



GLOSSARY OF TERMS

5 **Climate Change Scenario:** A plausible description of how the future may develop based on a coherent and internally consistent set of assumptions about key driving forces (e.g., rate of technological change, prices) and relationships. Note that scenarios are neither predictions nor forecasts, but are useful to provide a view of the implications of developments and actions..

6 **Sea Level Rise:** is the rise in the average height of the oceans over the entire globe at a single point in time, it does not include ocean tides, storm surge. Sea level rise at a specific location in the ocean may be higher or lower than the global mean because of differences in ocean temperature and other effects.

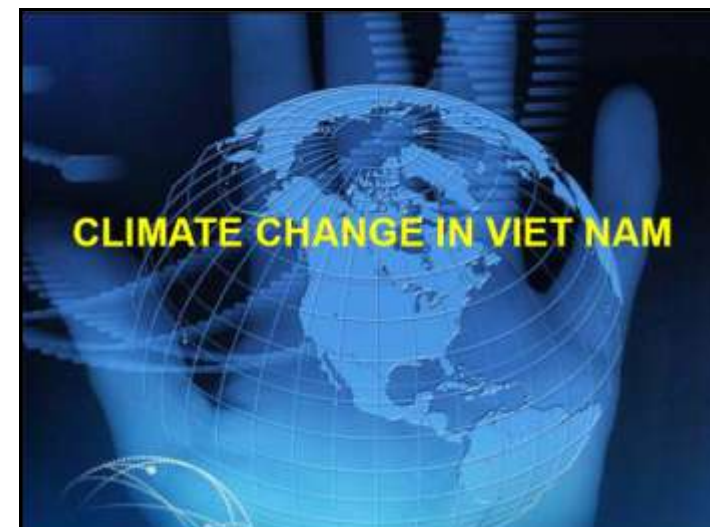
GLOSSARY OF TERMS

1 **CC:** Change in the state of the climate identified by changes in the mean or variability of its properties. CC may be due to natural internal processes or external forcing, or to persistent anthropogenic changes in the composition of the atmosphere or in land use.

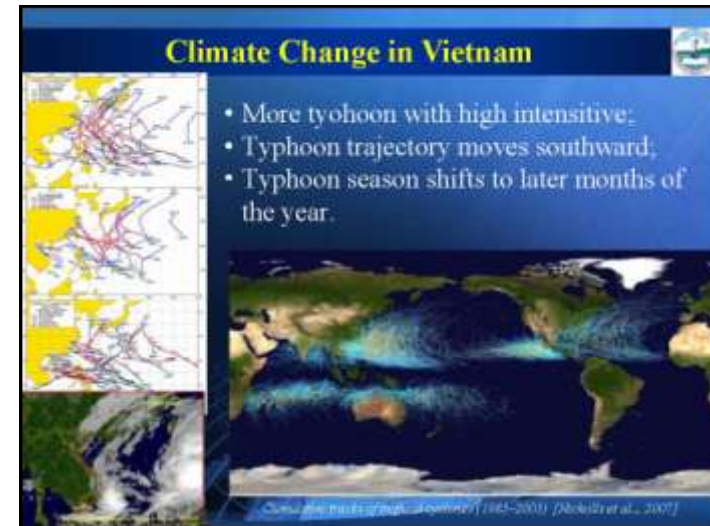
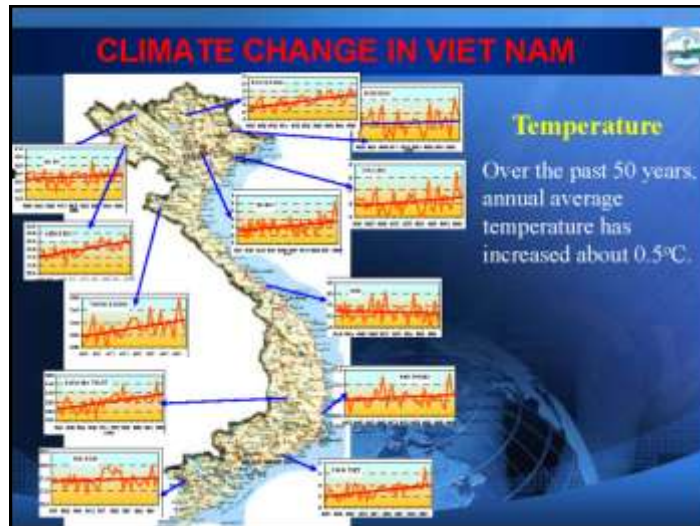
2 **Respond to CC:** Human activities aiming at climate change adaptation and climate change mitigation.

3 **Adaptation:** Adjustments in natural or human systems, intended to reduce vulnerability to actual or anticipated CC variability or exploit beneficial opportunities.

4 **Mitigation:** Actions resulting in reductions to the degree or intensity of GHG emissions.





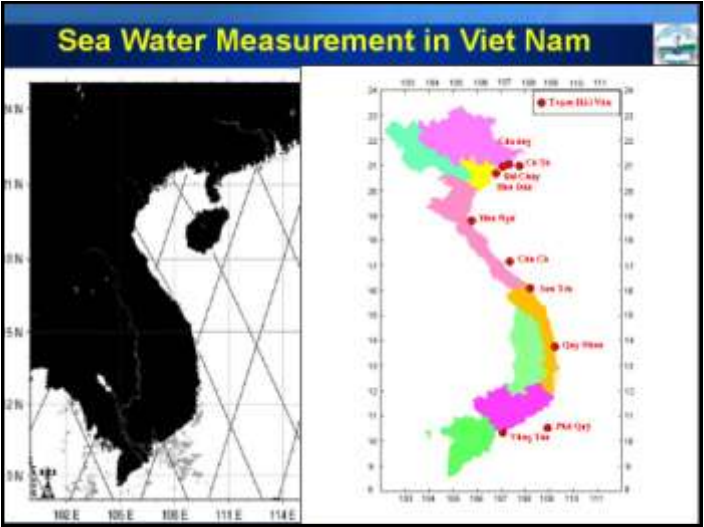
2. Climate Change in Vietnam and Response



2. Climate Change in Vietnam and Response

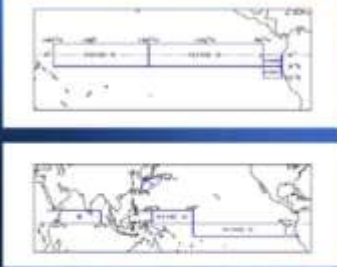
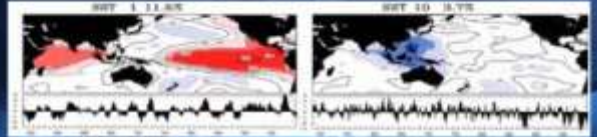
Climate Change in Vietnam

- Number of hot wave is more in 1991 - 2000, especially in the Central and South;
- Off-season extreme rainfall events occur more frequently. More profound are events in November in Ha Noi and surround in 1984, 1996, 2008.

Climate Change in Vietnam

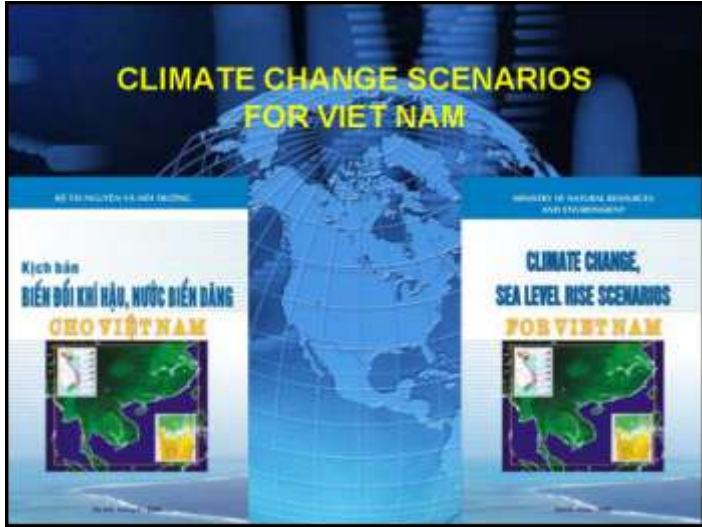
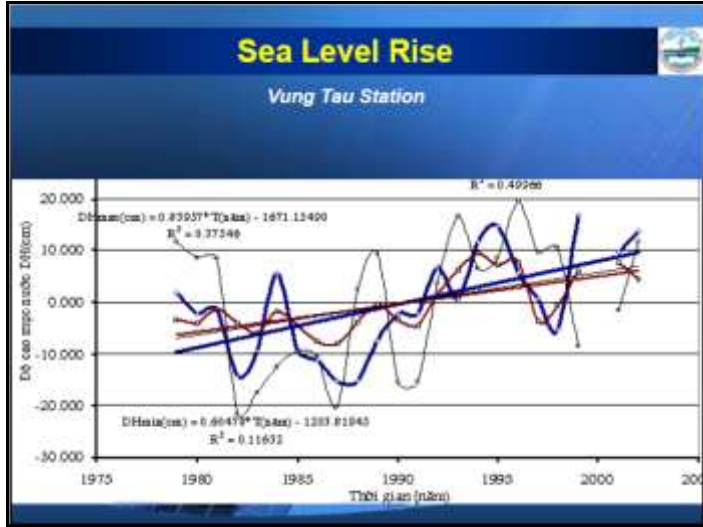
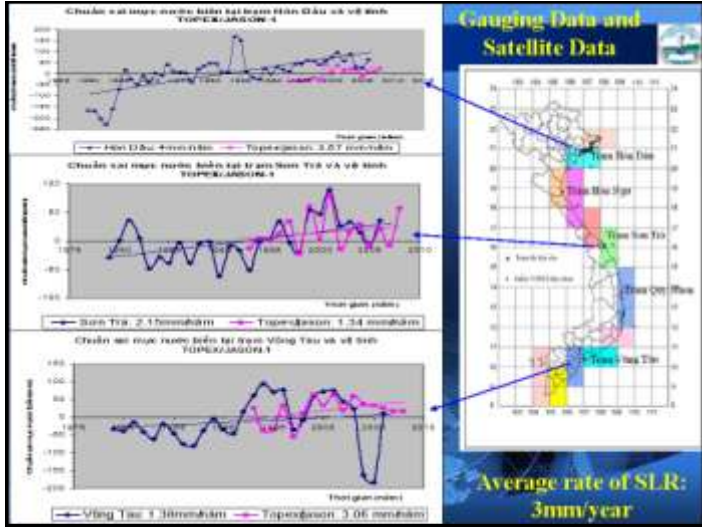
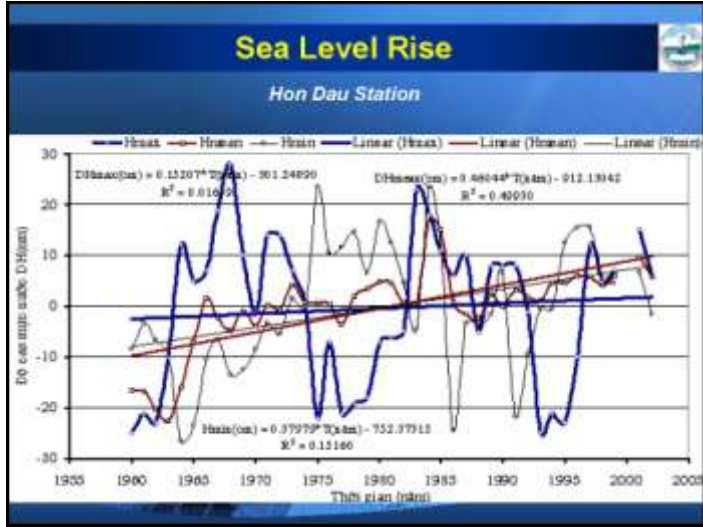
ENSO has stronger effects on weather and climate in Viet Nam

Tidal Gauge with more than 20 years of Records

No	Station	Latitude	Longitude	Record
1	Cua Ong	21°01'	107°21'	1961 - now
2	Co To	20°59'	107°46'	1958 - now
3	Bai Chay	20°57'	107°04'	1927 - now
4	Hon Dau	20°40'	106°48'	1960 - now
5	Hon Ngu	18°48'	105°46'	1962 - now
6	Con Co	17°10'	107°22'	1974 - now
7	Son Tra	16°06'	108°13'	1979 - now
8	Quy Nhon	13°46'	109°15'	1976 - now
9	Phu Quy	10°31'	108°56'	1979 - now
10	Vung Tau	10°20'	107°04'	1979 - now

2. Climate Change in Vietnam and Response



2. Climate Change in Vietnam and Response

Targets set by the NTP

1. "Complete CC scenarios, especially SLR, in VN by early 2009 based on existing studies so that sectors and localities can use the scenarios to develop their action plans to respond to CC";
2. "By the end of 2010, update CC scenarios, especially SLR, for each period between 2010-2100. The scenarios must have a solid scientific and practical basis";
3. "By 2015, Update CC scenarios, especially SLR, in Vietnam".

Human have emitted excessive greenhouse gas to the atmosphere through activities such as industry, agriculture, transportation, deforestation... hence, **the basis to greenhouse gas emission scenarios are:**

- Development at global scale;
- Population and consumption;
- Income and way of life;
- Energy consumption and energy recourses;
- Technology transfer; and
- Land use change;...

Objectives

- To provide basic information of the future trends of CC and SLR in Vietnam, corresponding to different scenarios of global socio-economic development which cause different emission rates of GHG.
- Preliminary basis for ministries, sectors and provinces to assess CC impacts on socio-economic sectors, to develop and implement their respective action plans for responding CC.

Greenhouse Gas Emission Scenarios

- **A1 family:** Rapid economic growth; Population reaches 19 bill. in 2005 then gradually declines; Quick spread of **new and efficient technology**; A convergent world-income, way of life converge between regions, Extensive social and cultural interactions worldwide:
 - A1FI: An emphasis on fossil fuels (high);
 - A1B: Balanced emphasis on all energy sources (medium);
 - A1T: Emphasis on non-fossil energy sources (low).
- **A2 family:** world of independently operation; Continuously increasing population. Regionally-oriented economic development. Slower and more fragmented technological changes and improvements to per capita income (high).

2. Climate Change in Vietnam and Response

Greenhouse Gas Emission Scenarios

- **B1 family:** Rapid economic growth as in A1, but with rapid changes toward a service and information economy; Reductions in material intensive and the introduction of clean and resources efficient technologies; An emphasis on global solutions to economics, social and environment stability (low).
- **B2 family:** Continuously increasing population, but at a slower rate than in A2; Emphasis on local rather than global solutions to economic, social and environmental stability; Intermediate levels of economic development; Less rapid and more fragmented technological changes than in B1 and A1 (medium).

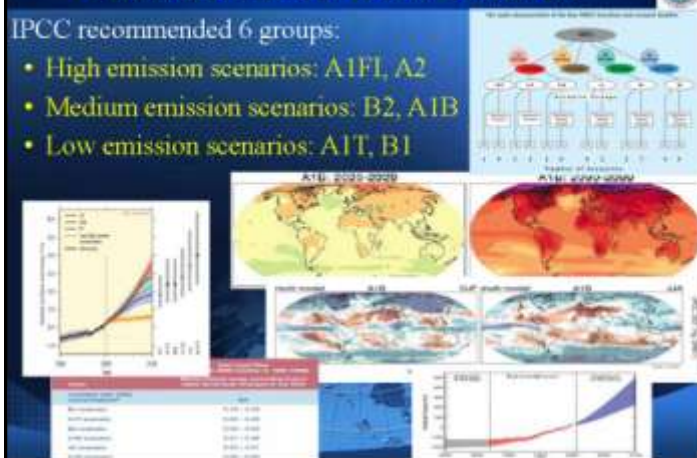
Method Used for Scenario Development

- 1) Ensemble Global Climate Models (GCM)
- 2) Dynamic Downscaling
- 3) Statistical Downscaling,
- 4) Others (chart, interpolation,...)

Greenhouse Gas Emission Scenarios

IPCC recommended 6 groups:

- High emission scenarios: A1FI, A2
- Medium emission scenarios: B2, A1B
- Low emission scenarios: A1T, B1



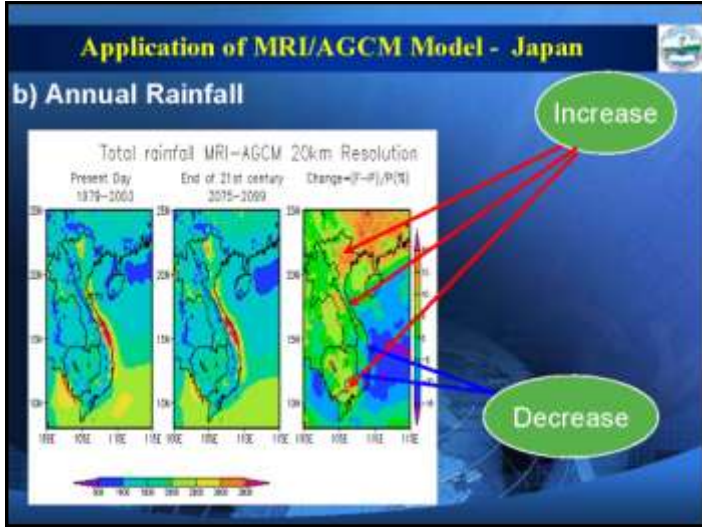
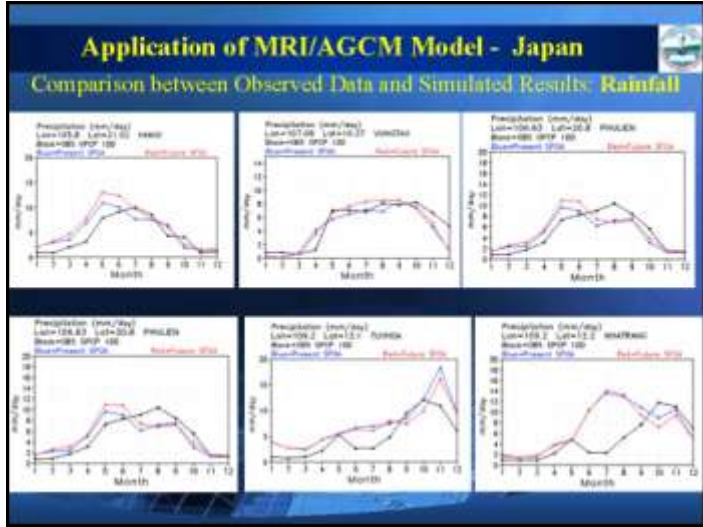
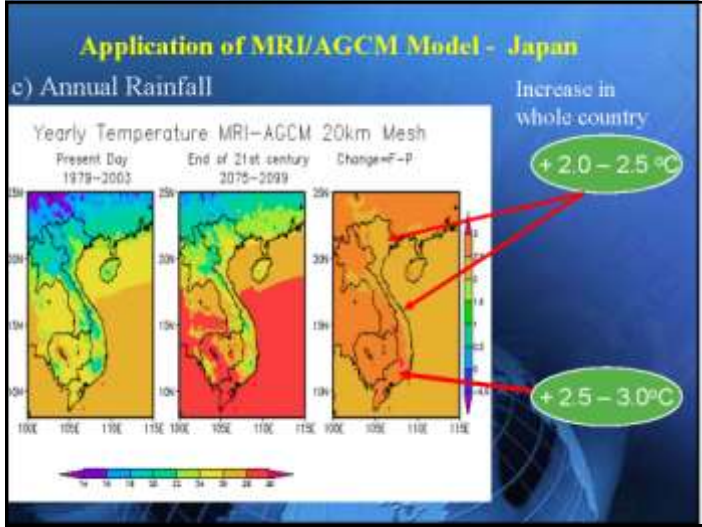
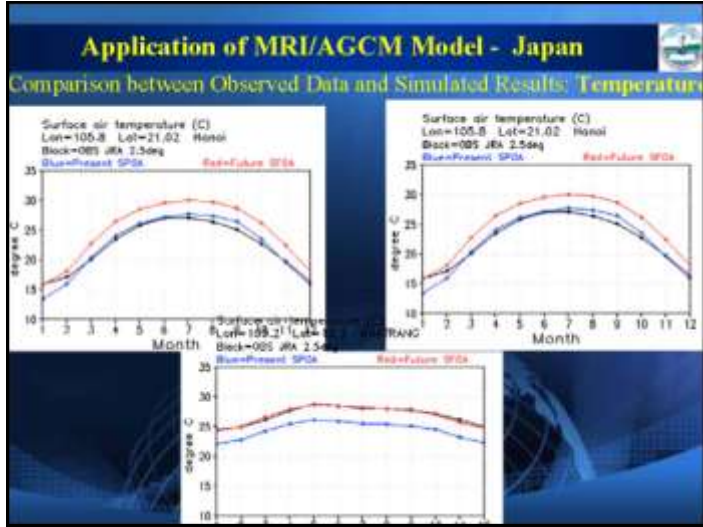
Application of MRI/AGCM Model - Japan

Calibration:

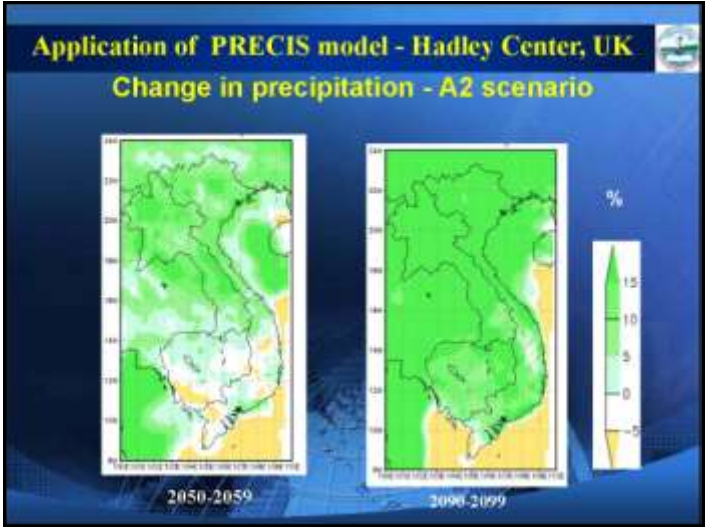
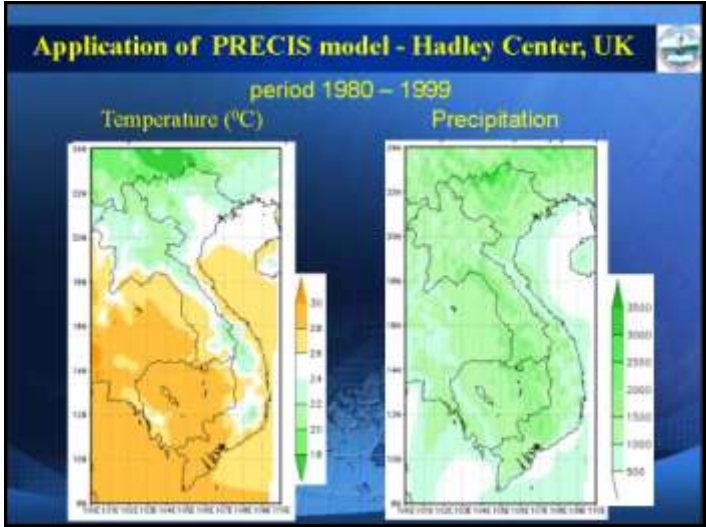
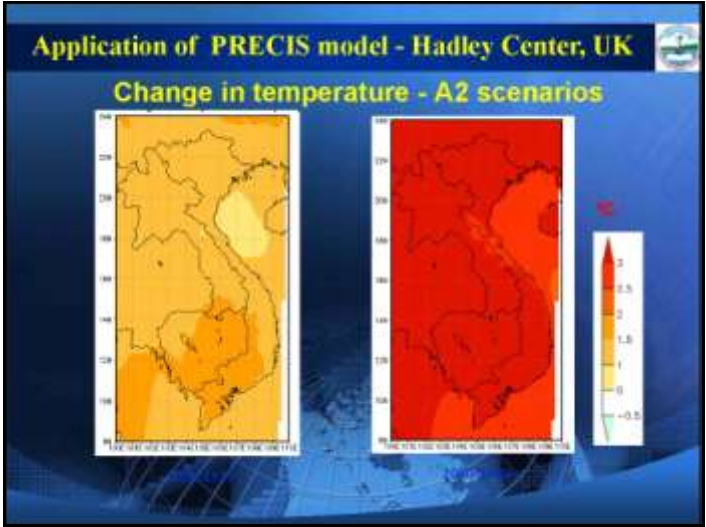
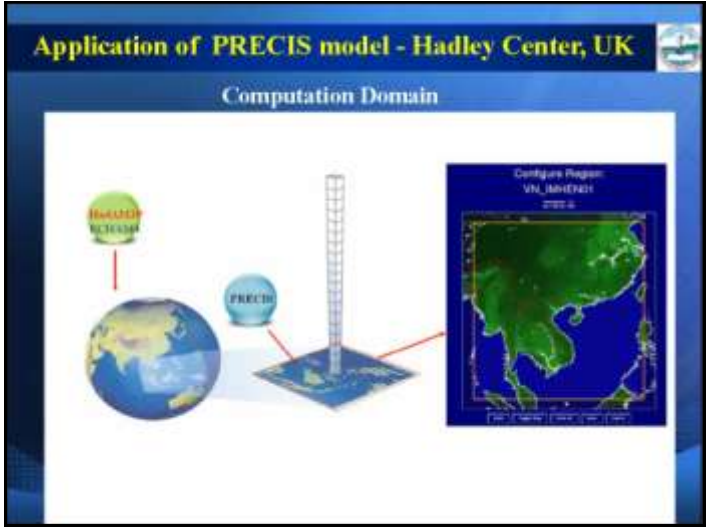
- Stations used: 18
- Data: Monthly rainfall, temperature
- Period: 1979-2007



2. Climate Change in Vietnam and Response



2. Climate Change in Vietnam and Response



2. Climate Change in Vietnam and Response


Application of MAGICC/SCENGEN software and Statistical Downscaling Method



The slide displays several visual elements: a 3D surface plot showing a spatial distribution of a variable, a line graph with multiple data series showing a general upward trend, a schematic diagram of a model or system, and logos for MAGICC and SCENGEN software. The MAGICC logo includes the text 'Model for Assessment of Greenhouse-gas Induced Climate Change' and 'MAGICC 2.3.2'. The SCENGEN logo includes the text 'A Model-based Regional Climate Change Scenario Generator'.

CC Scenarios for Viet Nam

1) CC, SLR scenarios for VN are developed basing on different emission scenarios: low (B1), medium (B2), and high (A2, A1FI).




Baseline period is 1980-1999 (IPCC 4th Report).

The slide features a map of Vietnam with seven regions highlighted in different colors. A legend on the right side of the map lists the regions: North West, North East, Northern, North of Central, South of Central, Highlands, and Southern Region. The text on the left explains that CC and SLR scenarios for Vietnam are developed based on different emission scenarios: low (B1), medium (B2), and high (A2, A1FI). It also notes that the baseline period is 1980-1999, according to the IPCC 4th Report.

Selection of methods for CC scenario development

- 1) Credible level of global CC scenario;
- 2) Level of details of CC scenario;
- 3) Inheritance;
- 4) Up-to-date;
- 5) Regional appropriate;
- 6) Comprehension of scenario;
- 7) Possibility for Updating




The slide lists seven criteria for the selection of methods for CC scenario development. The background features a globe of the Earth.

CC Scenarios for Viet Nam

❖ Low scenarios (B1) describes the world with low emission: changes toward a service and information economy, low population growth, clean and resources efficient technologies; global solutions to economics, social and environment stability.

- With a current convergent world economy,
- Different views between developed and developing countries,
- Difficulties in negotiation in limiting temperature increase to 2°C.



Low emission scenario does not seem to be possible for the 21st century

The slide discusses the low emission scenario (B1) and its characteristics. It includes a list of points: 'With a current convergent world economy', 'Different views between developed and developing countries', and 'Difficulties in negotiation in limiting temperature increase to 2°C'. At the bottom, there is a cartoon illustration of an elephant with an American flag on its side, labeled '2012', and a photograph of a person sitting on a wooden structure, possibly a boat or a bridge, with a building in the background. The text next to the photograph states: 'Low emission scenario does not seem to be possible for the 21st century'.

CC Scenarios for Viet Nam

- ❖ High scenarios (A2, A1F1) describes the world with high emission, independently operation, self-reliant nations; **Continuously increasing population**, regionally-oriented economic development, **slower and more fragmented technological changes** and improvements to per capita income (A2); or **extensive use of fossil fuels** (A1F1).
- These are the worst scenarios we can imagine.
- With the development of new and climate friendly technology, affords in negotiation, the world's campaign in "combating CC".

We can hope that the high scenarios will not happen.



CC Scenarios for Viet Nam

- 2) By the end of 21st century, temperatures in Vietnam would rise 2.3°C relative to the average of 1980-1999.
 - The increase in temperature would be in the range of 1.6°C to 2.8°C in different climate zones.
 - Temperatures in Northern and Northern Central climate zones of Vietnam would increase faster than those in Southern zones.
 - In each climate zone, winter temperatures would increase faster than summer ones.

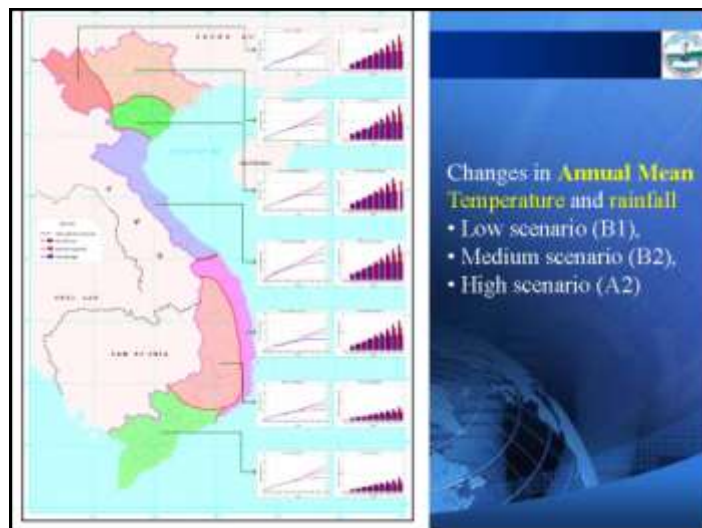
CC Scenarios for Viet Nam

- ❖ Due to the complexity of CC and limitation of our knowledge in CC, both in VN and in the world, together with the consideration of mentality, economy, uncertainty in green house gas emission ..., **the most harmonious scenario is the medium scenario. It is recommended.**

CC Scenarios for Viet Nam

- 3) Both annual rainfall and rainy season's rainfall would increase, while dry season's rainfall tends to decrease, especially in Southern climate zones.

2. Climate Change in Vietnam and Response



CC Scenarios for Viet Nam

8) The results still contain uncertainties due to low confidence level of social - economic development resulting low confidence level of emission scenarios; IPCC recommended applying tolerance (end of century):

- For temperature: $\pm 0.4 - 0.6^{\circ}\text{C}$;
- Annual rainfall: $\pm 1 - 2\%$;
- Monthly rainfall: $\pm 5\%$.
- Moreover, scenarios must be frequently updated in data, knowledge, computing model, and method of computation.

4) Sea Level Rise Scenarios

- By mid of the 21st century sea level is expected to increase about 30cm
- Sea level would rise about 75cm by the end of 21st century compared to the period of 1980 - 1999.

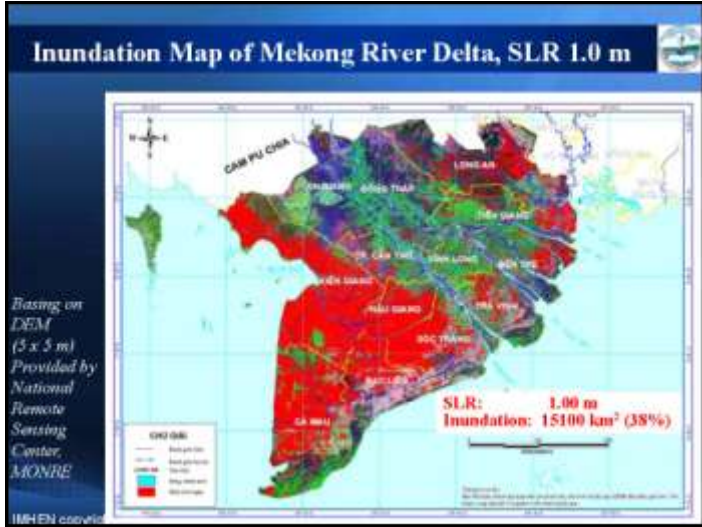
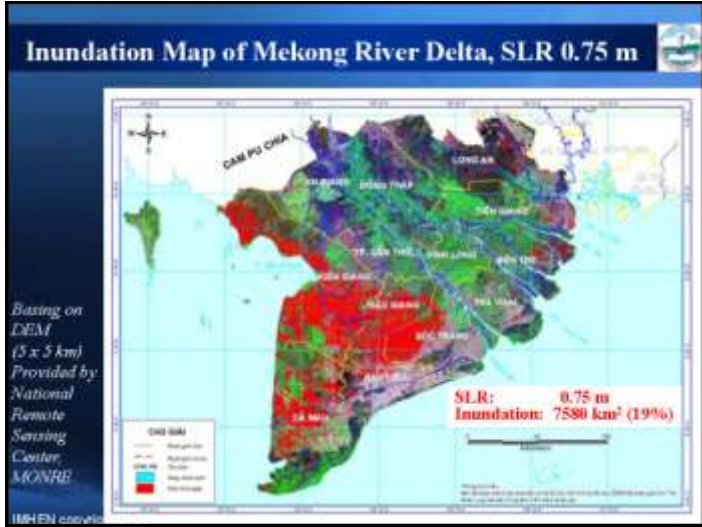
SLR Scenario	Decades in the 21 Century								
	2020	2030	2040	2050	2060	2070	2080	2090	2100
Low (B1)	11	17	23	28	35	42	50	57	65
Medium (B2)	12	17	23	30	37	46	54	64	75
High (A1FI)	12	17	24	33	44	57	71	86	100

CC Scenarios for Viet Nam

9) Climate change scenarios for VN will be updated as indicated in the NTP:

- 2010;
- 2015.

2. Climate Change in Vietnam and Response



2. Climate Change in Vietnam and Response

