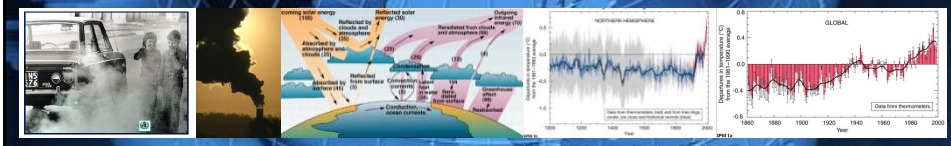
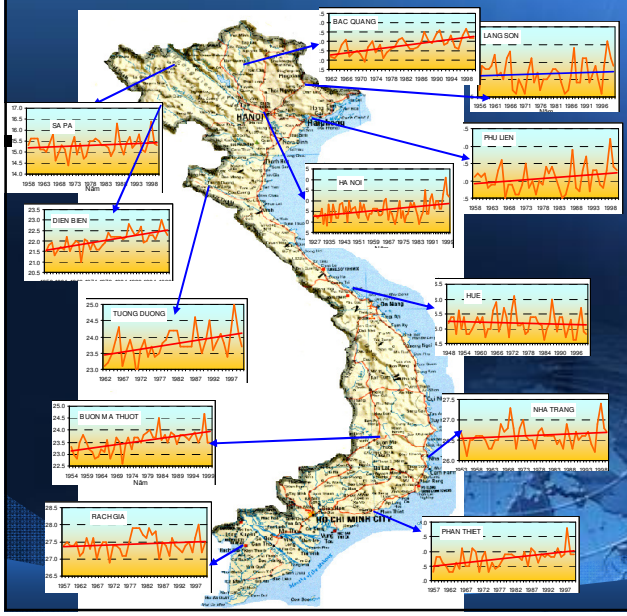
CLIMATE CHANGE IN VIETNAM AND RESPONSE



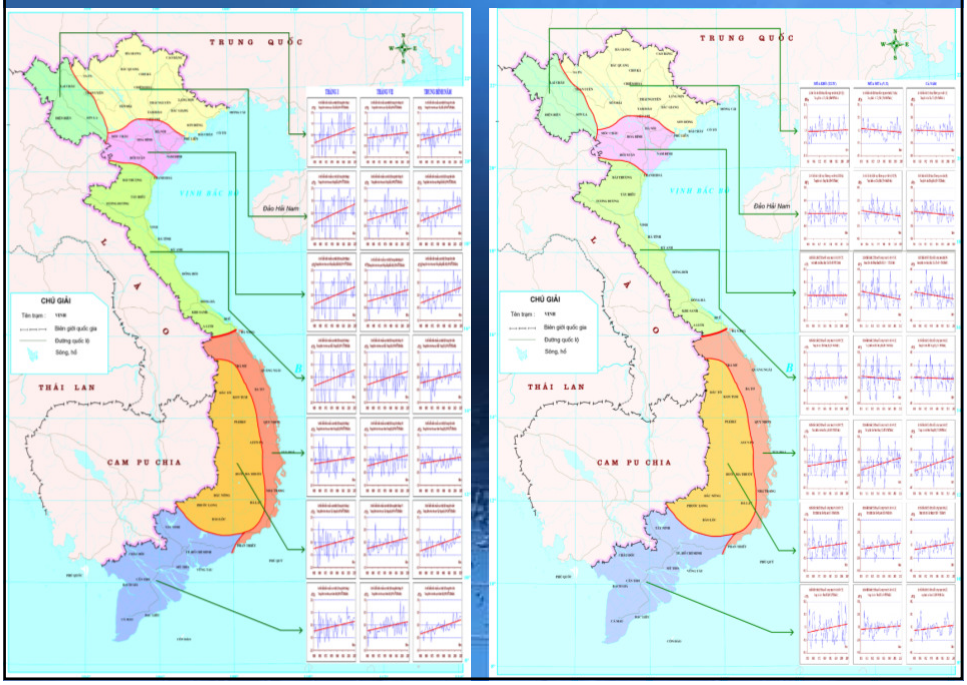
Tran Thuc,
Institue of Meteorology, Hydrology and Environment

(1) CURENT STATUS OF CC IN VIET NAM



Over the past 50 years, annual average temperature has increased about 0.5°C.

Changes in temperature | **Changes in rainfall**



Current Status of CC in Vietnam

1) Number of drizzle days decreases significantly;
2) Frequency of cold front in the North decreases significantly in the past three decades;
3) Number of cold spell decreases.

Decade	Average number of drizzle days in Ha Noi
1961 - 1970	29,7
1971 - 1980	35,8
1981 - 1990	28,7
1991 - 2000	14,5

Decade	(T_{avr} day <15°C)	Prolong (day)	(T_{tvr} day < 13°C)	Prolong (day)
1961 - 1970	26,6	26	11,7	16
1971 - 1980	29,7	25	13,5	14
1981 - 1990	29,8	16	17,0	10
1991 – 2000	20,4	16	7,3	10

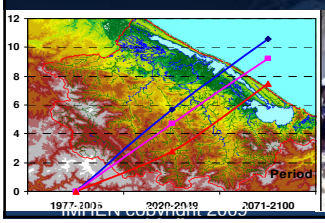
Current Status of CC in Vietnam

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

Station	19hrs 30/10/08 to 1hrs 1/11/08
Ha Noi	408
Ha Dong	572
Hung Yen	158
Hai Duong	-
Hoa Binh	129
Bac Giang	136
Hiep Hoa	186

Current Status of CC in Vietnam

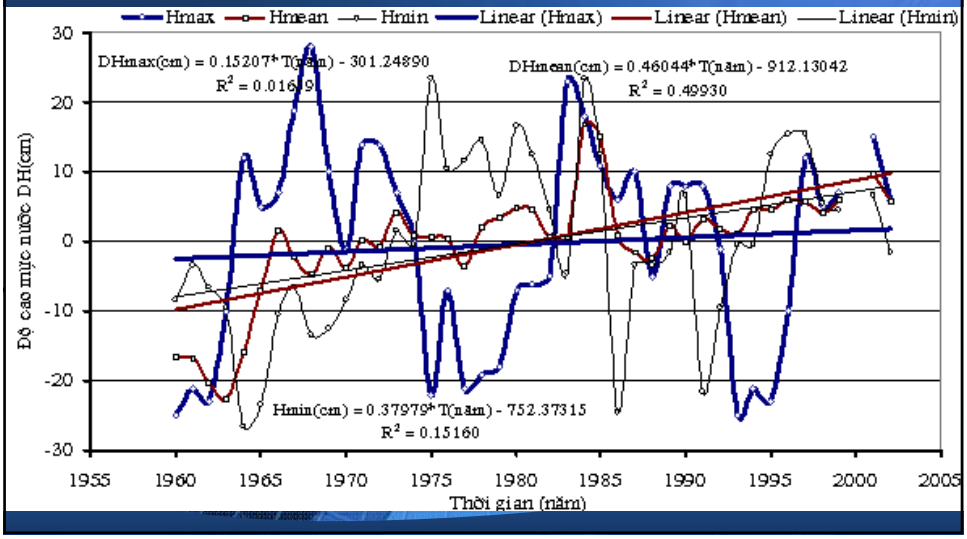
- Rainfall increases in rainy season (Sep. to Nov.)
- More heavy rainfalls causing severe floods which occur more frequently in the Central and Southern VN.
- Rainfall decreases in dry season (Jul., Aug.).
- Drought happen every year in most regions of the country.
- CC already caused severe natural disaster, especially typhoons, floods and droughts.

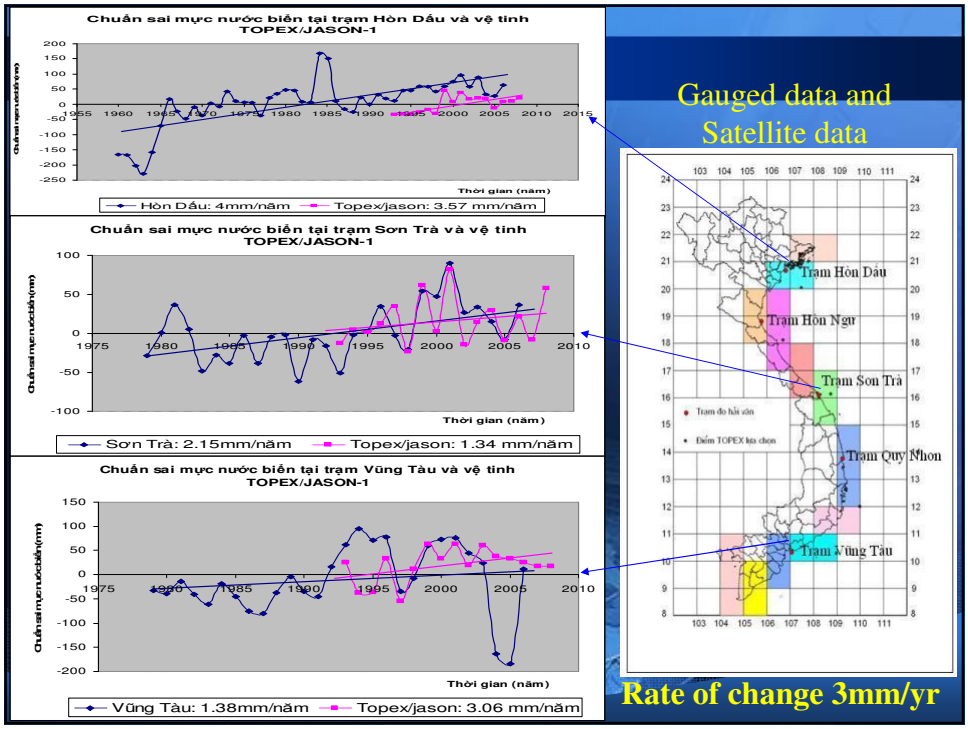


Current Status of CC in Vietnam

Change in Sea Level

Hon Dau Station





(2) NATIONAL TARGET PROGRAM TO RESPOND TO CC

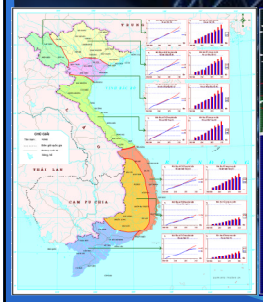
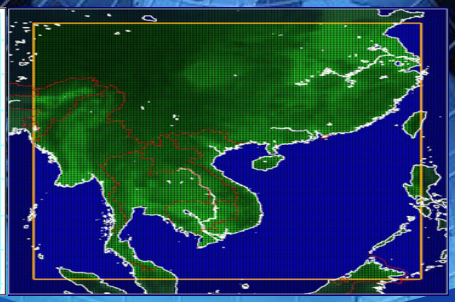
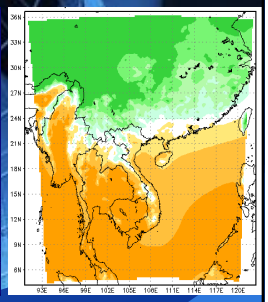
- Identify the extent of CC and assess CC impacts on sector, area and locality
- Identify measures to respond to CC
- Promote scientific and technological activities to respond to CC
- Enhance organizational structure, institutional capacity and development and implementation of policies
- Enhance public awareness and develop human resources
- Promote international cooperation
- Mainstream CC issues into socio-economic, sectoral and local development strategies, plans and planning
- Develop and implement action plans of sectors and localities to respond to CC

Strategic objectives: Assess CC impacts on sectors and regions and develop feasible action plans to effectively respond to CC in the short and long-term to ensure sustainable development of VN. To take opportunities to develop towards a low-carbon economy, and to join the international community's efforts in mitigating CC.

DIFFICULTIES IN THE IMPLEMENTATION

1) Poor awareness (scope, level, measures) at all levels and sectors (from officials to communities);
2) Weak coordination for mainstreaming CC in national/local policies & plans due to "**mainstreaming overload**";
3) Lack of tools and methodologies for policy development;
4) Lack of knowledge.

(3) CLIMATE CHANGE, SEA LEVEL RISE SCENARIOS FOR VIETNAM

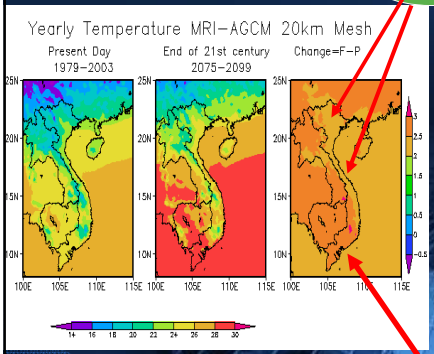




Application of MRI/AGCM Model - Japan

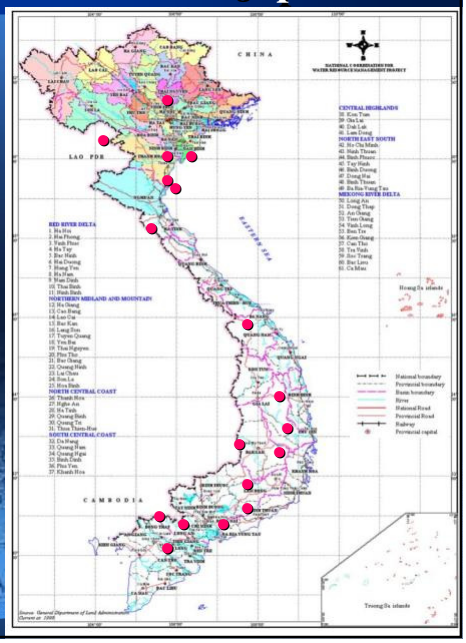
Validation

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

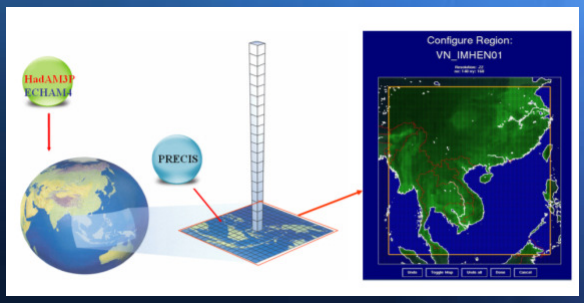
+ 2.0 – 2.5 °C



+ 2.5 – 3.0°C



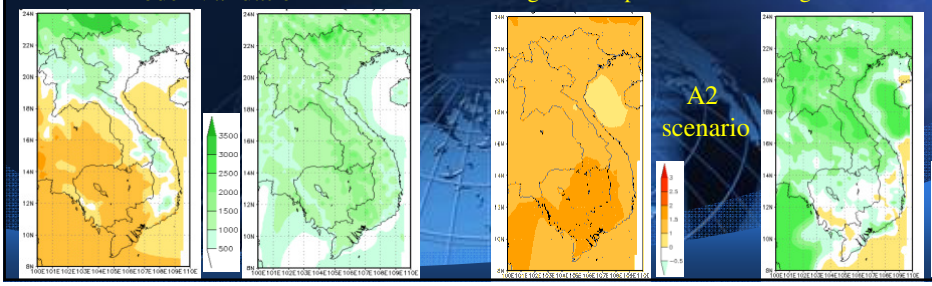
Application of PRECIS Model - Hadley Center, UK



Model Validation

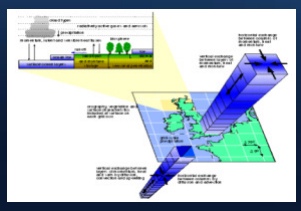
Change in Temperature

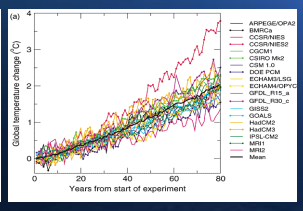
Change in Rainfall

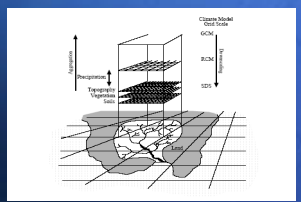


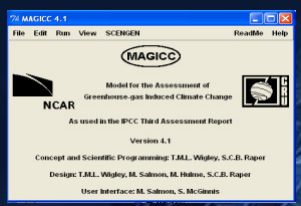
A2 scenario

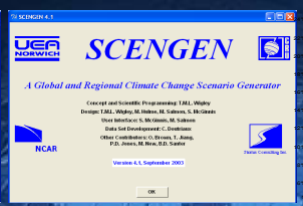
Application of MAGICC/SCENGEN software and Statistical Downscaling Method

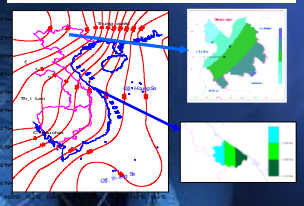












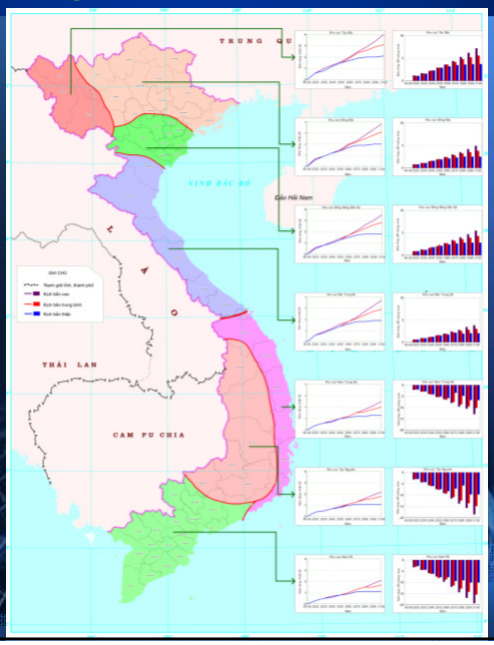
Climate Change Scenarios for Viet Nam

Changes scenarios were developed for:

1)Low emission scenario (B1)

2)Medium emission scenario (B2)

3)High emission scenario (A2)



- Northwest
- Northeast
- Northern
- North Central
- South Central
- Central Highlands
- Southern

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 scenarios..., **the most harmonious scenario is the medium scenario. It is recommended**.

CC Scenarios for Viet Nam

1) **By the end of 21st century, temperatures in Vietnam would rise 2.3°C relative to the average of 1980-1999.**

2) **Annual rainfall and rainy season's rainfall would increase, while dry season's rainfall tends to decrease, especially in Southern climate zones.**

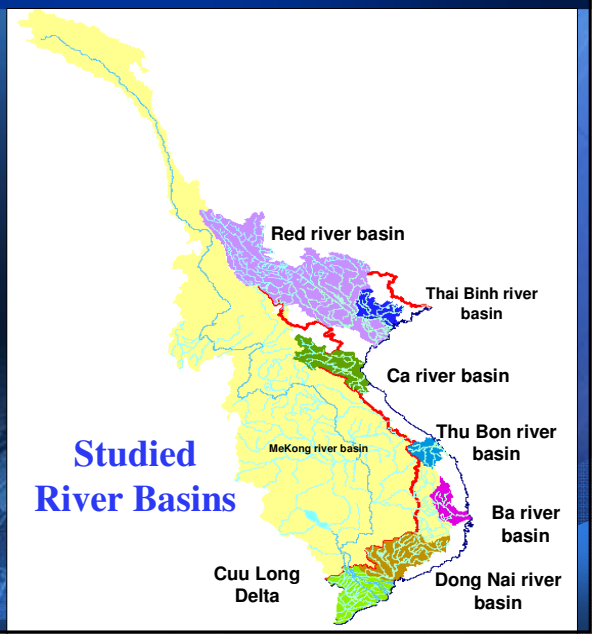
Sea Level Rise Scenarios

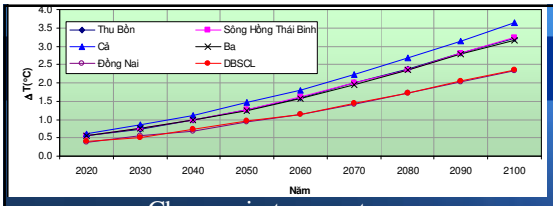
- By mid of the 21st century sea level is expected to increase about 30cm
- Sea level would rise about 75cm by the end of 21st century compared to the period of 1980 - 1999.

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**

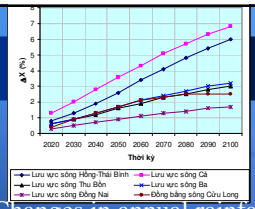
(3) CLIMATE CHANGE IMPACTS

Impacts on Water Resources

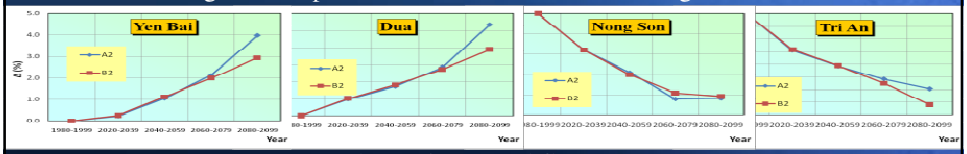




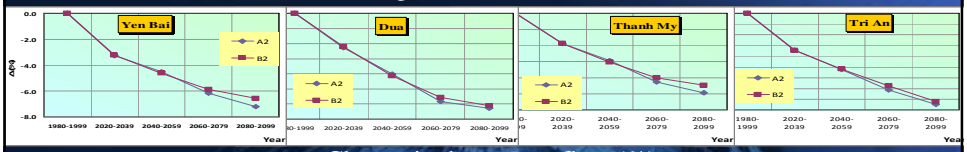
Changes in temperature



Changes in annual rainfall



Change in Annual flow (%)



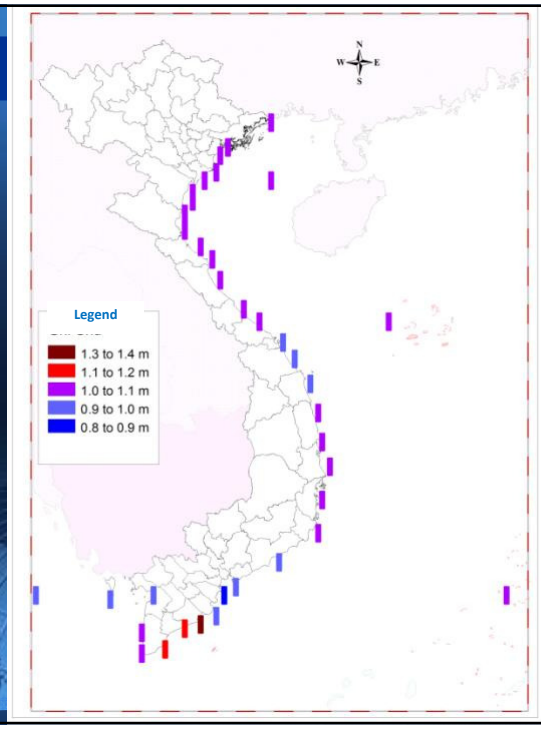
Change in dry season flow (%)

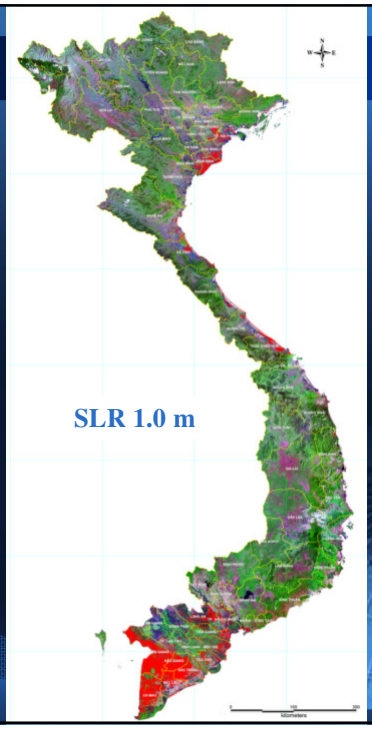
- **Annual flow tend to increase about 2 % to 5%.**
- **Flood flow tended to increase 4% to 7%.**
- **Dry season flows: tend to decrease about 4% to 12%.**

SEA LEVEL RISE

Vulnerable Area

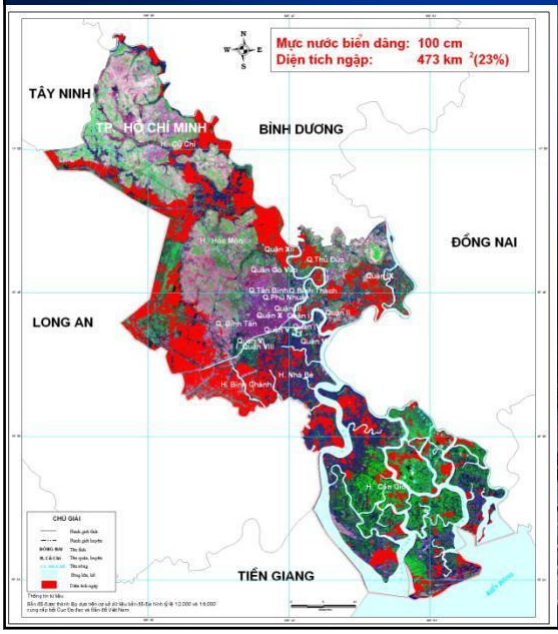
Sea level rise along the coastline of Vietnam





Inundation

Inundation Map of Ho Chi Minh City Area



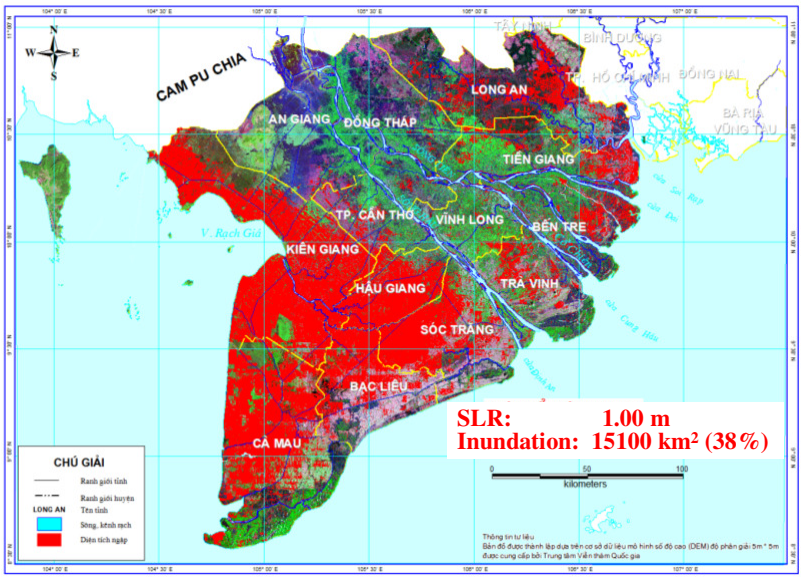
SLR: 1.0 m
Inundation: 473 km² (23%)

- Based only on topographic maps,
- Other aspects such as effects of tide, wave, storm surge, flow from rivers and other dynamic effects are not yet considered.

- *Based on Topographic Map Scaled 1/2.000 and 1/5.000*
- *Sources: Department of Survey and Mapping , MONRE*

Inundation Map of Mekong River Delta, SLR 1.0 m

Basing on DEM (5 x 5 m) Provided by National Remote Sensing Center, MONRE

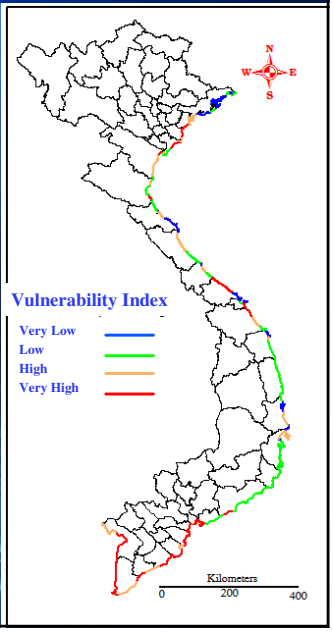


Morphological Vulnerability Index

Morphological Vulnerability Index

$$MVI\ 1 = \sqrt{(a*b*c*d*e)}/5$$

Ranking	Very low	Low	Mode rate	High	Very high
Mark	1	2	3	4	5
a: Topography – geology b: Shoreline Slope (%) c: Rate of SLR (mm/yr) d: Deposition/ Erosion (m/yr) e: Tidal amplitude (m)					



(4) OPTIONS FOR SUSTAINABLE DEVELOPMENT

Adaptation requires:

- Raising public awareness.
- Vulnerability and adaptation assessments.
- Enhancing resilience.
- Inter sectoral coordination / oversight policy implementation.

OPTIONS FOR SUSTAINABLE DEVELOPMENT

Financing Adaptation and long term investments should focus on:

- Large-scale infrastructure to protect lives, livelihoods and property;
- Location of industrial zone is critical to vulnerability to CC;
- Urban drainage and wastewater systems must be designed or adjusted for higher rainfall and peak flow.
- Apply critically participatory, consultative approaches in large investment programs.
- Strengthen urban and rural spatial planning and formulation of integrated master plans.

OPTIONS FOR SUSTAINABLE DEVELOPMENT

Key issues are:

- Immediate mainstreaming off CC in investment plans
- Ethnic minority are vulnerable but also hold great value in adaptation knowledge and practices
- Required adaptation can become an opportunity for achieving sustainable development

Conclusions

1) Being particularly impacted by CC.
2) Long history and capacities to mitigate natural disasters: research and development capacities in agriculture sector, and substantial intellectual capacity and human resources in water management.
3) Civil engineering capacities and built up experience with participatory, community-based approaches to DRR and small scale infrastructure development.

=> All these capacities, together with international cooperation in research, capacity building, planning and investment.

Conclusions

4) Laws, strategies, plans and programs on CC related issues are made consistent with principles of sustainable development:

- National Target Programme to Respond to CC

+ Provides basis for action planning in all sectors and localities and supports researches and awareness raising, and helps coordination;

+ Formulate an overall CC strategy with long term goals on adaptation and mitigation.

- CC scenarios: provides "*precautionary principle" for* long-term visioning and planning.

Conclusions

5) Moving towards a low carbon economy has other benefits in addition to GHG emissions mitigation, VN also has potential and capacities to improve upland and coastal forests;

6) The right domestic policies, good international relations, and political will from all sides, *global and national efforts to mitigate CC can become a development opportunity for VN, including its business, managers, and citizens*.

7) Government continues to demonstrate commitments in dealing with CC, nationally and internationally.


THANK YOU