



# ***Climate change impacts and adaptation efforts in Viet Nam***

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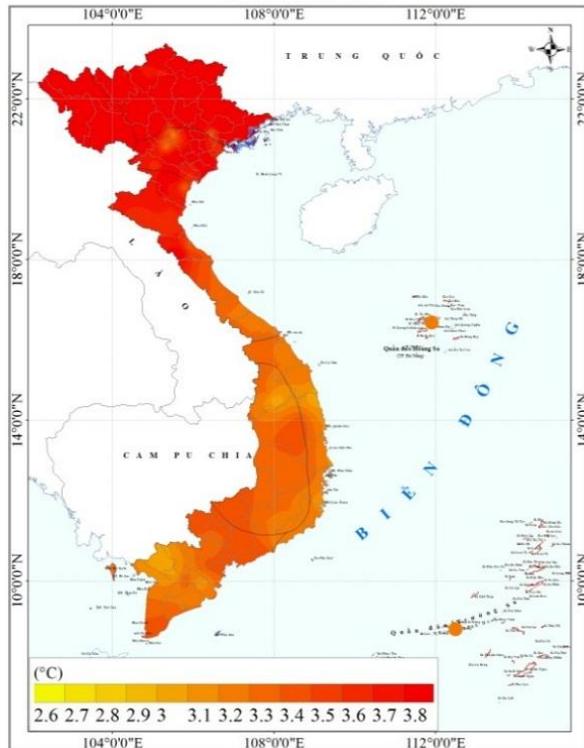
Vietnam Institute of Meteorology, Hydrology, and Climate Change  
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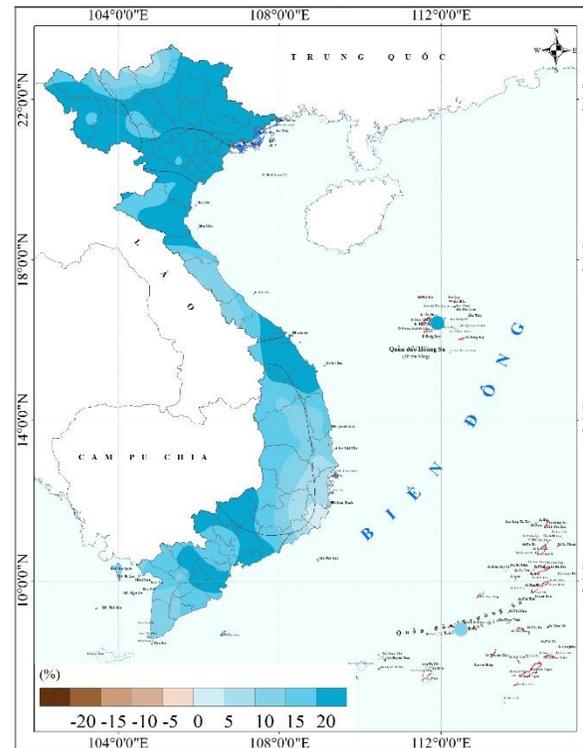
- 1. Climate change and sea level rise scenarios for Viet Nam*
- 2. The effects of climate change in Viet Nam*
- 3. Adaptation efforts in Viet Nam*
- 4. Adaptation measures in Viet Nam*

# 1. Climate change and sea level rise scenarios for Viet Nam

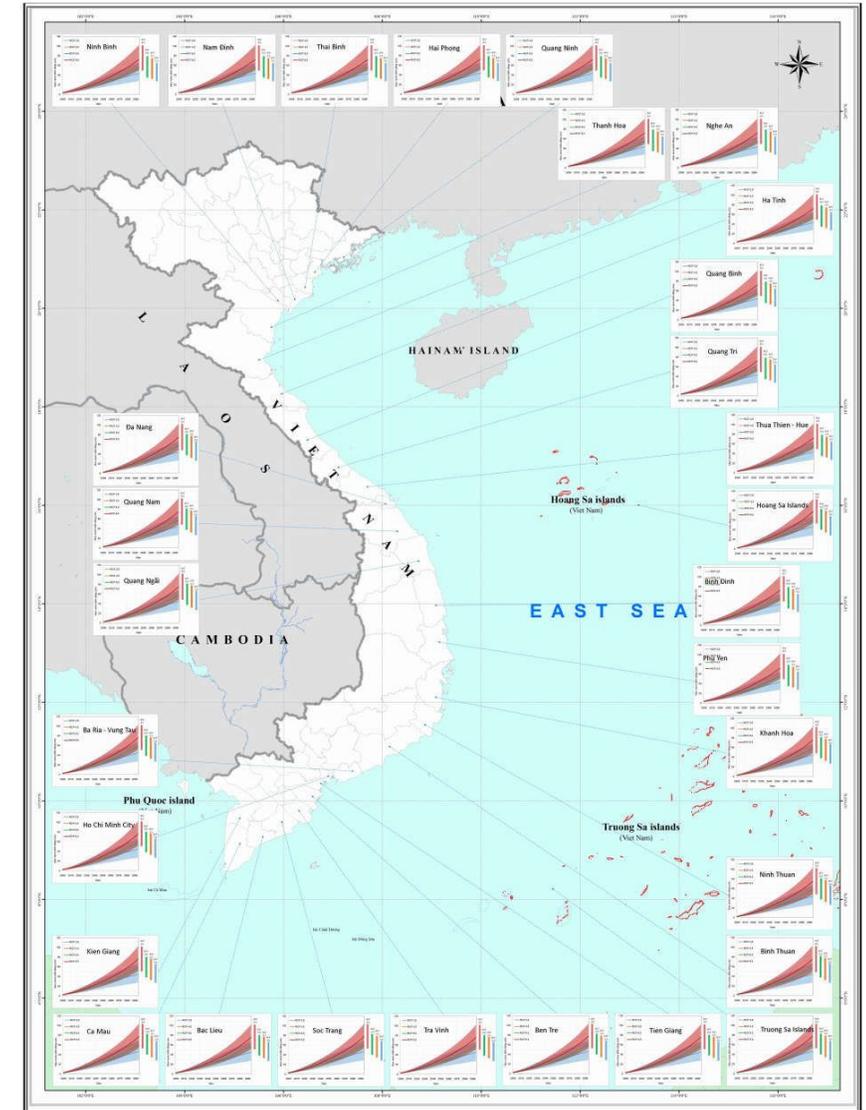
1. The first scenario was announced in 2009
2. The second scenario was announced in 2012
3. The third scenario was announced in 2016
4. The fourth scenario was announced in 2020



The change in temperature during the end of the century



The change in rainfall during the end of the century



Sea level rise scenarios for coastal provinces and islands in Viet Nam

# The impact of climate change in Viet Nam

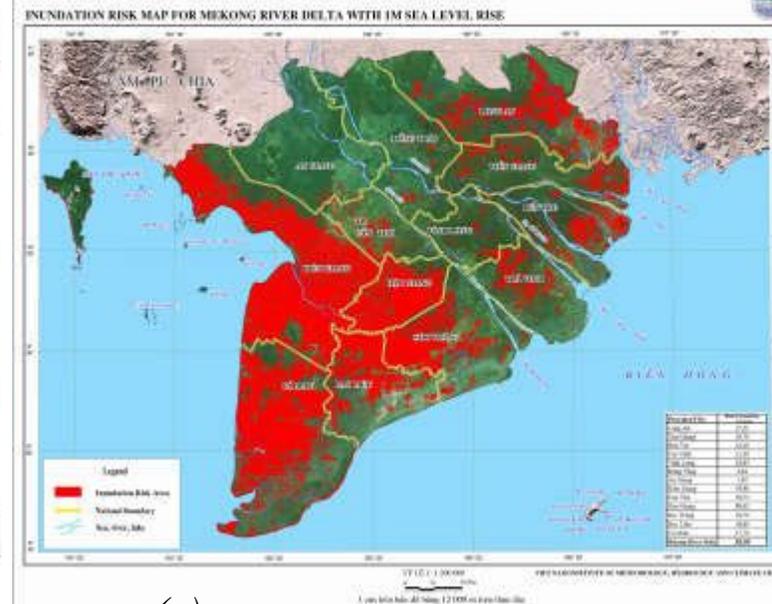
## *The impact of climate change on flooding*

When the sea level rises by 1m by the end of the century, it is anticipated that:

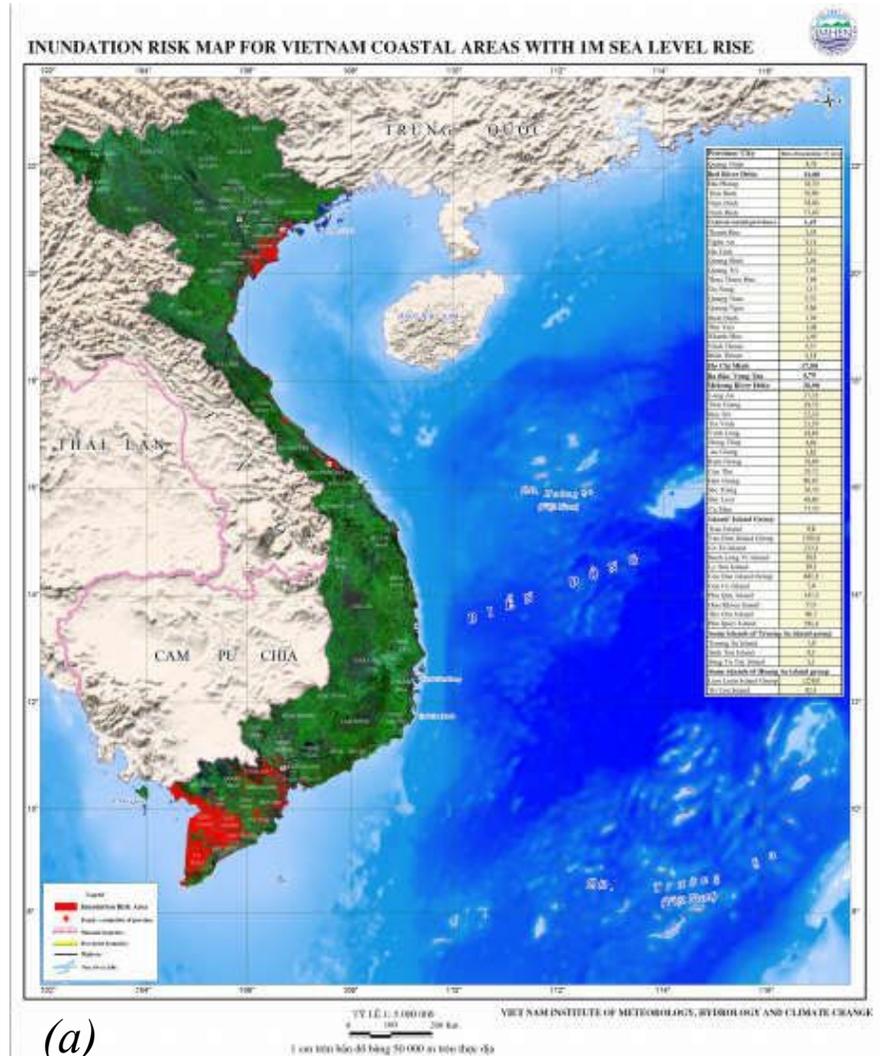
- 9.1 % of natural area will be flooded and 16% of the population will be affected.
- In the Red River Delta, the flooded area will be 1,668 km<sup>2</sup> (11.2 % area and over 10 % population).
- In the Mekong Delta, the flooded area will be 26,856 km<sup>2</sup> (67 % area and about 55 % population).



(b)



(c)



(a)

**Inundation maps with a sea level rise of 100 cm**

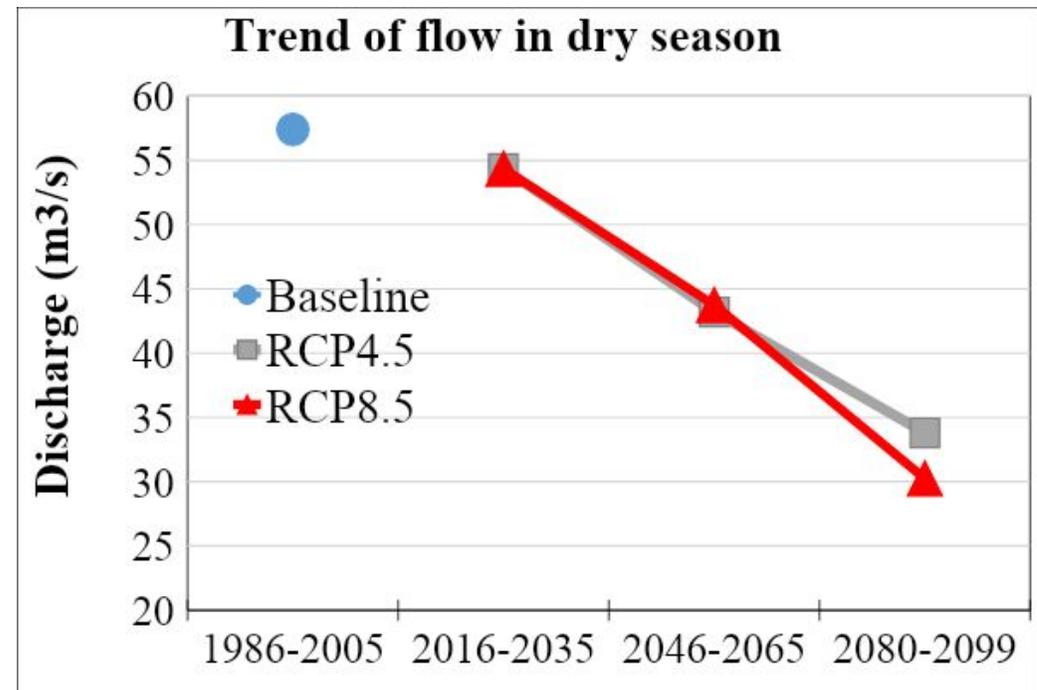
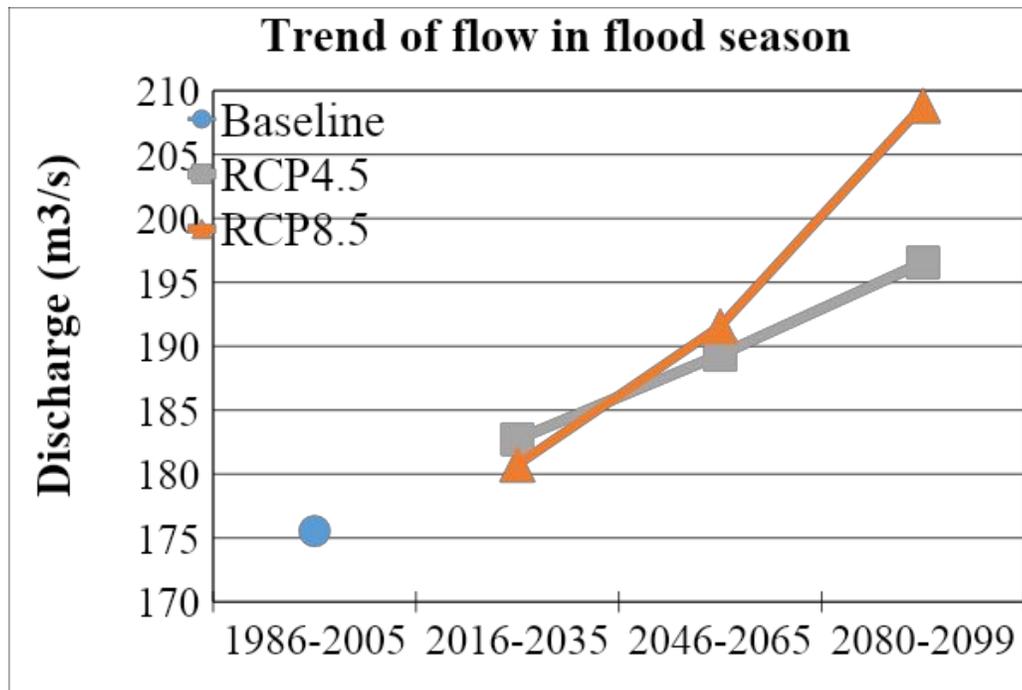
(a) Coastal areas of Viet Nam; (b) Red River Delta and Quang Ninh; (c) Mekong Delta

# The impact of climate change in Viet Nam

## The impact of climate change on water resources

Under the impact of climate change, the water resources of watersheds in VN will be heavily affected:

- The majority of the watersheds will have annual flow increased, a few watersheds will have annual flow stabilized or slightly decreased.
- For all watersheds, the trend of flow will increase in flood season and decrease in dry season.

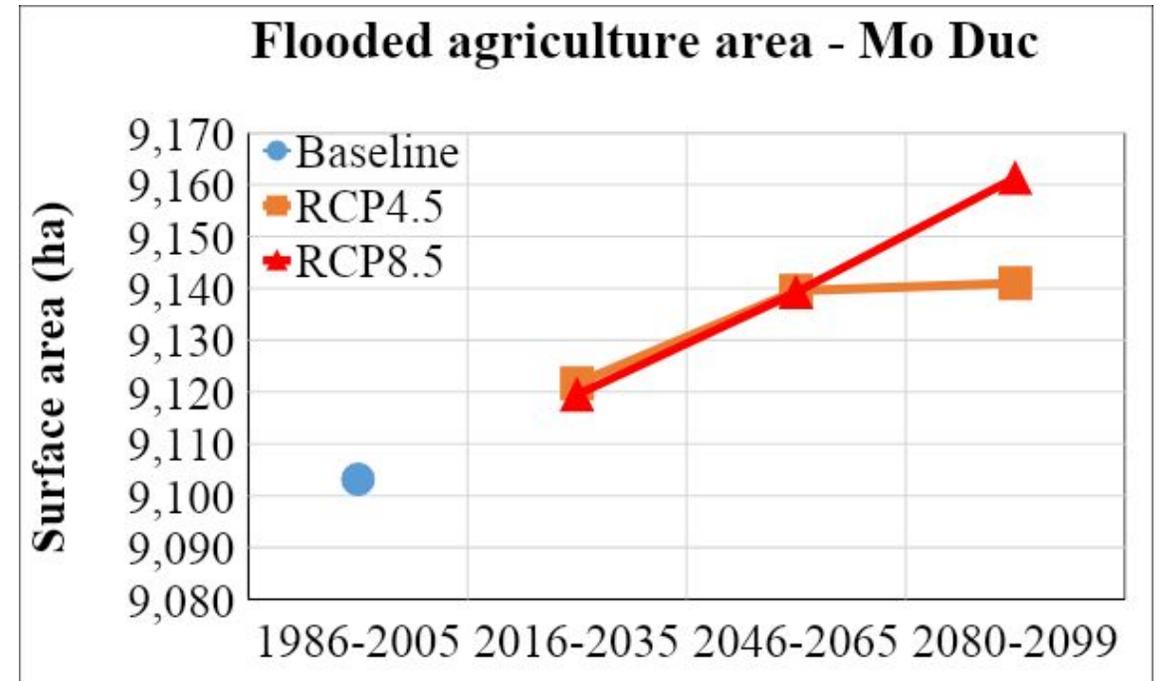
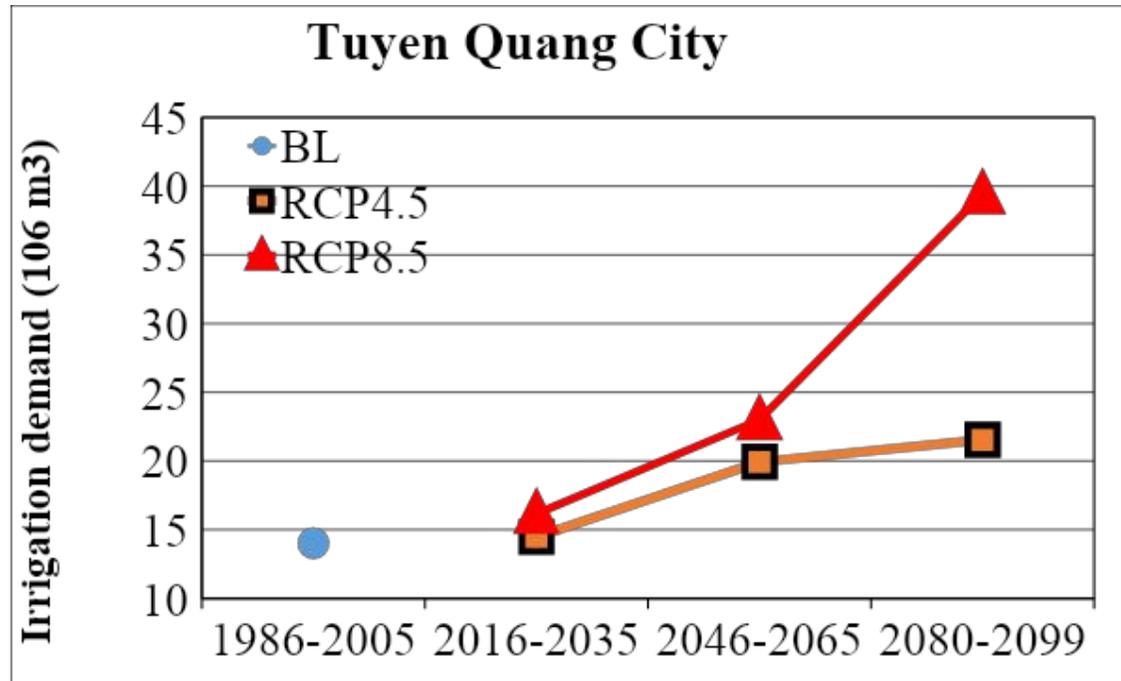


# The impact of climate change in Viet Nam

## *The impact of climate change on agriculture*

Agriculture takes a large proportion in Viet Nam and thus is most affected by climate change.

Climate change makes irrigation demand increase, as well as increasing flooded agriculture area.



# The impact of climate change in Viet Nam

## *The impact of climate change on forestry*

- The area of coastal mangrove forests will suffer heavily due to the rise of sea level;
- The increase in temperature base, evaporation, hurricane, temperature extrema, rainfall intensity and the decrease in humidity index... will make the boundary between climate regions (tropical, subtropical, temperate) shift to higher heights, which is the mountain top. Oil plant forests will expand to the North and higher belts, deciduous plant forests along with drought tolerant plants will flourish...
- New types of pests or exotic pests will grow.
- The increase in temperature and evaporation will make the dry period and dryness intensity rise.

# The impact of climate change in Viet Nam

## *The impact of climate change on fishery*

- The increase in sea temperature will negatively impact the living environments of several sea creatures, mineralization process and decomposition process, thus affect the food sources of aquatic creatures, making them spend more energy on respiration and other activities, hurting the capacity and quality of aquatic products; Prompting the degradation of coral reefs or change the physiology and biochemical processes in the symbiosis relationship between coral and seaweed.
- Change the location, intensity of the tide, upwelling areas and increase the frequency, intensity of hurricanes as well as low and small cyclones.
- Several fresh water creatures living in mangrove forests will lose their according habitats. Ponds and lakes will become exhausted before the harvest period, making the quantities of harvest plummet.

## *The impact of climate change on industry*

### Rising temperature:

- Increase the cost of cooling,
- Affect the longevity of devices, cause more wear and tear
- Affect the workers' health
- Increase the demand for water

### Rising rainfall:

- Flood the industrial areas □ damage the machines, equipment and products

# The impact of climate change in Viet Nam

## *The impact of climate change on energy*

### *1) Climate change can negatively affect the renewable energy*

- Climate change will increase the intensity of flood and in several extreme cases, hydroelectric power plants are forced to release the flood and the rivers are at a critical state. Drought will decrease electric time and electric productivity in case of intense drought. Decline of wind energy potential.
- There are possibilities of decreasing potentials from different energy sources in the future.

### *2) Climate change can negatively affect mining*

- Create many difficulties for the mining system of antraxit coal in the coal pool.
- Increase the diminish possibilities, damage the coal quantities due to frequency, increase the intensity of storms and hurricanes.
- Increase the production cost, building and function costs, drilling rig maintenance and vehicle cost.

Aside from the above, increasing temperature will rise the demand for energy used in cooling.

# The impact of climate change in Viet Nam

## *The impact of climate change on transportation*

- Many railways, highways, traffic roads, seaports and aerial ports could be flooded.
- Foundation erosion, destruction of road foundation, especially in the mountainous areas, land roads, railways as well as pipes.
- Accelerate the degradation of traffic structures and increase the maintenance fee, repair fee of constructions and transportation vehicles.
- Rise the risk of encountering accidents for transportation.
- Affect many transportation activities including devices, engines and vehicles. Increase the fee for air conditioning, especially in passenger transportation.

# The impact of climate change in Viet Nam

## *The impact of climate change on life and public health*

- Due to climate change, the GDP growth will become unstable, the poor will not have the opportunity to raise their education and their life expectancy will also be affected. Resulting in a slow growth for HDI despite the country's efforts in economic and social development.
- Climate change will bring about many negative side effects to the human's physiology.
- Extreme weather might cause mutation to the elderly, old people, victims of cardiovascular disease, victims of neuropathy,...
- Climate change will increase the possibilities of catching a sickness or becoming the host of a disease.

# The impact of climate change in Viet Nam

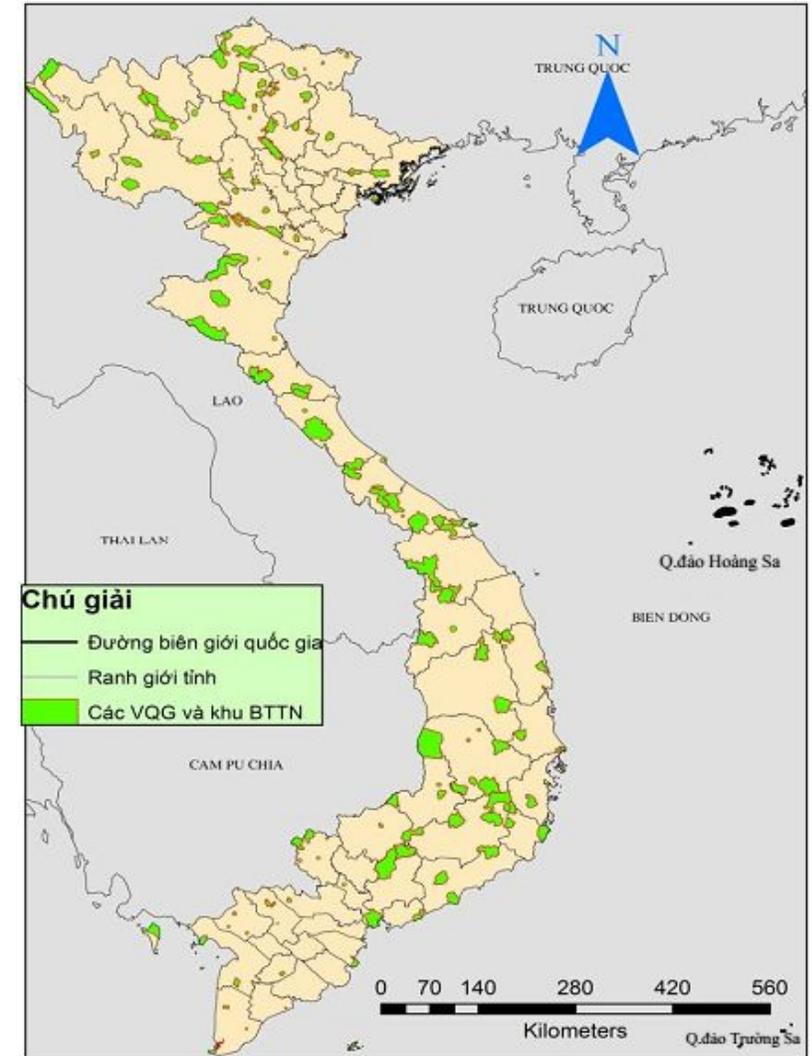
## *The impact of climate change on tourism*

- *Climate change will cause many setbacks to tourism*
- + Rising sea-level will increase the depth of the beach and the height of the waves.
- + Many tours might encounter more risks.
- + Increase the ultra-violet rays as well as the visible rays.
- *Climate change will affect some ecotourism activities*
- + The travel agency and tourists might encounter more troubles;
- + The fee for ecotourism will rise.
- *Climate change will affect many mountainous ecotourism activities*
- + Many attraction spots will become less attractive to tourists.
- + Increase the risks throughout the entire trip.
- *Climate change will cause many problems for the development of sustainable tourism*

# The impact of climate change in Viet Nam

## *The impact of climate change on biodiversity*

Viet Nam has a diverse and abundant ecosystem. Viet Nam currently has 164 nature reserves on land, including: national parks, nature reserves, protected areas, protected landscapes, research forests, scientific experiments. The total surface area of the nature reserves is about 2,2 million hectares which is roughly 7,2% of the natural surface areas. This nature reserve system is a location used to preserve animal genes, maintain the ecological processes and protect the environment.



The nature reserve system on land in Viet Nam

# The impact of climate change in Viet Nam

## *The impact of climate change on biodiversity*

### **The risk to biodiversity via affected water source**

+ Increase the evaporation of the surface cover, thus, change the quality and the distribution of the vegetation, affecting the law of distribution, dispersion, migration of animals.

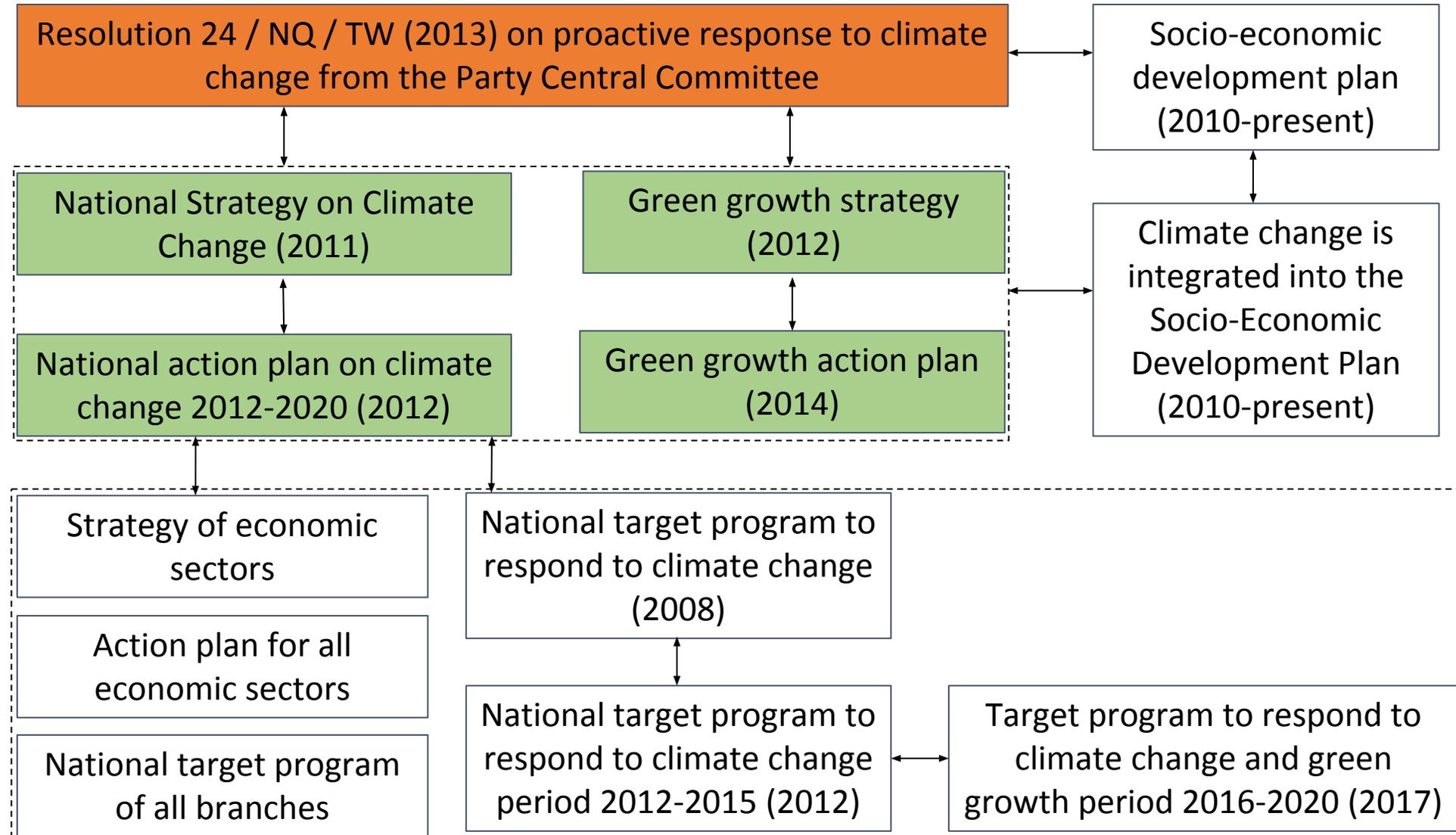
+ The increase in currents during rainy seasons will rise the danger of flooding, flash flood, mudslide, deluge and negatively affect the vegetation, which will change and destroy the habitats of various groups of animal.

### **The threat of affecting the biodiversity via the change in temperature**

- The increasing temperature will accelerate the reproduction rate of plants, the time for reproduction will shorten compared to that at present.

# The adaptation effort in regard to climate change in Viet Nam

## The climate change policy in Viet Nam



## The climate change policy in Viet Nam (continued)

There are many policies regarding the climate change adaptation effort :

- ✓ Mineral Law in 1996.
- ✓ Land Law in 2001.
- ✓ Law on Environment Protection in 2005.
- ✓ Law on Biodiversity in 2008.
- ✓ Law on Water Resource in 2012.
- ✓ Law on Disaster Prevention in 2013.
- ✓ Law on Environmental Protection in 2014.
- ✓ Law on Meteorology and Hydrology in 2015.

Many Decrees, Decisions, directives, circulars,... from ministries regarding climate change have been enacted

# The adaptation solutions to climate change in Viet Nam

After the policies regarding climate change were enacted, a lot of projects, scientific researches were carried out and brought many measures to the adaptation of climate change

## **1. The adaptation measures in water resources**

- a) *Restructuring, repairing and upgrading irrigation systems*
- b) *Additional construction of multi-purpose reservoirs*
- c) *Build and develop a basin management mechanism*
- d) *Use water appropriately and economically*
- e) *Increase revenue and reduce water loss*
- f) *Step by step organize an anti-saline intrusion*

## **2. The adaptation measures in agriculture**

- a) *Adjust crop structure and seasonality to the climate change situation*
- b) *Diversify intercropping and rotation activities*
- c) *Improve the efficiency of agricultural irrigation*
- d) *Organize flood and drought warnings*

## **3. The adaptation measures in forestry**

- a) *Enhance afforestation, greening barren land and bare hills, protect and develop mangrove forests*
- b) *Protect upstream and natural forests*
- c) *Organize effective forest fire prevention*
- d) *Improve wood use efficiency and curb the use of wood materials*
- e) *Protect rare and precious plants, select and propagate suitable plants for each locality*

## **4. The adaptation measures in fishery**

- a) *Climate change adaptation in coastal zones and in marine fisheries*
- b) *Climate change adaptation in the field of fisheries economy*
- c) *Climate change adaptation in fresh and brackish water fisheries*

## **5. The adaptation solutions in energy, industry, transportation**

- a) *Adjust energy, industry and transportation development plans to suit climate change situation*
- b) *Upgrade and renovate energy, industrial and transportation projects in key areas*

## **6. The adaptation solutions in health and public health**

- a) *Upgrade the infrastructure and community health activities*
- b) *Develop a health promotion, environment improvement program to better control disease and cope with climate change*

## **7. The adaptation solutions in tourism**

- a) *Adjust planning and activities for marine tourism*
- b) *Adjust planning and activities for ecotourism and mountain tourism*

## 8. The adaptation measures in biodiversity.

- a) *Integrate with biodiversity conservation plans in protected areas*
- b) *Integrate with the sustainable forest management plan*
- c) *Integrate socio-economic development plans*

### *Specifically:*

- Sustainable economic development goes hand in hand with protecting the environment from encroaching on nature reserves. Economic development is associated with socio-cultural development.
- Strengthen forest management, protection and development, support people to plant forests and cover bare land. Forest rehabilitation and sustainable forest management in the region have a medium to long-term impact on significantly reducing soil erosion and thereby reducing downstream dam fill.
- Developing ecotourism in association with forest protection, environmental protection, natural resources protection and economic interests of people in the area.

*Thank you for your attention!*