National Symposium on Climate Change Adaptation

Putrajaya, Malaysia 16-17 November, 2011

Climate Change Adaptation in the Agriculture and Water Sectors: Impacts, Strategies for Adaptation in Mekong and Red River Deltas

Tran Dinh Trong
Vietnam Institute of Meteorology, Hydrology and Environment

Outline

1. Introduction
2. Climate Change Impacts on Water Resources in MRD and RRD
3. Climate Change Impacts on Agriculture in MRD and RRD
4. Climate Change Adaptation in Water Resources in MRD and RRD
5. Climate Change Adaptation in Agriculture in MRD and RRD

1. Introduction

- Country position: Southeastern Asia, 8º27 to 23º23N and 102º08 to 109º30E

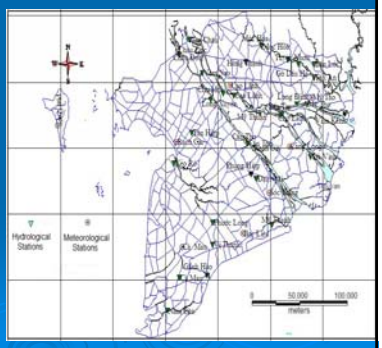
-Area: 330,990 km²

-The coastline length: 3,260 km

- Climate: Tropical monsoon suffering from natural disasters such as typhoons, floods, drought,… which affected regularly to socio-economic development

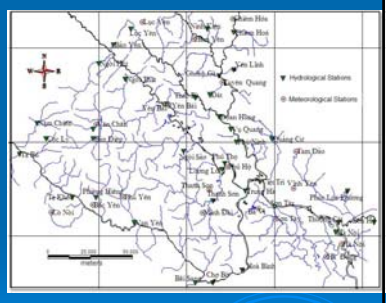
Mekong River Delta

- Accounting for 60.82% of total water throughout Vietnam.
- Affected by strong tidal flow
- The impact of climate change, sea level rise leading to narrowing of the arable land area Mekong



Red River Delta

- Red river system is the second largest river system in Vietnam
- Annual rainfall is unevenly distributed and large differences between regions are due to the influence of topography.
- The rainy season accounts for 75-85% of the total annual rainfall, dry season about 15-20% of the total annual rainfall.

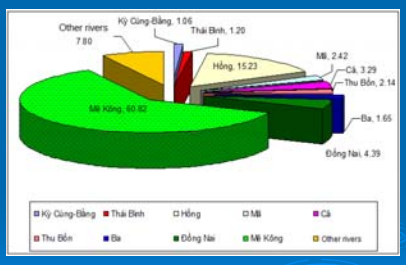


2. Climate Change Impacts on Water Resources in Mekong and Red River deltas

2.1 Overview on water resources

- Water resources consist of surface water, rainwater, ground water, seawater
- The surface water is usually exit in lakes, ponds, reservoirs, marshes, fields, snow and ice. Water resources in lakes are the essential component, which are widely used for everyday activities and manufacture
- Basing on the data measuring from the gauging-stations in Vietnam, the meteorologists have estimated the total average amount of river and lake water in Vietnam is approximately 835 billion m3, of which 522 billion m3 (62,5%) come from the outers, only 313 m3 (37,5%) is from the inside country (usually called the inner flow).

- The biggest river water is from Mekong river reserves system, making up 60.8%, Red river system holds 15,23% comparing to all the areas in the country.



2.2 Estimation the impacts of climate change on water

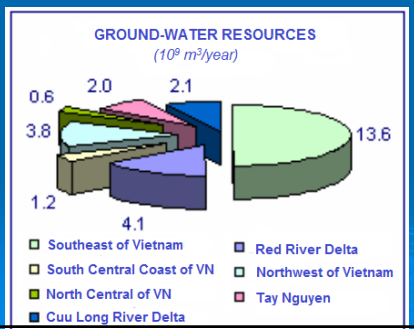
Characteristics of rainfall distributions in Red river and Mekong river system

River system	Rainy season		Three uninterrupted highest months		The highest month		Dry season		Three uninterrupted lowest months		The lowest month	
	Month	%	Month	%	Month	%	Month	%	Month	%	Month	%
Red	May-Sep., Oct.	80,8	Nov.-Aug.	51,6	Jul.-Aug	19,6	Oct, Nov-Apr.	19,2	Dec, Jan.-Feb.	4,3	Dec.	1,18
Mekong	May-Oct	85,7	Aug-Oct	46,3	Oct	17,6	Nov.-Apr	14,3	Jan.-Mar.	1,5	Jan., Feb.	0,24

Characteristics of water flow distribution in Red river system

Number of gauging-station	Characteristics	Flood season		Draught season		Three highest months		The highest months		Three lowest months		The lowest months	
		Month	%	Month	%	Month	%	Month	%	Month	%	Month	%
56	On average	Jun.-Sep.	74,49	Oct	25,51	Jul.-Sep.	53,86	Jul., Aug.	21,66	Jan.-Mar	8,22	Jan-Feb	2,34
	Highest	May,Jun	82,49	Nov-Apr.	33,47		67,39		31,26	Feb-Apr	20,97		4,18
	Lowest	Oct,Nov	66,53	May	17,51		39,49		13,56		3,85		1,12

Distribution of ground-water resources in Vietnam



3. Climate Change Impacts on Agriculture in Mekong and Red River deltas

3.1 *Overview on agriculture*

Order	Areas	Rice area (thousand ha)	% of the area compared to country	power (tons/ha)
1	Mekong Delta	**3683,6**	**51,2**	**5,1**
2	Red River Delta	**1158,1**	**15,4**	**5,7**
3	North Central Coast	683,2	9,5	4,7
4	Northeast	552,5	7,7	4,6
5	South East	431,6	6,0	4,2
6	South Central Coast	375,8	5,2	5,1
7	Highlands	205	2,8	4,2
8	Northwest	157,7	2,2	3,6
	Country	**7201,0**	**100**	**5,0**

3.2 Estimation the impacts of climate change on agriculture

a. Land Resources

In Mekong River Delta

Scenarios	Sea level rise (m)	Tidal Peak (compare to mean sea level)	Tidal Peak higher than mean terrain	Saline Area (1000 ha)
Present		1.0-1.5		1.303
B1 (2100)	0.69	1.70-2.20	0.2 - 0.7	1.493
A1FI (2100)	1.00	2.00-2.50	0.5 - 1.0	1.637

In Red River Delta

Scenario	height (m)	Red River Delta	
		Area external of dykes (ha)	Area internal of dykes (ha)
Present			
Completely flooded region	< 0,8 m	1.423	2.013
Semi-submerged region	< 1,5 m	24.136	157.781
Sea level rise of 0.69 m (in 2100)			
Completely flooded region	< 0,8 m	18.576	114.645
Semi-submerged region	< 2,2 m	37.030	263.319
Sea level rise of 1.0 m (in 2100)			
Completely flooded region	< 1,5 m	24.136	157.781
Semi-submerged region	< 2,5 m	43.433	321.998

The impact of climate change on flood conditions in RRD

b. Planting seasons

Provinces in RRD	Winter spring		Late spring		Change	
	% Area	Productivity (tons/ha)	% Area	Productivity (tons/ha)	% Area	Productivity (tons/ha)
Ninh Binh	5,60	5,02	94,40	6,23	88,80	1,21
Nam Dinh	1,00	6,09	99,00	7,02	98,00	0,93
Vinh Phuc	16,50	4,72	83,40	5,64	66,90	0,92
Ha Noi	6,20	4,82	70,80	5,63	64,60	0,81
Ha Nam	0,10	5,19	95,80	5,86	95,70	0,67
Ha Tay	2,60	5,74	95,10	6,08	92,50	0,34
Bac Ninh	3,00	5,81	90,20	6,00	87,20	0,19
Hai Duong	37,90	6,45	61,66	6,64	23,70	0,19
Hai Phong	31,40	6,01	62,80	6,12	31,40	0,11
Hung Yen	6,7	6,47	94,30	6,45	87,60	-0,02
Thai Binh	26,7	7,04	73,30	6,87	46,60	-0,17
Mean	12,52	5,76	83,70	6,23	71,18	0,471

c. Crops yield

- Yield and production of food have reduced due to CC (scenario B2)

Time	2030	2050
Spring rice	1,2 million tons	2,16 million tons
Summer autumn rice	743,8 thousand tons	1475 thousand tons
Corn	500,4 thousand tons	880,4 thousand tons
Soy	84,47 kg/ha	214,41 kg/ha

- Losses rice production (if sea level rise 1,0 m)

Provinces in MRD	Area (thousand ha)			Average power (tons/ha/crop)	Number of crop/ year	lost yield (thousand tons)
	Natural land	Natural land is flooded	Land Agricultural is flooded			
Ben Tre	231,5	113,1	81,7	4,06	2,0	663,7
Long An	449,2	216,9	160,0	4,08	2,0	1.305,3
Tra Vinh	222,6	102,1	83,5	4,43	2,0	739,9
Soc Trang	322,3	142,5	116,6	4,93	2,0	1.150,1
TP. HCM	209,5	86,2	39,2	3,17	2,0	248,6
Vinh Long	147,5	60,6	49,2	4,77	2,0	468,9
Bac Lieu	252,1	96,2	80,4	4,66	2,0	749,0
Tien Giang	236,7	78,3	60,1	4,90	2,0	588,5
Kien Giang	626,9	175,7	112,8	4,61	2,0	1.040,5
Can Tho	298,6	75,8	64,6	5,18	2,0	669,6
Sum	**2.996,8**	**1.147,4**	**848,1**	**44,79**		**7.597,4**
Structure (%)		**38,29**	**32,16**			**40,52**

d. Pest and diseases

- Climate change also changes the living conditions of the creatures
- Losing or changing the link in the chain and food webs
- disappearance of some species and increased pest the disease.

4. Climate Change Adaptation in Water Resources

4.1 Red river system

- Continuing to develop multi-functions reservoir systems and small reservoirs.
- Upgrading and building salt preventing projects in coastal areas.
- Reinforcing, improving embankment and dyke systems.
- Improving irrigation canals, flood drains.
- Changing land using purposes, plants and farming schedule.
- Saving and using water resources reasonably and effectively
- Protecting and forestation watersheds; exploiting water and soil resources effectively.
- Building projects on collecting, solid garbage treatment in residential areas, urban areas, and industrial zones.
- Increasing water resources management in river basins.
- Supplementing, completing operation process for multi-function reservoirs within river system.
- Cooperating with China in exploiting, using and protecting Red river water resources.

4.2 Mekong river system

- Completing and reinforcing the approved water conservation projects in MRD. Those projects aim at avoiding flooding and increasing the flood drain speed; building and completing the residential areas near the flooded areas and flood control dykes in AnGiang, DongThap and LongAn; widening drainage canals to west sea (Thailand bay) and to Tien river.
- Programming and gradually building dykes along East and West coastal areas to prevent salt contamination in case the seawater level may rise.
- Building salt preventing drains in risky areas.
- Programming land using in the conditions of seawater rising to change plant, domestic, and crop mechanism.
- Using different methods in saving fresh water in coastal areas such as Ben Tre, Bac Lieu, Soc Trang, Ca Mau which are most affected by tide.
- Increasing different methods in protecting environment and preventing water contamination; supervising the sewage treatment in factories, industrial zones; making strict law to impose a fine to any institution that breaks the law.
- Speeding up the activities of the Commission's Mekong river in water resources management; increasing the assistance between nations in upstream.

5. Climate Change Adaptation in Agriculture

5.1 in the MRD

- Upgrading and developing the dike system, to block floods;
- Planning of inland river systems, reservoirs and irrigation systems;
- Development of sustainable forestry, restoration, planting and protecting mangrove forests;
- Rehabilitation and development of rice varieties that have ability salinity tolerance, drought tolerance, heat and flooding, with high resistance to pests and diseases.
- Stepping up the propaganda and rapid transfer of plant varieties resistant to adverse conditions of the environment to serve the production.

5.2 in the RRD

- Afforestation and watershed protection to ensure security flow.
- Building reservoirs upstream the river to flood during the rainy season and store, stable water supply for dry season river dyke system upgrades to ensure the safety of downstream areas.
- In estuaries and coastal provinces such as Nam Dinh, Thai Binh ... to build sewer systems and dams to prevent intrusion of sea level rise and mangrove upgrade and improve the bottom drain and sea dykes;
- Investment in new construction, upgrading and modernization of irrigation such as lakes, dams, pumping stations for irrigation, drainage in the RRD. Accordingly, the RRD will be upgraded and new built 272 reservoirs, 572 pumping stations to provide water for 398,000 ha of agricultural land, 398 upgrade pump stations, sewer standards and building 143 new works to ensure that targets for 1.162.160ha.
- Protection and planting of mangroves: This is a belt of coastal protection against the effects of storms and sea level rise. At the same time, it also works to protect sea dikes and ensure the development of biological diversity of plants and animals under the forest.

Thanks for your attention!

Mangroves against climate change in Hai Phong Province