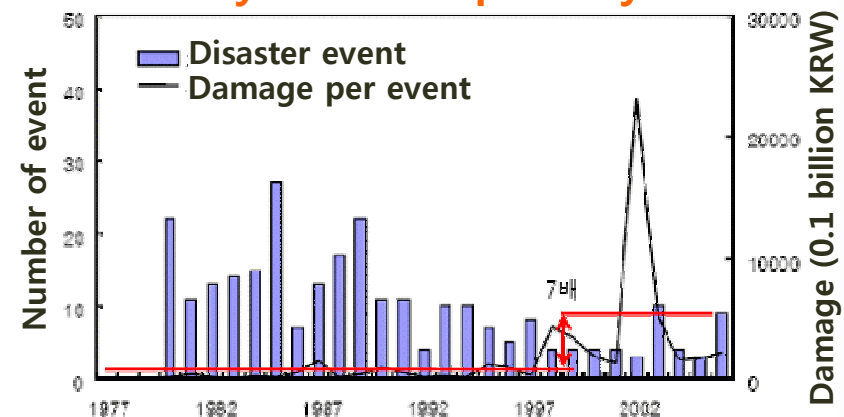
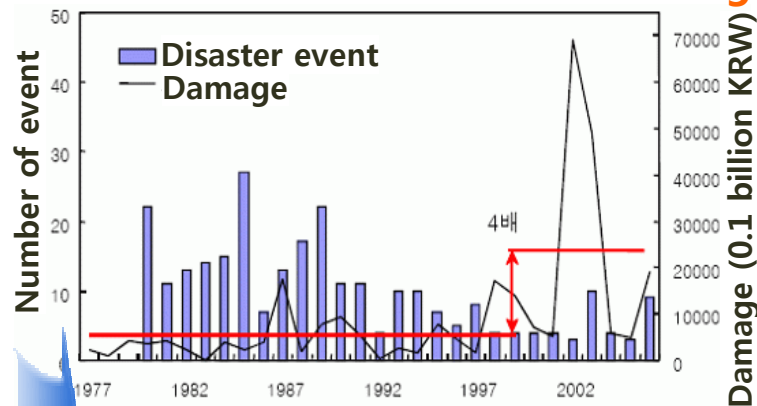
**Stern Review
(2006)**



- Average temperature of Korean peninsula increased by 1.5°C over the last 100 years.
- Sea level raised 22 cm (Jeju Island) since 1960's
- Shorter (one month) winter and longer (20 days) summer
- Increasing precipitation, but more variability in local-scale

Disaster damages

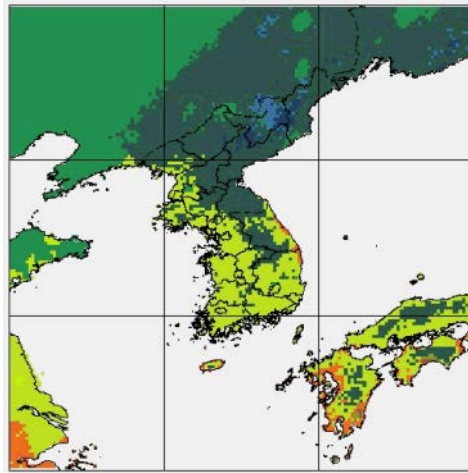
- Disaster events have been increasing since 2000
 - The events had been reduced by dam construction and levee reinforcement till 2000
 - But the typhoon, Rusa, at 2002 and other severe typhoons devastated several areas
- Food damages are increasing
 - The amount of flood damage increases by 3.2 times per 10 years



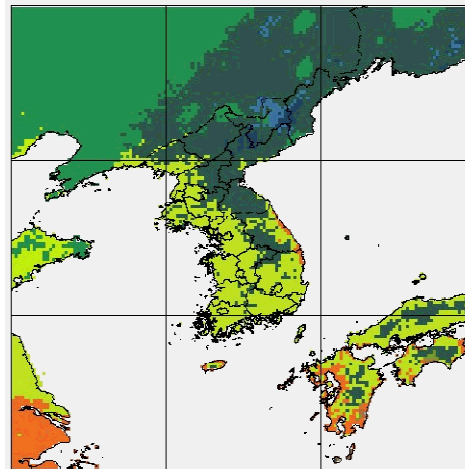
- The amount of damage per an event increased more rapidly than the total amount of damage
 - The damage intensity has been increasing

Vegetation Change by GCM

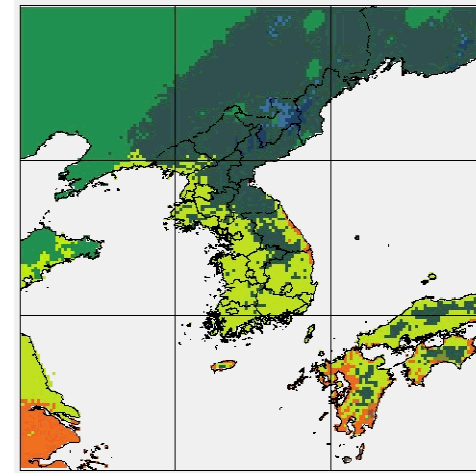
KEI, 2003



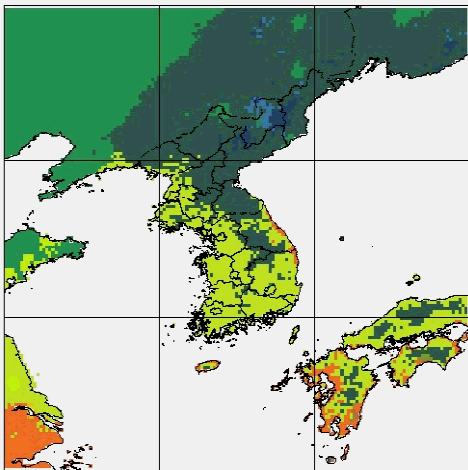
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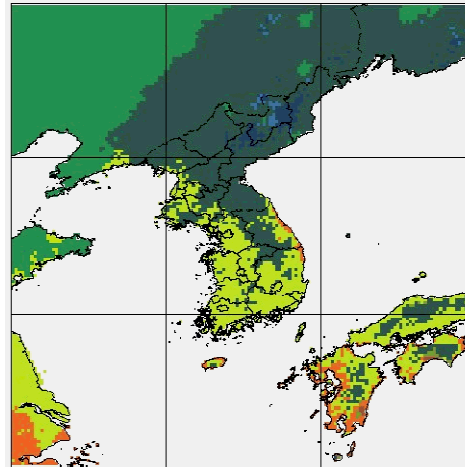
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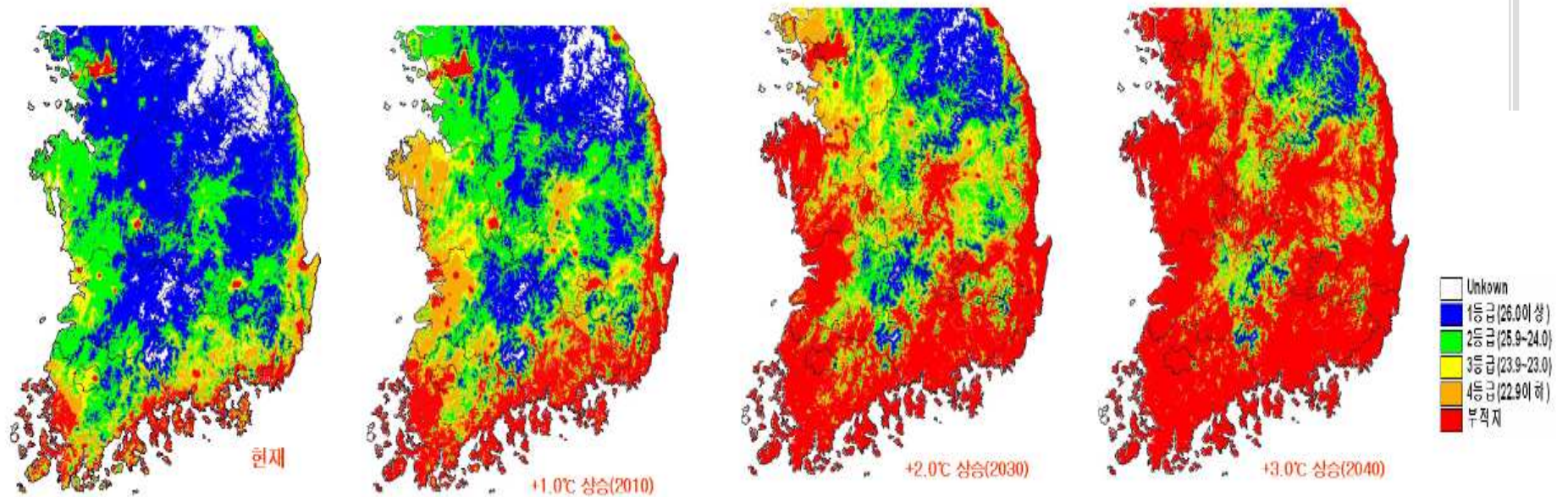
< HadCM2 >



< CCSR/NIES >

(Result of Holdridge Vegetation Classification by Climate Change in 2100 by GCM)

Apple Vegetation Change by climate change



(Suh, 2005)

Seashore erosion in Korea



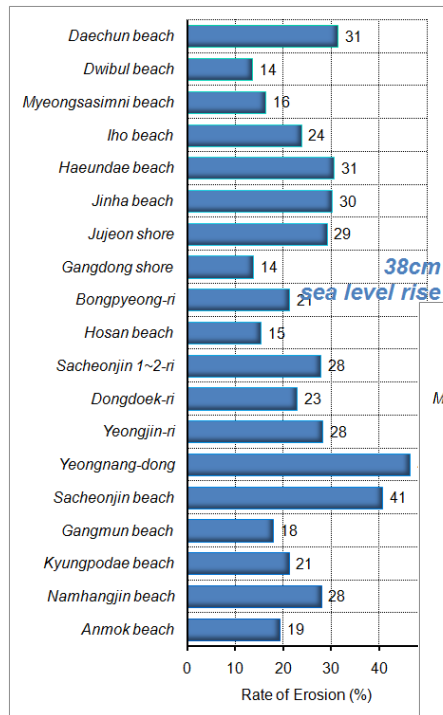
Nov 2006



Feb 2009

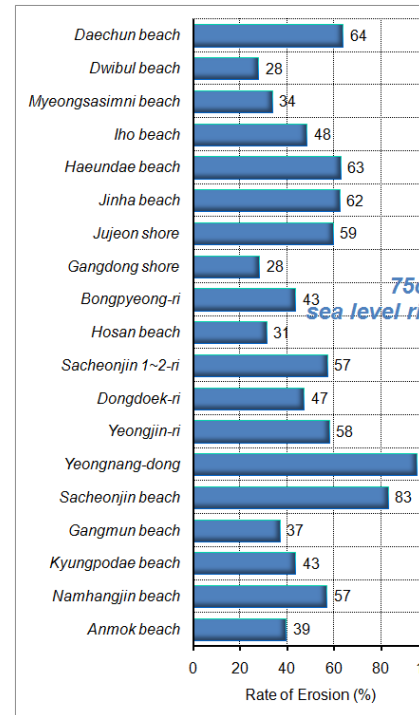
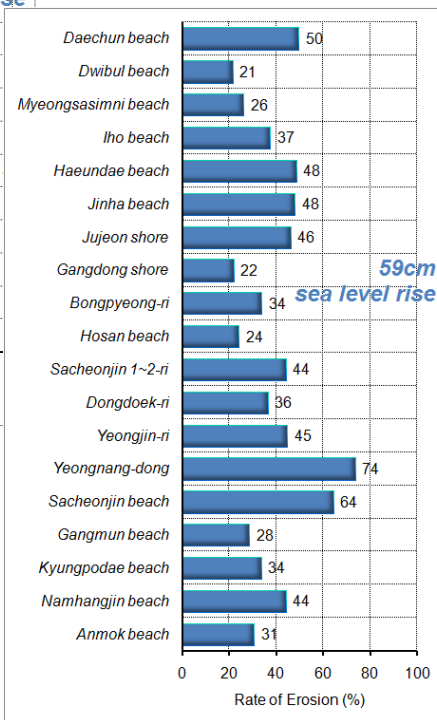
Gosung, Gangwon-Do

- Sea level rise of Korea from 1993 to 2008: 4.02 mm/yr
 - 30% higher than global mean (3.10 mm/yr)



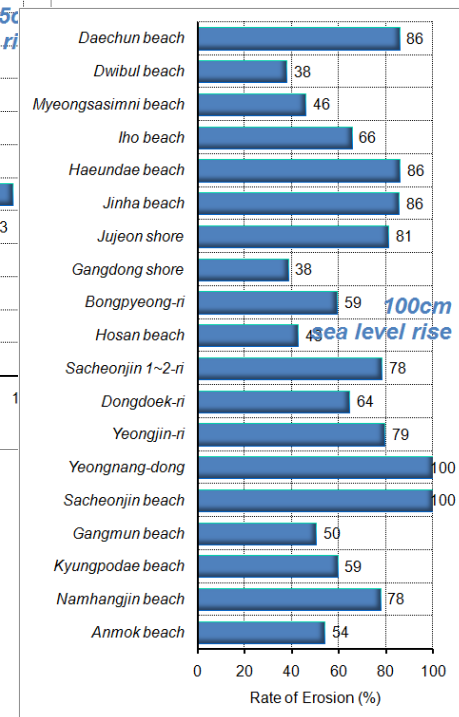
Average: 28%
(If sea level = 38 cm)

Average: 43%
(if 59 cm)

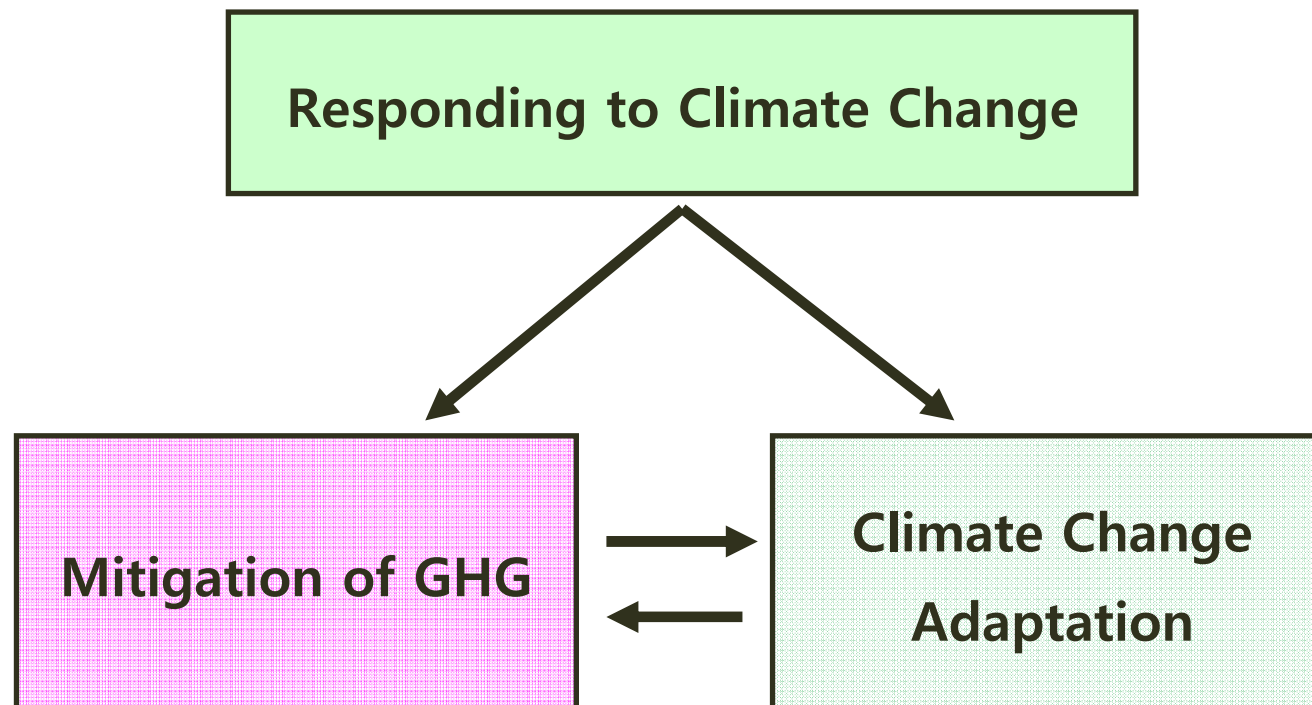


Average: 53%
(if 75 cm)

Average: 68%
(if 100 cm)



Strategy to Climate Change



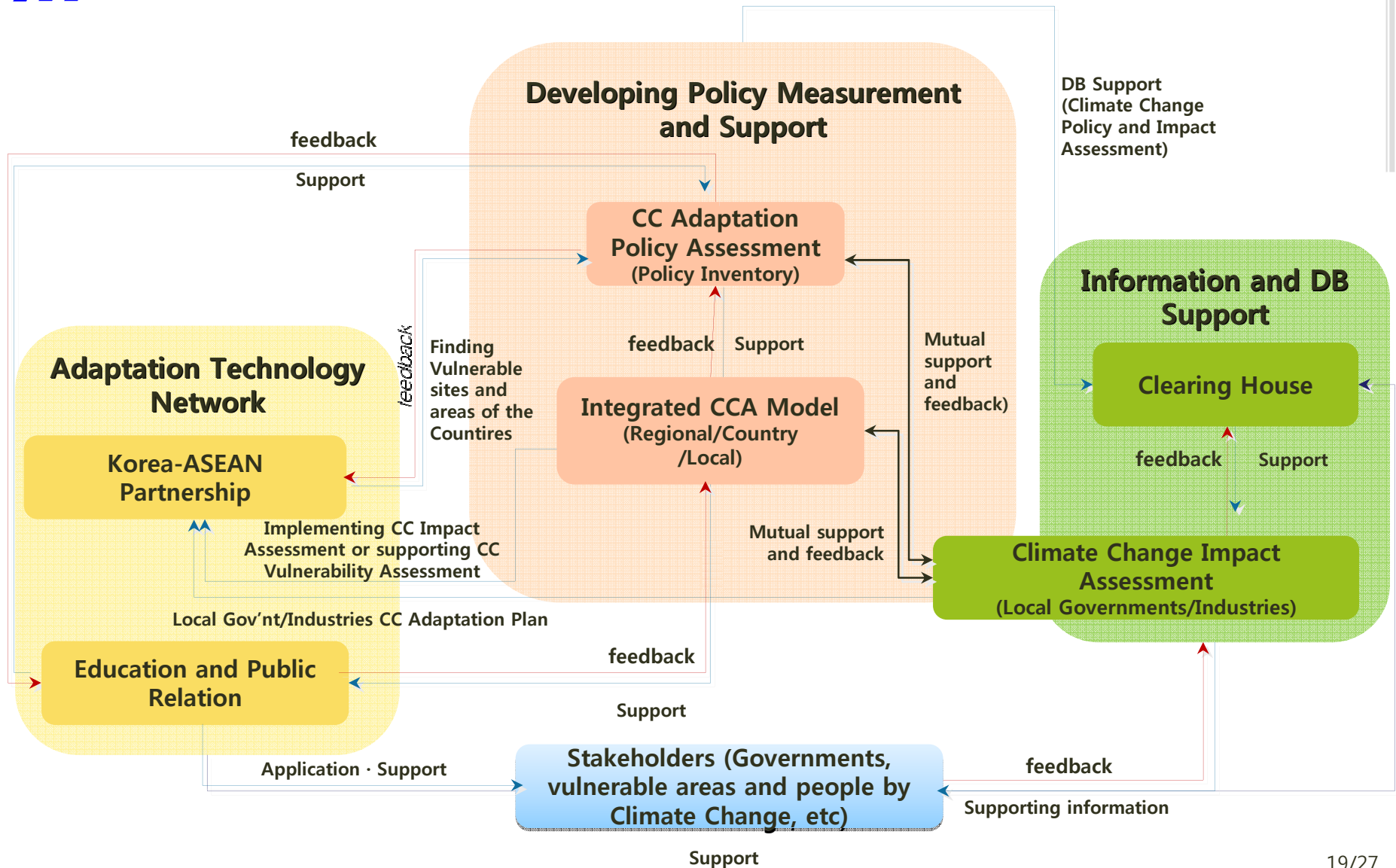
Adaptation policy to deal with unavoidable CC

- **Local benefits without long lead times in most cases**
 - Except some infrastructure decisions, climate system researches, climate-resilient crops and technologies
- **Additional costs of \$15-150bn/yr (0.05-0.5% of GDP)**
 - New infrastructure and buildings resilient to CC in OECD
- **Key areas of government's role**
 - High-quality climate information and risk management tools
 - CC consideration in land-use planning and performance standards
 - Long-term policies for climate-sensitive public goods, including natural resources protection, coastal protection, and emergency preparedness
 - Financial safety net for the poorest, including insurance

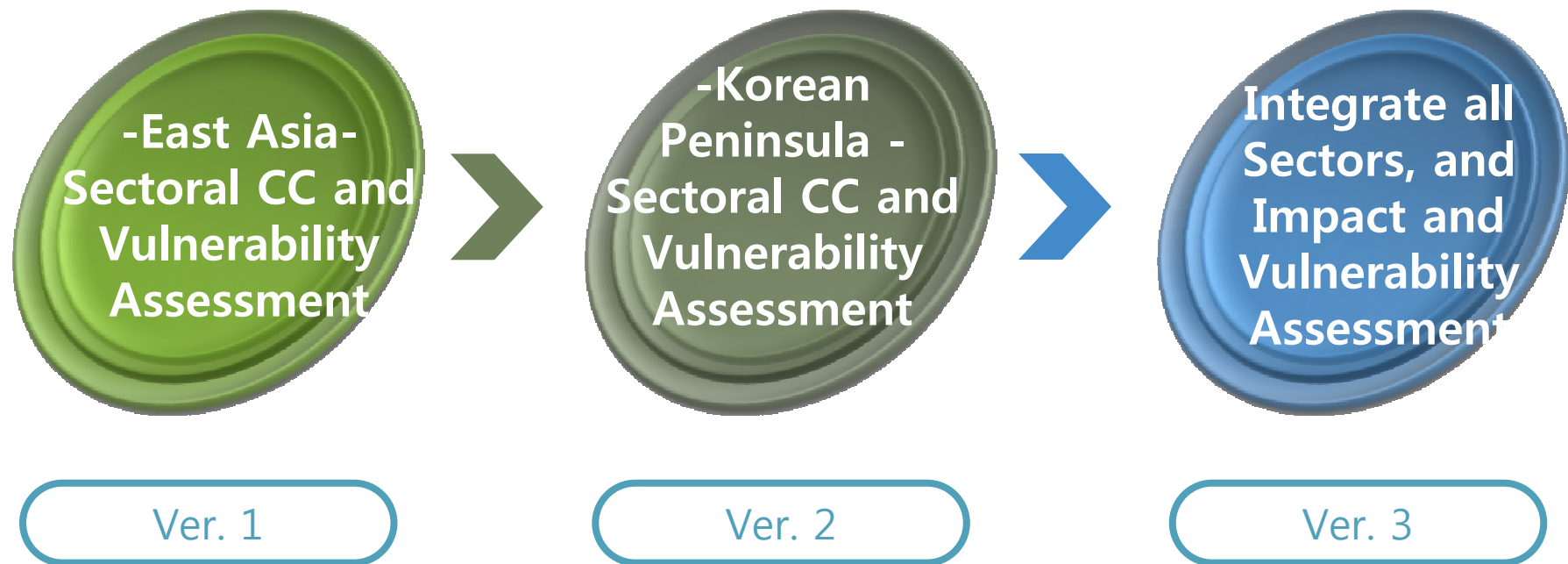
»» Establishing Korea Adaptation Center for Climate Change

- In Sep 2008, Climate Change Committee in the Prime Ministry adopted the “Climate Change Responding Comprehensive and Basic Plan” which stated establishment of a master plan for the “Comprehensive Plan for National Climate Change Adaptation”
- In “The Comprehensive Plan for National Climate Change Adaptation”, establishment of the Korea Adaptation Center for Climate Change (KACCC) was declared to achieve the objective of the Climate Change Adaptation
- In July 2009, both the Ministry of Environment and KEI agreed to establish the KACCC in KEI

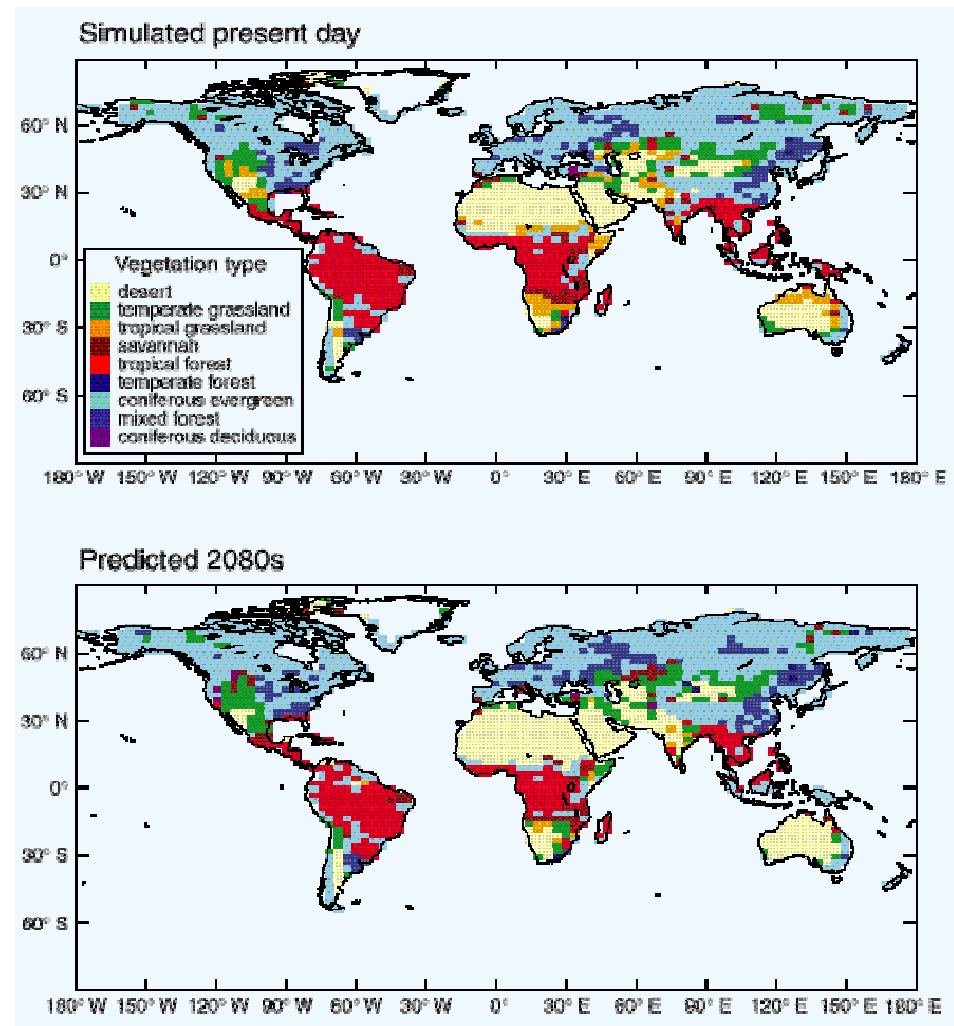
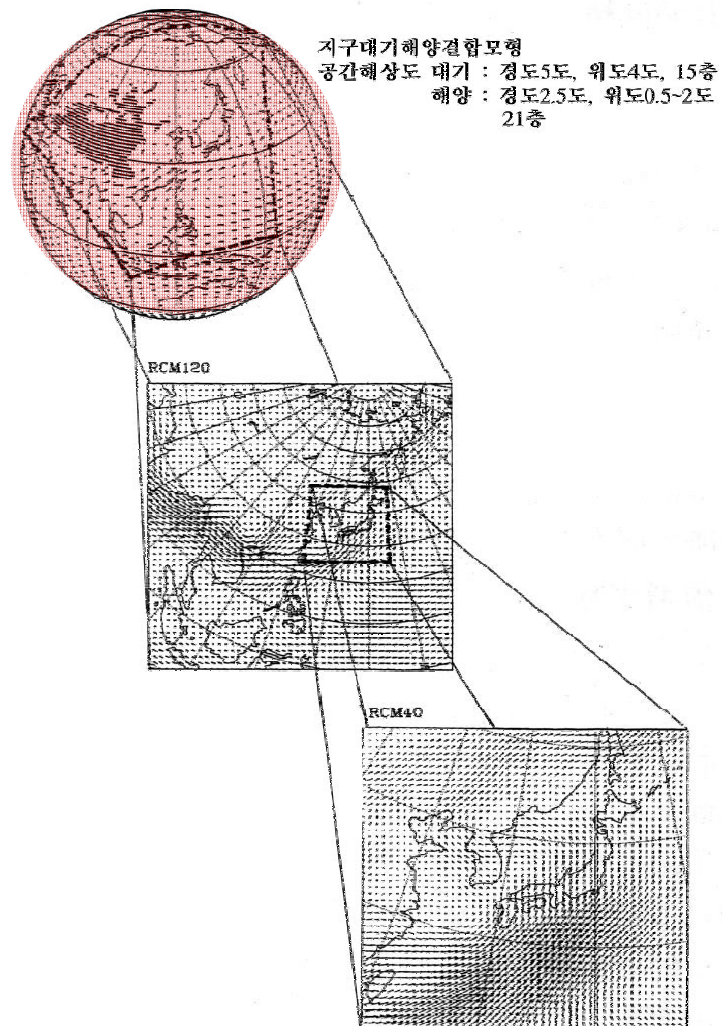
Climate Change Adaptation Research Scheme of KACCC



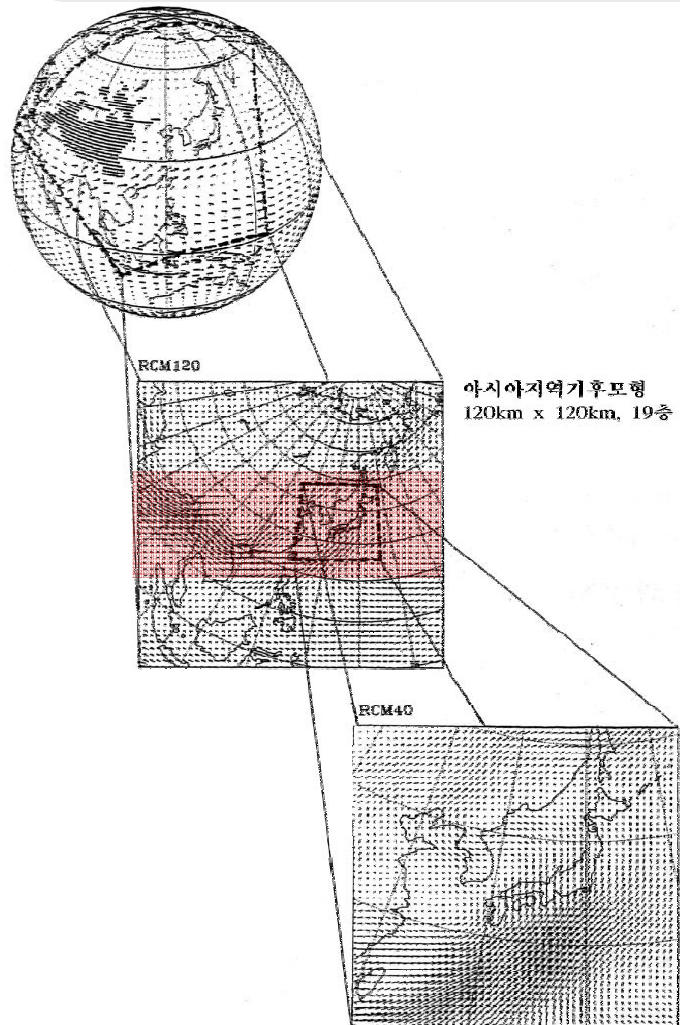
Integrated Model



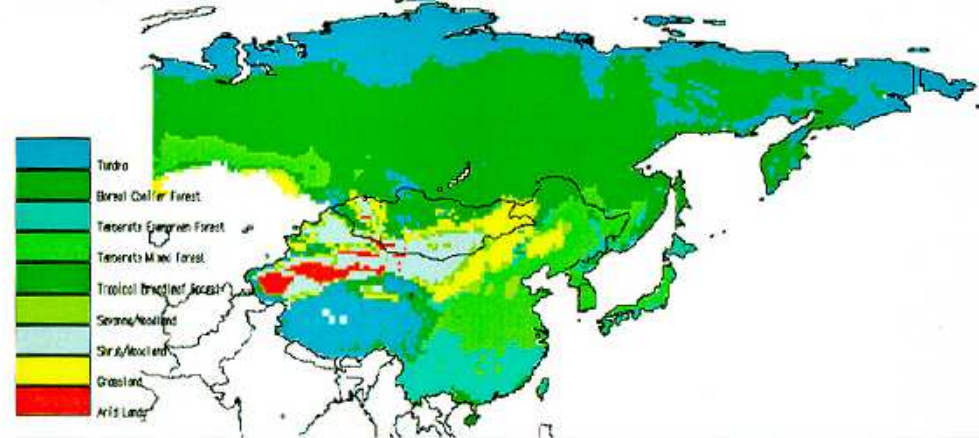
Global Scale



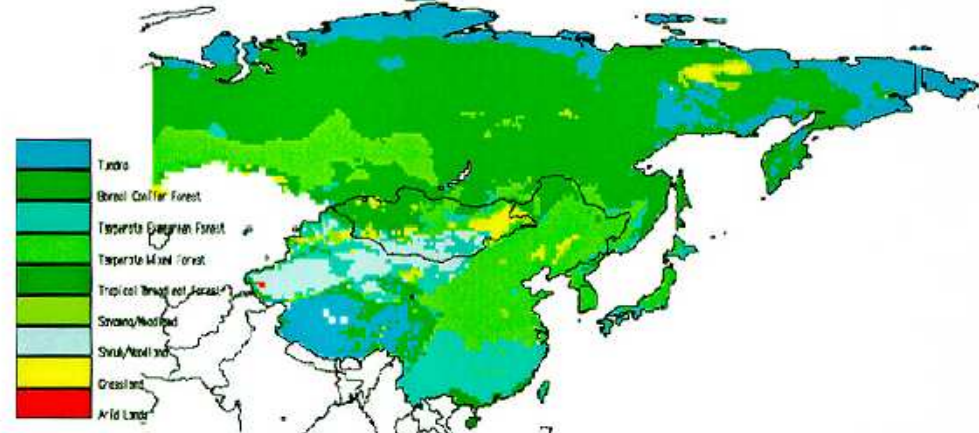
Integrated Model_Ver.1 East Asia



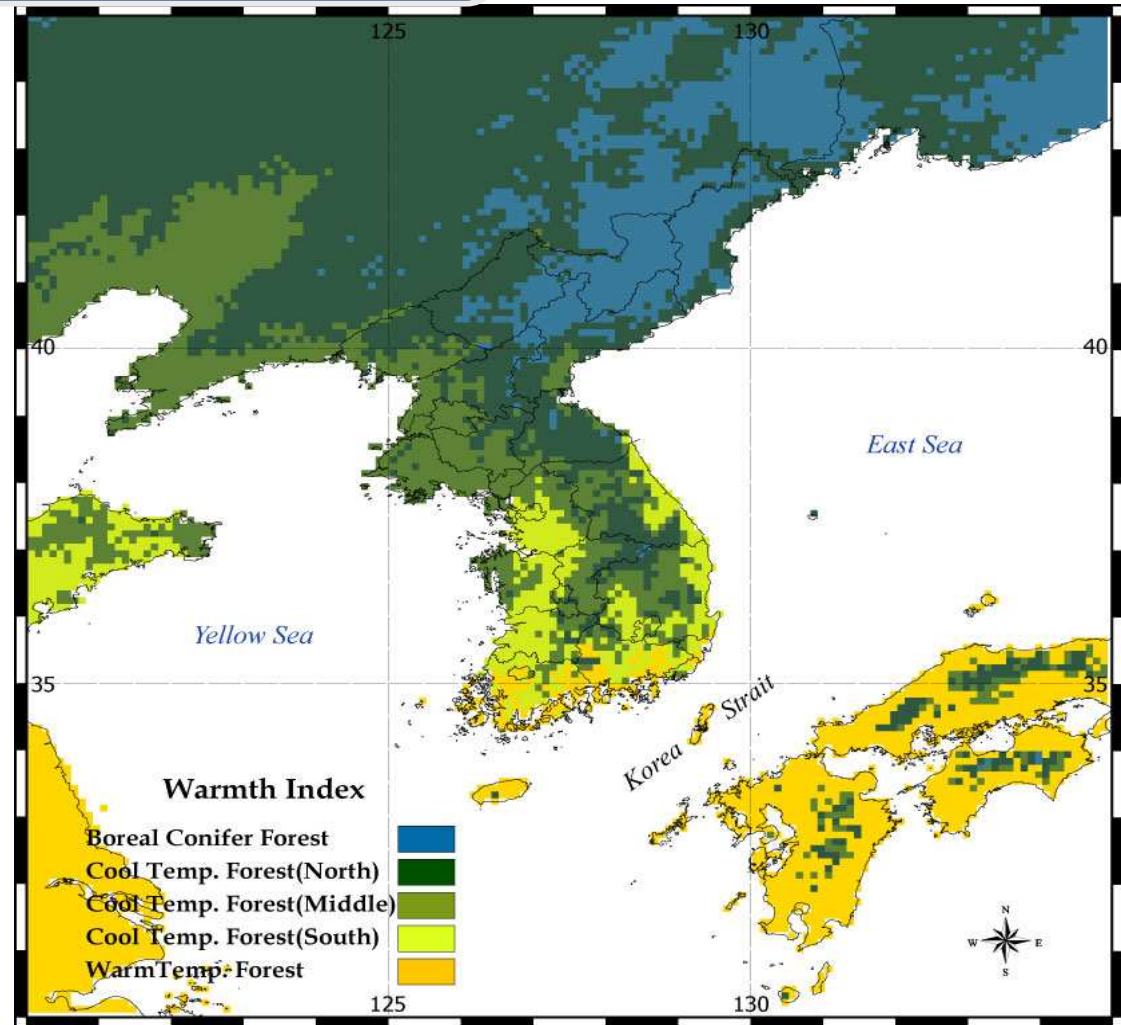
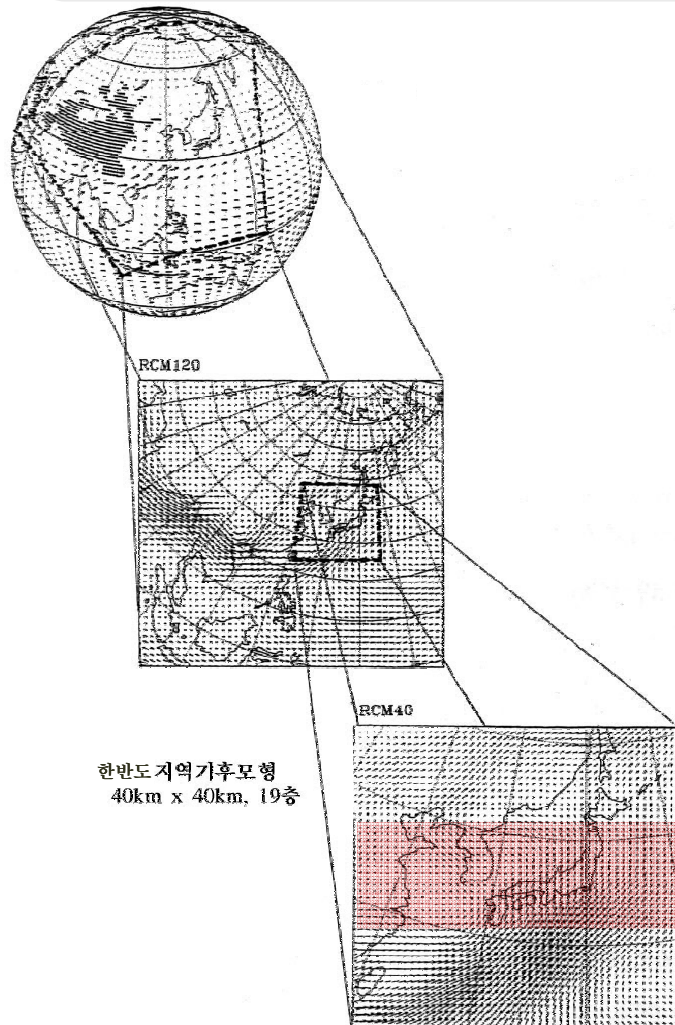
BIOME3-Control, Veg. Classes.



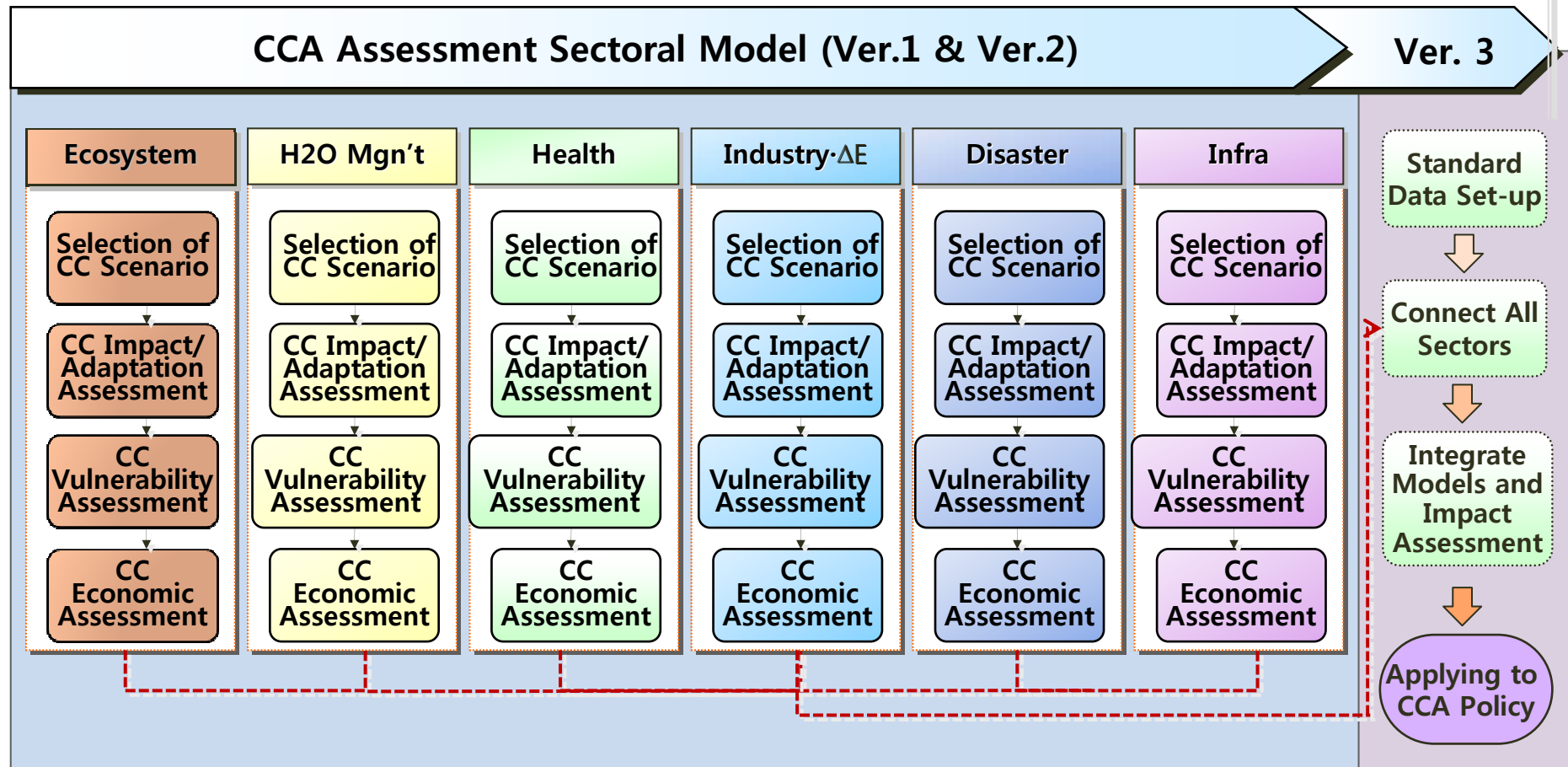
BIOME3-2xCO2



Integrated Model_Ver.2 Korean Peninsula

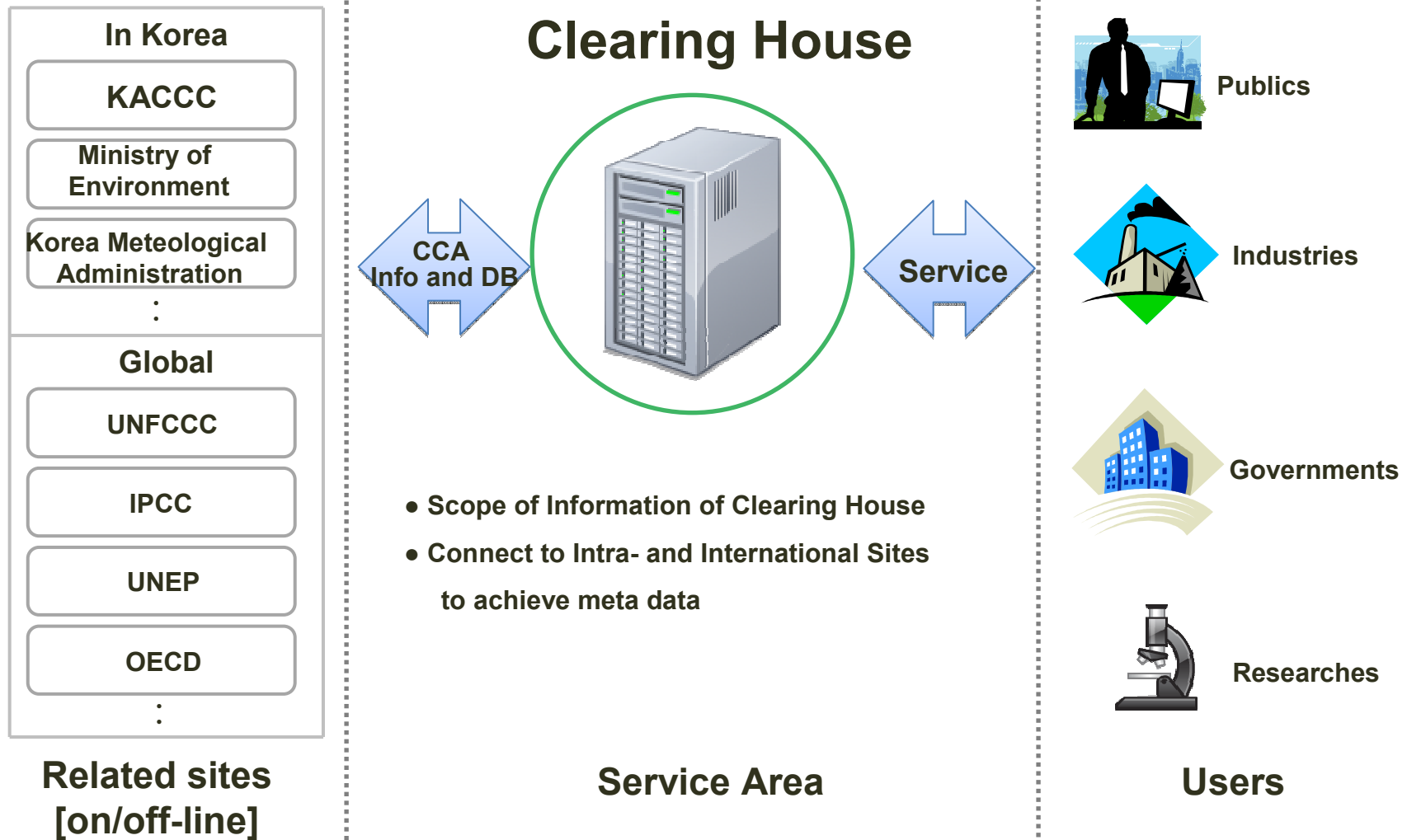


Climate Change Adaptation Integrated Model

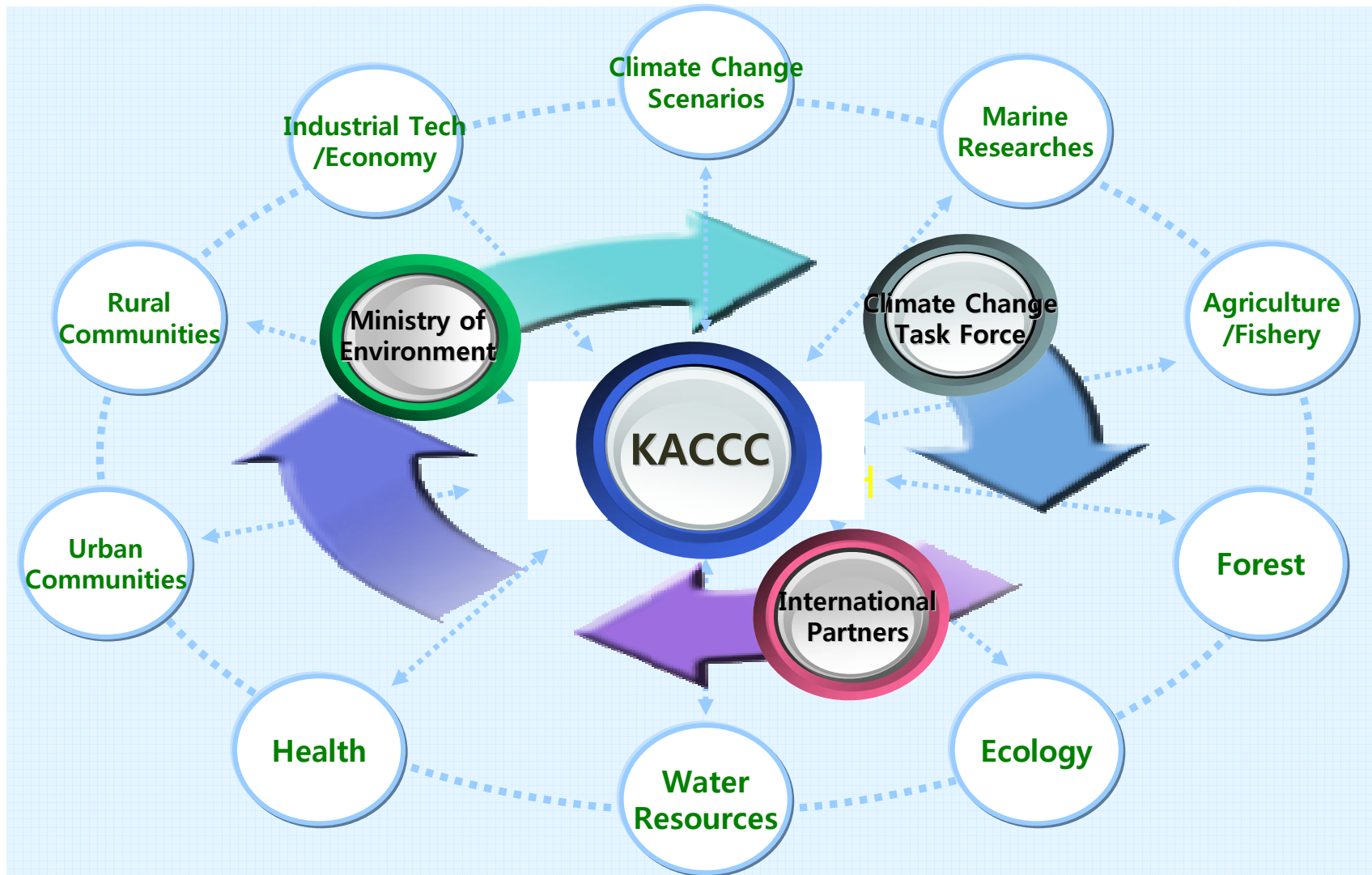


※ Sectoral Application based on the Comprehensive Plan for National Climate Change Adaptation

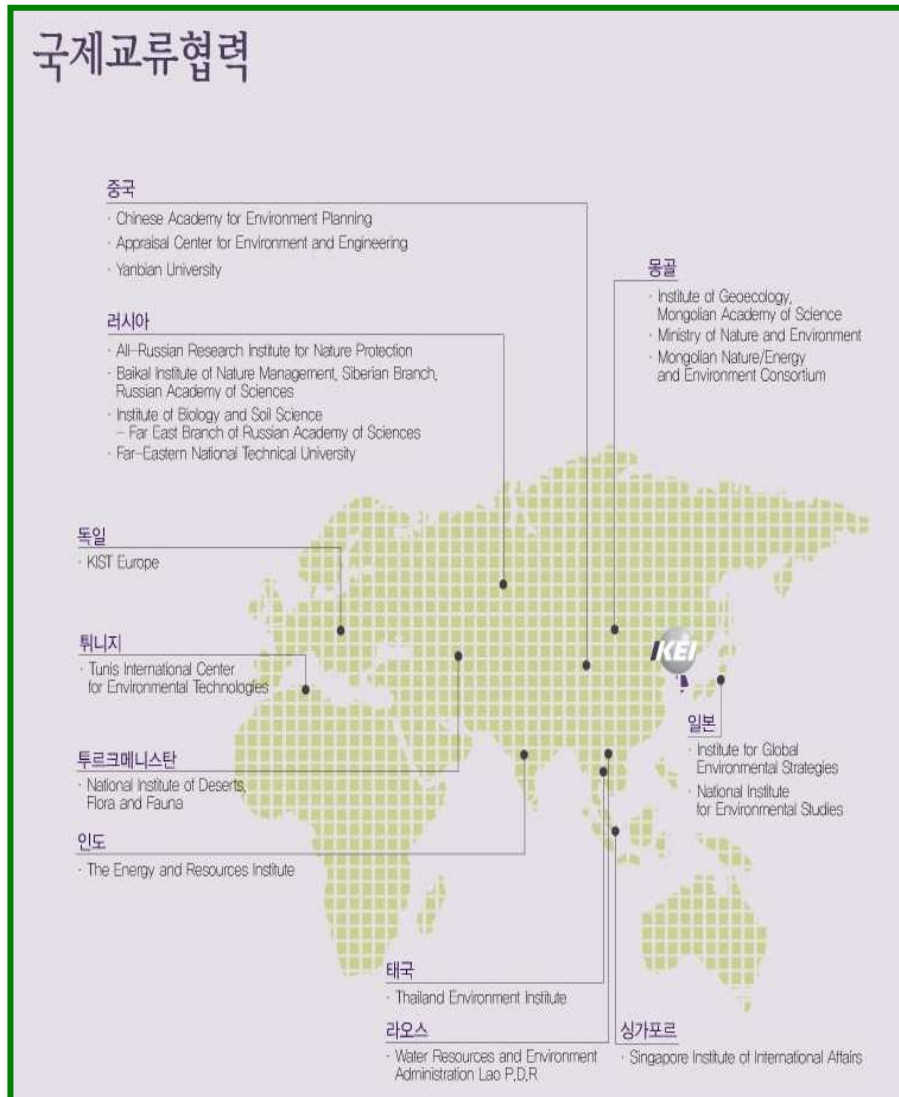
Climate Change Adaptation Clearing House



Collaboration Fields



International Cooperation



- International Cooperation with KEI

- Building research networks
- Policy development & conference
- Education and capacity building

- Current Organizations working with KEI

- ASIA: 16 (Japan, China, Russia, Mongol, etc)
- EUROPE: 1 (Germany)
- Africa: 1 (Tunisia)
- America: 2 (USA, Canada)
- UNEP, World Bank, OECD, PEMSEA, IAIA
- Korea Polar Research Institute
- 13 Research Institutes, Industries, Univ
- International correspondents: 8 countries
 - Canada, Japan, Germany, Brazil
 - England, USA, Australia, China,

Thank you