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The Climate Change Influences on the Trees and a Life of Men in the Mekong River Delta—Remedial Actions

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Abstract: Mekong River Delta has many home-gardens, here, everybody organizes the tourisms. We observed the real situations and substances, evaluation, a choice at some households in the Mekong River Delta in order to have a purpose of search, here, they have the home-gardens; the farmers plant fruit trees at the villages of provinces, that is a place which is influenced by the climate change. We went to the villages such as: Hiep Thanh village, Chau Thanh district, Long An province; Tan Phu village, Tan Phu Dong district, Tien Giang province; Tieu Can village, Tieu Can district, Tra Vinh province to observe the landscape (here 10 households for 1 village), and we took the sample to analyze. We knew the factors such as: drought, deficiency of water, salt water intrusion, flood. These factors influence the trees, assets, diseases, lives of the persons who stay here, and cause many damages. We compare many home-gardens having a climate change with the normal home-gardens. Thus, we propose the reasonable methods in order to fix the consequence and prevent the salt intrusion, flood, important damages… And we present some illustrations.

Key words: Climate change, trees, men, home-gardens.

1. Necessary Cause of Research

Nowadays, the climate change happens anywhere from a hot sun in Europe to a flood in the Asia, Vietnam country is affected, too. Mekong River Delta is in the South of Vietnam, without exception: the weather, the climate, the plants must all change badly.

The factors of climate change include: the high temperature, the rainfall changes: the drought, the salt, the flood, the stormy rain: the biodiversity disappears and the health of men was threatening [1].

In the Mekong River Delta, the climate change had flood, landslide, drought, salinity [2] …; bearing all obligation, we must research in order to have one good method which overcomes the consequence. In this report, we would present about our studies, specially, we notice about the salt factor, it affects the plants and the men, then we present the remedial actions and the petitions.

2. Introduction

Total area of Mekong River Delta: 3.94 million hectares, the population: 17.5 million persons (it occupies 12% of the natural area and 20% the population of the country, in year 2024), it has an important role for the economy of my country.

2.1 The Impacts of Climate Change

The impacts of climate change include: The impact and a change of extreme weather; the impact on the food security; the impact on the industry; the impact on the natural resources; the impact on the disappearance of biodiversity; the impact on the financial market; the impact on the poverty and the immigration; the serious damage to socio-economics; the effect on the health of the persons, many dangerous diseases [3].

2.2 Reason of the Dry and Salty Soil in the Mekong River Delta in the Year 2024

The stations have the water level that is low; The contiguous zone between Vietnam and Cambodia is hot sun and drought; This year, the hydroelectric dams of

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the upstream drained water with the little traffic; This year, with the little rainfall, therefore a water level of the natural river is low; Ho sea in Cambodia is a place of the upstream in the Mekong River, the water level is lower than the other year about 0.7 m…; At last, China has an activity of Tarpaulin dam, with a capacity: 1.400 MV, it begins operation since February 1th, year 2024, on the principal branch of Mekong River, it kept the water very much, it affects the amount of water to the downstream of Mekong River here, Mekong River Delta.

The salty water is a factor limiting the agricultural production, firstly, the plants such as: dragon, durian, longan, coconut, orange, tangerine trees…, those are: small fruits, not tasty.

We see the following table (Table 1) of salt water intrusion at some branches of Mekong River Delta [4].

The damages of the Sud West with the salted periods in the year 2024 [4] is shown in Table 2.

2.3 Flood (Next Report)

The water logging is always a phenomenon at the Mekong River Delta, firstly, that is a depression area and a zone between Tien and Hau River. Therefore, it affects an acreage, a productivity of the garden and the field.

3. Materials and Methods of Research

3.1 Materials

Materials include: lands, home-gardens, trees, the laboratory, instruments, chemicals to experiment.

3.2 Methods

3.2.1 Method of Data Collection and Analysis

We have information because we aggregate many other sources such as: data, online manual, data of irrigation department, statistic department, statistic room of district.

Table 1 At the present, salt water intrusion is at some branches of Mekong River Delta (it is exceeded year 2016).

Order	River	The depth of saltwater intrusion Salty dick kg/L (Kw)	It compared to the same period (+ / - km)		
		The week Since 28/03-03/04/2024	2016	2020	2023
1	Area of two Vam Co River				
2	Vam Co Dong	70	-30	-19	+5
3	Vam Co Tay	78	-27	-65	+14
4	Area of river mouth at Mekong River				
5	Cua Tieu River	50	+7	-39	+4
6	Cua Dai River	48	+5	-41	+9
7	Ham Luong River	60	-4	-18	+22
8	Co Chien River	37	+3	9	+1
9	Hau River	36	-8	+9	+2
10	Area of the West coast on CaiLon River				
11	CaiLon River	51	-16	-11	+7

Source: Irrigation Department, 2024.

Table 2 Preliminary damages of Mekong River Delta by many times of saline drought at year 2024.

Order	In year 2011-2016	In year 2019-2020	In year 2023-2024
1	405.000 ha of rice	58.400 of rice	1.581 ha of rice
2	80-100 ha flowers	1.241 ha flowers 25.120 ha fruit trees	4642 ha lemon and fruit trees
3	82.000 ha	17.203 ha plant seafoods	-
4	210.000 Households have little living water.	95.600 Households have little living water.	73.900 Households have little living water (to 27/04/2024).

Source: Irrigation Department, 2024.

3.2.2 An Observation of Fieldwork

An investigation of the salt soil is at Hiep Thanh village, Chau Thanh district, Long An province; Tan Phu village, Tan Phu Dong district, Tien Giang province; Tieu Can village, Tieu Can district, Tra Vinh province… An investigation is conducted about the households having many fruit trees at the salt soil.

3.2.3 Method of an Evaluation and Statistics

We had statistics by the results that we collected and we propose many effective models. An application and an analysis about nutrient ingredient of fruits in the laboratory were given. We propose and write a report.

4. Results of Research

In the Mekong River Delta, the farmers plant many fruit trees, these trees are thirsty and need water very much, mostly dragon trees having the revelation clearly, specially, red fleshed dragon fruit (*Hylocereus undatus* (Haw) Britt and Brown-Cactaceae) [5].

Durian, longan, jackfruit are nutritious [6], and sensitive, too; coconut tree is sensitive a little. But, in year 2024, here, the salinity is high, therefore many trees die, fruits fall or a form of fruit changes, the small fruit, not delicious.

We see the following table (Table 3) about the ingredient of biochemistry of the white fleshed dragon fruits.

In Table 3, in the white fleshed dragon fruit, we have the ingredients of protein, organic acids, carbohydrate, vitamin C, K, energy, Ca, Mg…

Table 3 The ingredient about biochemistry of the white fleshed dragon fruit.

Order	Ingredient	Unit of calculation	In 100g can eat
1	Carbohydrate	g	10.10
2	Total saccharose	g	12.50
3	Organic acids	g	0.63
4	Protein	g	0.53
5	K	mg	212.20
6	P_2O_5	mg	8.70
7	Ca	mg	134.5
8	Mg	mg	60.40
9	Vitamin C	mg	14.40
10	Energy	calo	50.00
11	Fiber	g	0.71

Source: Analysis at the laboratory of University of Agriculture, in year 2000.

Table 4 The ingredient about biochemistry of the red fleshed dragon fruit.

Order	Ingredient	Unit of calculation	In 100g can eat
1	Protein	g	0.60
2	Lipid	g	0.20
3	Glucose	g	24.00
4	K	mg	221
5	Fe	mg	0.45
6	Ca	mg	8.50
7	P	mg	35.10
8	Beta-caroten (vitamin A)	μg	0.12
9	Acid ascorbic (vitamin C)	mg	9.01
10	Niacin (PP)	mg	0.45
11	Thiamin (vitamin B_1)	mg	0.10
12	Riboflavin (vitamin B_2)	mg	0.10
13	Energy	Calo	54.00
14	Fiber	g	0.90

Source: Analysis at Experimental analysis Center, 2023.

Table 5 The ingredient about biochemistry of the red fleshed dragon fruit that were salted.

Order	Ingredient	Unit of calculation	In 100g can eat
1	Protein	g	2.0
2	Lipid	g	0.10
3	Glucose	g	20.10
4	K	mg	208.00
5	Fe	mg	0.50
6	Ca	mg	6.50
7	P	mg	32.04
8	Beta-caroten (vitamin A)	µg	0.11
9	Acid ascorbic (vitamin C)	mg	10.81
10	Niacin (PP)	mg	0.35
11	Thiamin (vitamin B_1)	mg	0.10
12	Riboflavin (vitamin B_2)	mg	0.10
13	Energy	Calo	52.00
14	Fiber	g	1.20

Source: Analysis at Experimental analysis Center, 2024.

In Table 4, the ingredient about biochemistry of the red fleshed dragon fruit is very much, here, we have many vitamins such as: A, B_1, B_2, PP…

In table 5, we see: in the red fleshed dragon fruit that were salted, many ingredients change, the great part is lower, but the fiber is higher, the fruits are small, and not delicious.

5. Conclusion

The Mekong River Delta has tourisms, home-gardens are evaluated as a place which has a potential about the natural resources; it contains a quantity of silt and remarkable seafoods [7-10]. However, we pay attention to 2 factors:

The flood water: a source of seafoods, this is beneficial to the people, helps wash away dirt, washes the alum, and carries alluvium, but it causes damage, too. Firstly, it brings many illnesses to the persons [11] (we will present in the next report).

The salinity: it causes the plants to decrease productivity, even the rice, fruit trees, flowers …die, when the income reduces, the quantity reduces, too and the formers have not the revenue sources, the socio-economic side was affected, the food security was threatened [12, 13].

6. Petition

By many inconveniences in the Mekong River Delta, we would have petitions; about many methods against the salt water intrusion: Everyone selects relevant plants; Everyone relevant designs ditch and gardens; Everyone must reserve the water for the plants and the men in the dry season; When the salted degree is more than one in a thousand (1‰) in some areas, everyone can change durian, orange, longan, tangerine by tamarind, lemon trees…; Everyone does not use chemical fertilizer, herbicides pesticides [14] must decrease the nitrogen fertilizer, and must increase the organic fertilizer; Everyone must spray the foliar fertilizer having Ca K, Mg, Si…; Everyone does not handle the flowering trees before the salty intrusion; Everyone must close the sluice gates to prevent the salt intrusion in Mekong tributary [15]; In the Ben Tre province, there is a joint stock company that carried away the raw water from an upstream of Tien River to pump for the factories which handle and give the local people; In the Soc Trang province, a joint stock company asks for permission to build one water factory with a big capacity more than 10,000 m^3/day and night serving the people; The An Giang province has the high topography, everyone builds many big pools in the rainy season to reserve water for the dry season; At the salt zone, the people must have water storage, use water little by little.

Abbreviations

H_2O: water; Ca: Calcium; P: Phosphor; K: Kalium;

Fe: Ferrum; Mg: Magnesium; Na: Sodium; Cu: Copper; Mn: Mangan; Se: Selenium.

Conflict of interest

The author agrees that it has not one benefit conflict which is relative with the publishing result. We declare no conflict of interest.

Contribution of the Author

An Nguyen Thi Ngoc: The author observed, investigated, searched everywhere about the trees, controlled the experiments, studies, wrote and prepared, presented a report.

Trang Huynh Nguyen Thuy: gathered the information and made the experiments.

We guarantee to talk exactly.

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Appendix: There are Figures of the Soil Which was Salted

Fig. 1: The garden of dragon fruit.

Fig. 2: The dragon fruit garden was salted.

Fig. 3: Dragon fruits: white, red.

Fig. 4: The red dragon fruits were salted.

Fig. 5: The durians were salted.

Fig. 6: The tangerine trees were salted.

Fig. 7: Coconut tree and Nypa palms were salted.

Fig. 8: Here, this is a drought, no water.