

# **Policies and Programmes related to Water-Energy-Food for Red River and Mekong River Basins in Viet Nam**

**Presented by: Le Van Chinh**  
**Ministry of Science and Technology of Vietnam**

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# Development of hydropower in Viet Nam

- Strategy for Development of hydropower in Vietnam: Development of hydropower must meet both socio economic and environment targets
- Main hydropower plants in North of Viet Nam:
  - Thac Ba (1973):  $2.160 \times 10^6 \text{ m}^3$
  - Nui Coc (1979):  $178 \times 10^6 \text{ m}^3$
  - Hoa Binh(1990):  $5,650 \times 10^6 \text{ m}^3$
  - Tuyen Quang (2007):  $1,699 \times 10^6 \text{ m}^3$
  - Son La (2012):  $6,504 \times 10^6 \text{ m}^3$
  - Lai Chau (under construction):  $759 \times 10^6 \text{ m}^3$

Up to 2020 total volume of reservoir:  $20,115 \times 10^6 \text{ m}^3$ ; at present:  $17,730 \times 10^6 \text{ m}^3$ ; remainder:  $2,385 \times 10^6 \text{ m}^3$



# Development of hydropower Viet Nam

- Red River Basin: Among of the larges in the world (China, Lao, and Vietnam)
- Total area: 149,760 Km<sup>2</sup> ; Vietnam: 73,812 Km<sup>2</sup> (50.7%)
- Land use: Forest: 2,570,775 ha; Agriculture: 1,874,100 ha.

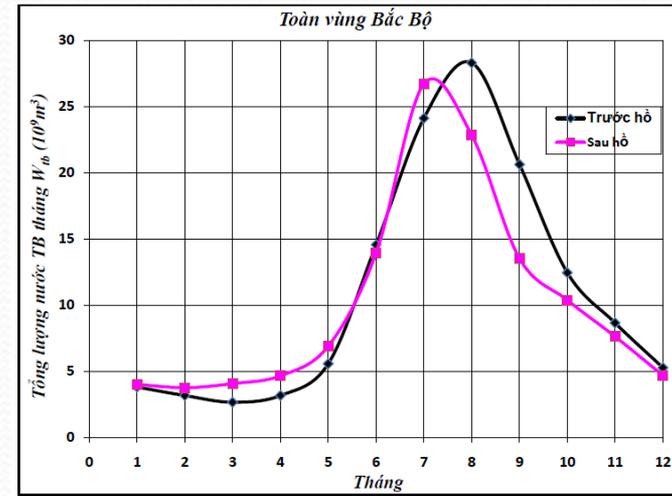
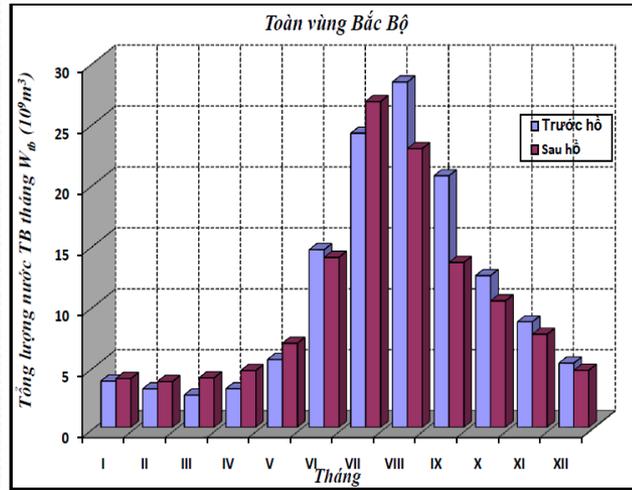


## Negative impact of hydropower in Vietnam

- Many hydropower dams have constructed at upstream of the river caused of changing in flow regime and water quality (there are 21 hydropower plants constructed in China)
- Recently, water shortage occurs in reservoirs in Vietnam: Hoa Binh: +103 (+117m – design mean water level); Tyne Quang +103 (+120m – design mean water level).
- Impacts on: ecosystem (biodiversity), fishery (reduction, extinct), agriculture, transportation, salt intrusion (20-40km), sedimentation (reduce, erosion), living condition of people in downstream areas.

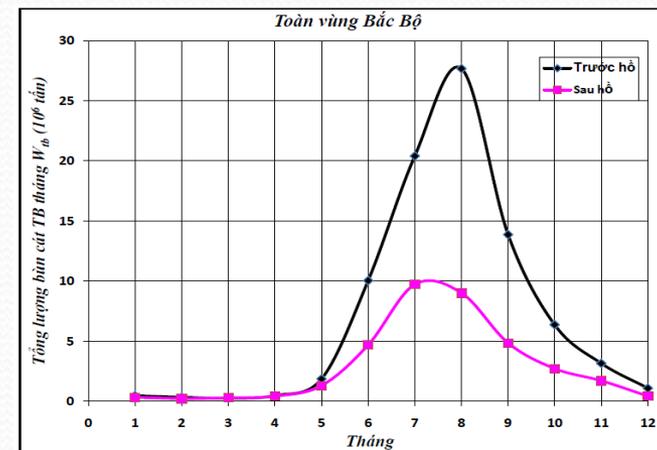
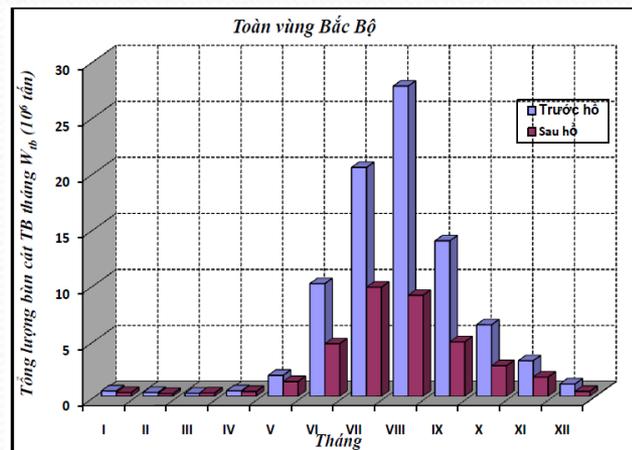
# Contribution of water, sediment in Red River delta

Water



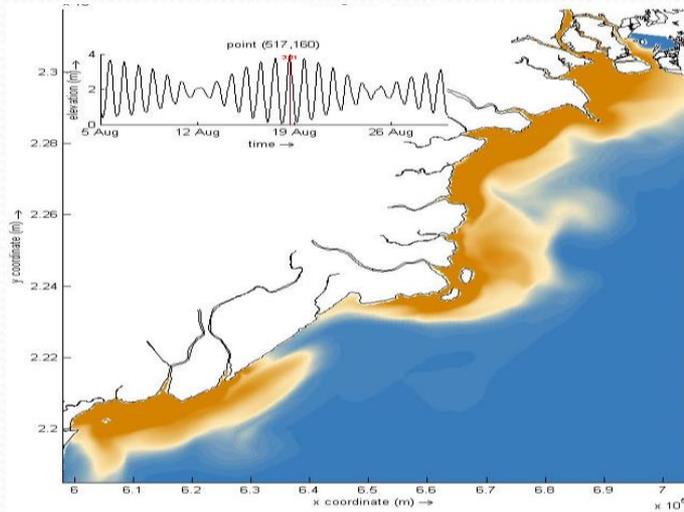
After building dam (2014), volume of water decreased:  $9.29 \cdot 10^6 m^3/year$

Sediment

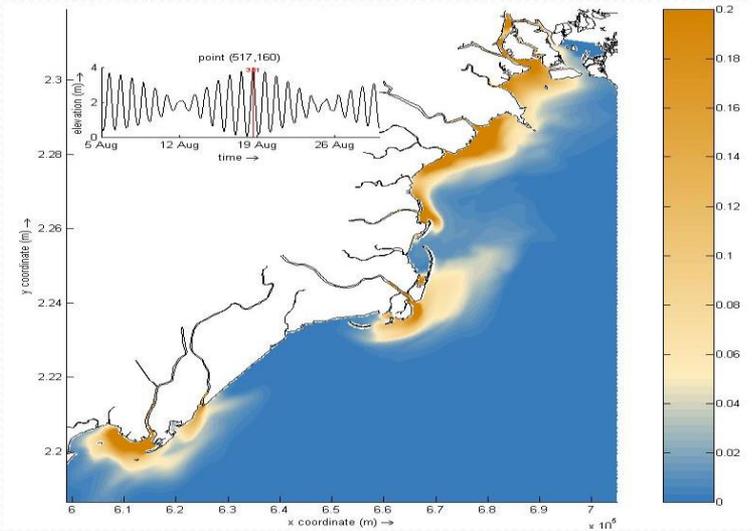


After building dam (2014), volume of sediment decreased:  $50.308 \cdot 10^6 \text{ ton/year}$

# Concentration of TSS in coastal area



Before building dam (1975)

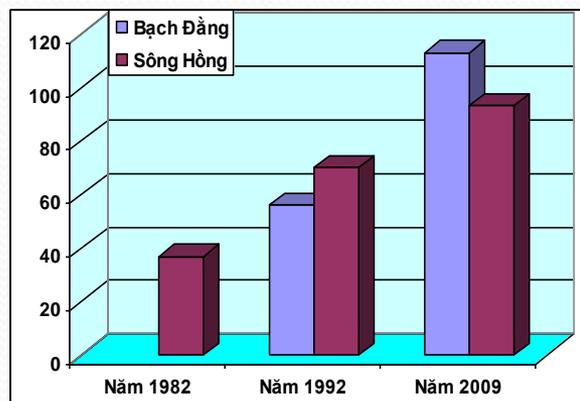


After building dam (2014)

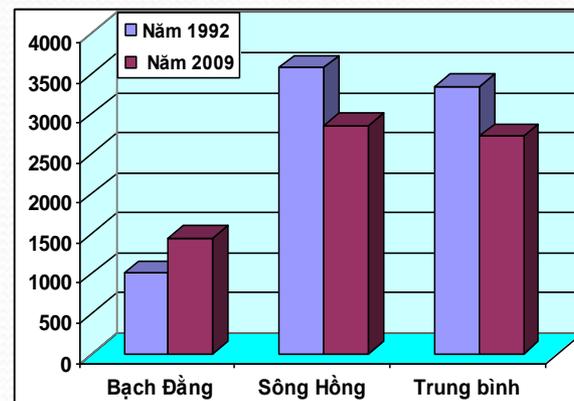
After building dam (2014), total volume of sediment decreased: 58%

# Nutrient contribution and fishery in Red River Basin

	TN (T/day)	TP (T/day)	Fish ( $10^3$ T/Year)
Before building dam (1975)	<b>47211.50</b>	<b>5286.50</b>	<b>24.64</b>
After building dam (2014)	<b>26958.00</b>	<b>2951.50</b>	<b>9.94</b>
Reduction (%)	<b>42.90</b>	<b>44.17</b>	<b>59.66</b>



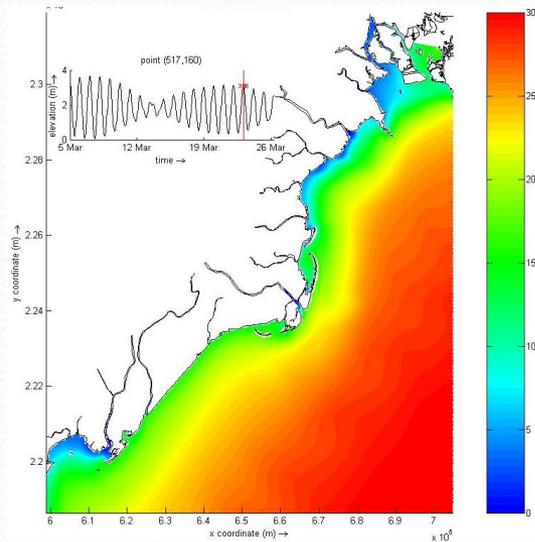
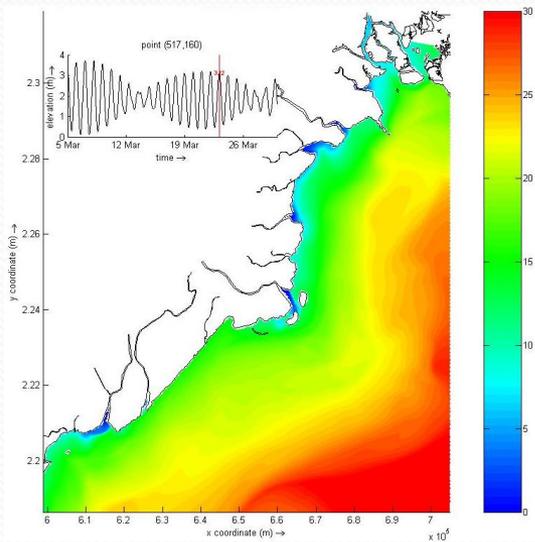
Total number of species



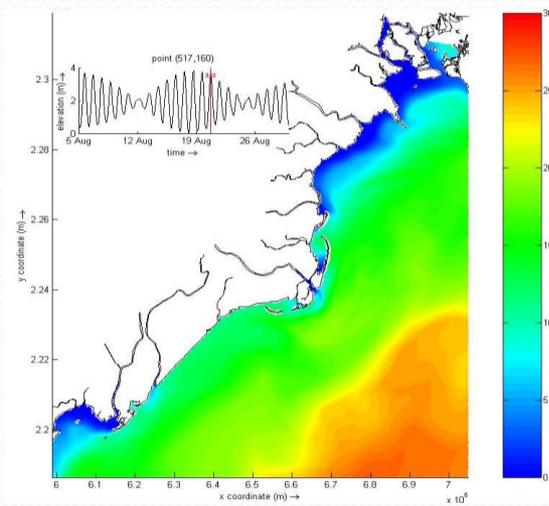
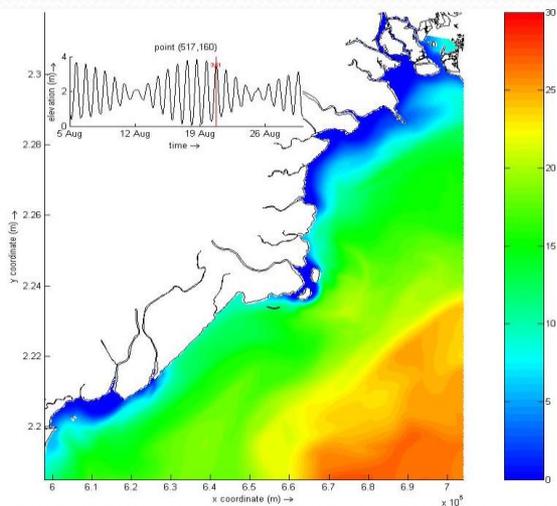
Density of species (number/m<sup>3</sup>)

# Salt concentration in dry and rainy seasons in coastal area

Dry season



Rainy season



Before building dam (1975)

After building dam (2014)

# COD and BOD<sub>5</sub> at the river mouth



	COD (mgO <sub>2</sub> /l)	BOD <sub>5</sub> (mgO <sub>2</sub> /l)
Before building dam (1975)	<b>3.607</b>	<b>2.693</b>
After building dam (2014)	<b>2.423</b>	<b>1.894</b>
Reduction (%)	<b>-32.83</b>	<b>-29.67</b>

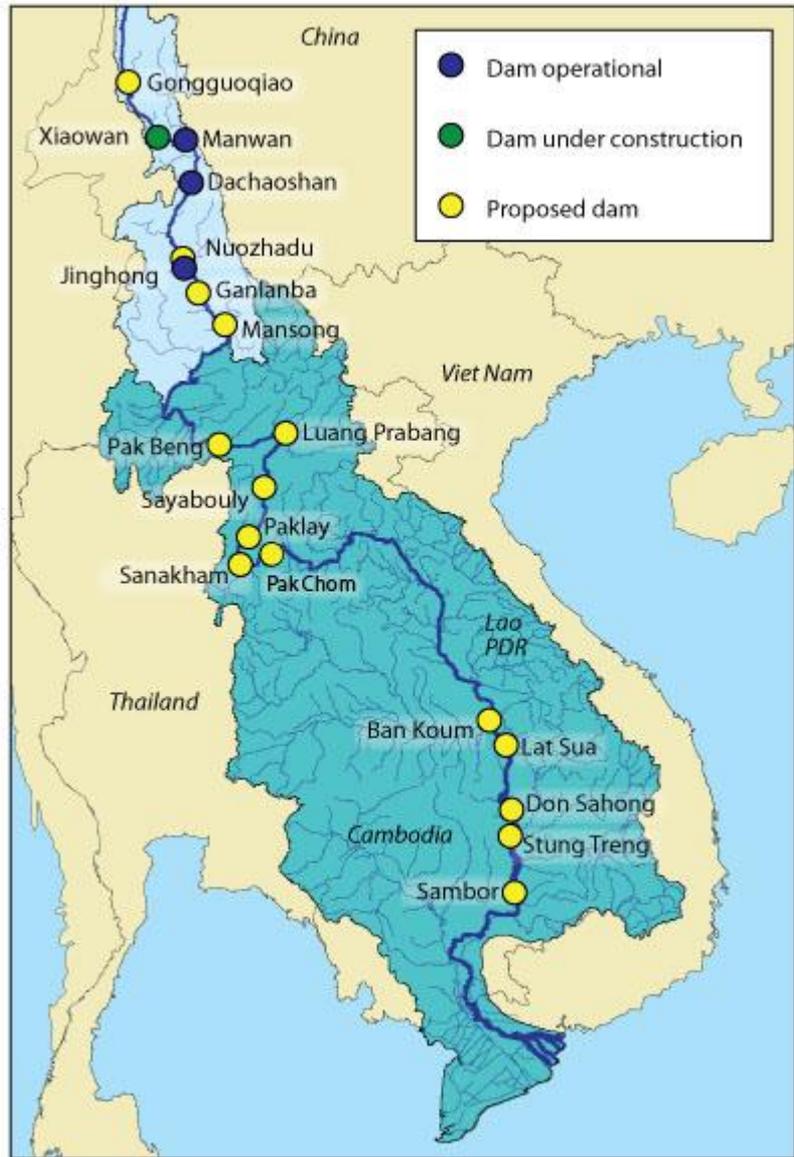
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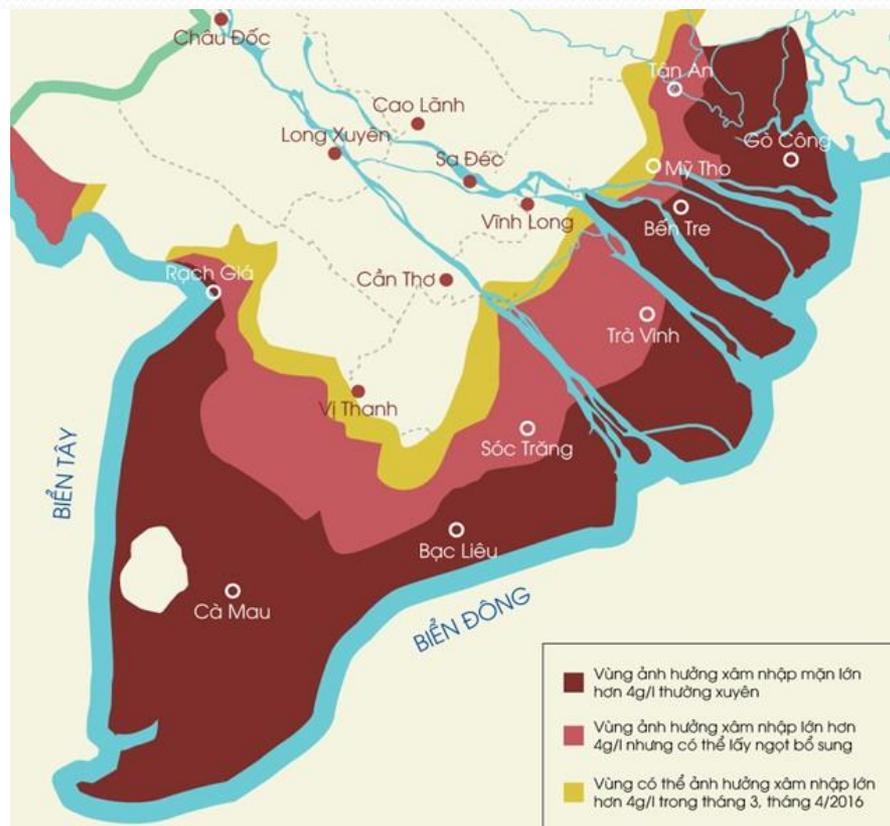
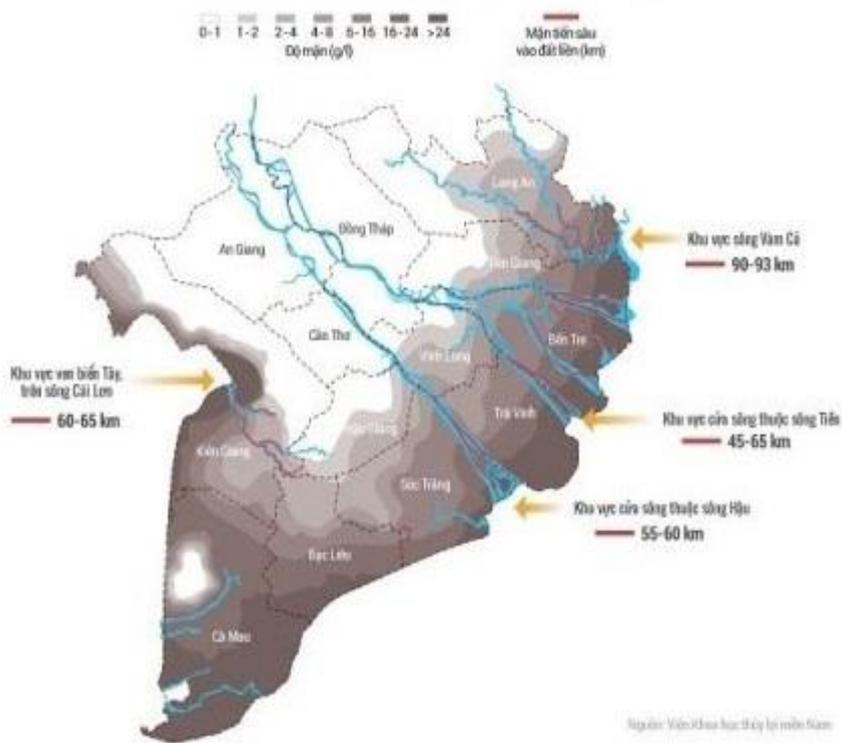
# Development of hydropower in Mekong River

- Salt intrusion;
- Irregular flood regimes;
- Water shortage for living, agriculture, industry and other services;
- Decreasing in sediment and nutrient;
- Costal line erosion;
- Decreasing in ground water table ;
- Land subsidence;
- Environmental pollution;
- Negative impact for ecological system



# Salt intrusion in Mekong River-Viet Nam

Xâm nhập mặn tại đồng bằng sông Cửu Long



# Flooding and water shortage in Mekong River-Viet Nam



# Coastal erosion in Mekong River-Viet Nam



# Biodiversity decrease in Mekong River-Viet Nam



# Existing and ongoing/planning programmes in Mekong Delta - Viet Nam

- 1. 1983-1990 (survey program): Natural conditions for planning of social-economic development**
- 2. 2000-up to now (KC.08): Solution for flood control, drought, salt intrusion, environment.**
- 3. 2011-2015 (scientific program for respond climate change respond): Adaptation and mitigation**

# Existing and ongoing/planning programmes in Mekong Delta- Viet Nam

- 4. 2014-2019 (Southern-west region program): Natural conditions for planning of social-economic development**
- 5. 2000-upto now (KC.08): Solution for flood control, drought, salt intrusion, environment.**
- 6. 2016-upto now (scientific program for climate change respond): Adaptation and mitigation**

## Existing and ongoing/planning projects in Mekong delta

- 7. Research on coastal erosion from Ca Mau – Ha Tien;**
- 8. 2000-upto now (KC.09): Solution for sustainable development of sea-economy;**
- 9. Project: Denmark, Netherlands, WB (ODA)**
- 10. Evaluation of ground water in in Me Cong Delta;**
- 11. Evaluation of land subsidence in Me Cong Delta (Approved by VN Government-2016).**

## National action Programmes

- 1. Determine the water use under upstream conditions and climate change (Update the hydrological regime from upstream-China; evaluation of existing observation system)**
- 2. Analysis and prediction of social-economic impact under different scenarios (water use; climate change)**
- 3. Integrate solutions for sustainable development in consideration of natural resources (soil, water), energy, food security and climate change with regional scale.**

## National action Programmes

### **4. Apply advantage technology from developed countries to Mekong Delta.**

- Install the automatic observation system for salt, sediment concentration.**
- Use solutions (Engineering and management) for coastal line erosion, land subsidence.**
- Green economy model (renewable energy, mangrove forest).**
- Change the cropping patterns.**

**THANKS FOR YOUR ATTENTION**

