

The Climate Change Responses in the Mekong River Delta

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Abstract: 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 village of province, that is a place which influences by the climate change. We went to the alluvial soil such as: My Hoa village, Thap Muoi district, Dong Thap province to observe the landscape, here (30 households for 1 village), and we took the sample to analyze. We knew the factors such as: a drought, a deficiency of water, a salt water intrusion, a flood. These factors: influence to the trees, many damages, assets, diseases, live of the persons who stay here. We compare many home - gardens having a climate change with the normal home - gardens. Here, especially, we take care to study the flood because it is very important. Thus, we propose the reasonable methods in order to fix the consequence and prevent, we present some illustrations, too.

Key words: Climate change, trees, home-gardens, flood, illustrations.

Abbreviations

UNDP	United National Development Program
WMO	World Meteorological Organization
H ₂ O	water
Ca	Calcium
P	Phosphor
K	Kalium
Fe	Ferrum
Mg	Magnesium
Na	Sodium
Cu	Copper
Mn	Mangan
Se	Selenium

1. A Problem Statement—A Necessary Cause of Research

The recent years, the citizens of the world must struggle against: extreme weather by climate change, from a lot sun in Europe to the flood in the Asia; this year alone 2024, in Europe, the hot sun causes 44,000 dead persons (according to WMO).

Recently, at the Korea, there is a forest fire in March of 2025, that causes 31 dead persons, more than 7,700

demolished buildings, an economic loss is nearly 1 billion dollars.

At the day 8th July at year 2025 in Texas, there is a flash flood with 120 persons died, more than 160 missing persons and Mexico (USA) with 3 dead persons, 10 houses are suffered damages. In the middle of the mountain area of China and Nepal: one flash flood causes 9 dead persons, 30 missing persons, one blood vessel bridge connection 2 countries which is washed away; and the other big flood of China, at Qui Chau province causes more 100 persons died, thousands of cars were float along the water. And Spain, a lot sun causes 11,890 persons died, in Europe, 2,300 persons died [1]. At Vietnam country, a disaster by flash flood causes, too, especially, in the Mekong River Delta.

It is principal about these disasters, by climate change, at Rio de Janeiro (Brazil), an expended Summit conference BRICS takes place at 7th July at year 2025 with a high—level meeting about “Environment, COP 30 and global health”, under the chairmanship of Brazil President Lula de Silva, Chairperson of BRICS at year

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2025. In Vietnam country, our Prime Minister participated, he proposed 5 factors about: “a climate, a medicinal, a health of men, an environment, a finance, a responsibility, a sustainable development...”

2. Introduction

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

The factors of climate change include: the high temperature, the rainfall changes: drought, salinity, flood, stormy rain, biodiversity disappears and the health of men was threatening [2, 3].

In the Mekong River Delta is a place which develop the ecotourism [4], the climate change make flood, landslide, drought, salinity [5]. In this report, we would present about our studies, specially, we notice about the flood factor, it affects to the plants and the men, then we present the remedial actions and the petitions.

2.1 The Impacts of Climate Change

The impact and a change of extreme weather.: the impact to the food security; the impact to the industry; the impact to the natural resources; the impact to the disappearance of biodiversity; the impact to the financial market [6]; the impact to the poverty and the immigration; the serious damage to socio – economics; the effect to the health of the persons, many dangerous diseases [2, 7].

2.2 The Flood

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

The depth of flooding level was hierarchical such as: [8]

→ Flooding very deep: > 2m: Tan Chau, Chau Doc.

→ Deep flooding: 1.5-2 m: Long Xuyen.

→ Enough deep: 1-1.5 m: Dong Thap, Minh Hai, Can Tho, Moc Hoa.

→ Average deep: 0.3-0.6 m: TanAn, Soc Trang, Rach Gia.

→ Flooding-little: < 0.3 m: Bac Lieu, My Tho, Ben Tre

→ No flooded: at the mountainous area.

The consequence of the flood

Of course, the flood brings to the alluvium, it can erase the alum kali, prevents salinity, it provides a profit source of the big seafood. However, we talk that it has following defects: It causes a pollution in water source when we have a flood; the flood leads to many kinds of diseases; it causes usually the men die because they do not swim or thunderstorm overturns the boats [9, 14].

At year 2000, in the Mekong River Delta, this is a fear for the people here. The big flood causes many trees fall down in the gardens, the fallen fruits such as: durians, longans, oranges, tangerines, papayas, jack fruits, rambutans... This flood causes 539 persons who die (among them, there are 300 children), 212 persons was injured, more than 9,457 houses were collapsed completely. A quantity of helper are more 500 persons. It's more than 80.000 students who did not go to school since 1 to 3 months. Total damages were estimated at more 4 billion the Vietnamese Dong.

3. Materials and Methods of Research

3.1 Materials

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

3.2 Methods

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. An observation of fieldwork. An investigation of the My Hoa village, Thap Muoi district, Dong Thap province... to study the flood. An

investigation about the households having many fruit trees.

- Method of an evaluation and a synthetic. We had statistics by the results that we collected. We propose many effective models [11];

- Having an application; An analysis about nutrient ingredient of fruits in the laboratory; Write a report and we propose.

4. Results of Research

In the Mekong River Delta, the farmers plant many

fruit trees, these trees need have waters, but, when water is with a big quantity, causes deluge for the dragon trees having the revelation clearly, specially, durian, longan, jackfruit ...Therefore, many trees die, fruits fall or a form of fruit changes [12].

In Table 1, the ingredient in the lemon fruits is changed if we compare the fruit trees in the normal home-gardens, and the quality of fruits are not delicious, too.

In Table 2, the ingredient of Pomelo is changed after the flood, the quality of fruit is bad [14].

Table 1 The ingredient of nutrients in lemon juice (*Citrus aurantifolia*. Sw–Rutaceae) [13].

Order	Ingredient	Unit of calculation	In 100 g of the lemon juice	After the flood
1	H ₂ O	(g)	91.63	93.34
2	Energy	(Calo)	24.00	23.10
3	Protein	(g)	0.38	0.28
4	Lipid	(g)	0.00	0.00
5	Glucid	(g)	8.63	5.09
6	Mineral	(g)	0.26	0.18
7	Fiber	(g)	0.40	0.35
8	Ca	(mg)	7.00	6.01
9	Fe	(mg)	0.10	0.05
10	Mg	(mg)	6.00	5.45
11	P	(mg)	6.20	5.84
12	K	(mg)	124.0	114.00
13	Na	(mg)	1.00	0.82
14	Zn	(mg)	0.05	0.03
15	Cu	(mg)	0.03	0.02
16	Mn	(mg)	0.008	0.008
17	Se	(mg)	0.10	0.10
18	Vitamin C	(mg)	46.00	49.32
19	Vitamin B ₁ (Thiamin)	(mg)	0.03	0.02
20	Vitamin B ₂ (Riboflavin)	(mg)	0.01	0.01
21	Vitamin PP (Niacin)	(mg)	0.10	0.10
22	Vitamin B ₅ (Pantothenic acid)	(mg)	0.103	0.05
23	Vitamin B ₆	(mg)	0.051	0.02
24	Folate total	(mg)	13.00	11.84
25	Choline	(mg)	5.10	5.00
26	Beta - carotene	(μg)	3.00	2.12
27	Cryptoxanthin beta	(μg)	17.00	15.21
28	Lutein	(μg)	9.0	6.25
29	Vitamin E	(mg)	0.15	0.13

(Source: Analysis at Experimental analysis Center, 2024).

Table 2 The ingredient of nutrients in the Pomelo (*Citrus grandis* L-Rutaceae) [13].

Order	Ingredient	Unit of calculation	In 100 g of Pomelo juice	After the flood
1	H ₂ O	(g)	89.00	92.20
2	Energy	(Calo)	39.00	38.10
3	Protein	(g)	0.93	0.81
4	Lipid	(g)	0.10	0.01
5	Glucid	(g)	7.80	5.81
6	Fiber	(g)	0.40	0.50
7	Ca	(mg)	12.00	10.00
8	Fe	(mg)	0.39	0.19
9	Mg	(mg)	9.00	7.12
10	P	(mg)	26.00	20.14
11	K	(mg)	841.00	561.00
12	Cu	(mg)	0.08	0.05
13	Mn	(mg)	0.33	0.18
14	Vitamin C	(mg)	31.00	32.25
15	Vitamin B 1 (Thiamin)	(mg)	0.016	0.012
16	Vitamin B 2 (Riboflavin)	(mg)	0.06	0.02
17	Vitamin PP (Niacin)	(mg)	0.30	0.19

(Source: Analysis at Experimental analysis Center, 2024).

Table 3 The ingredient of nutrients in the durian (*Durio zibethinus* Murr-Bombacaceae) [13].

Order	Ingredient	Unit of calculation	In 100 g of the durian	After the flood
1	H ₂ O	(g)	64.00	67.00
2	Energy	(Calo)	153.00	141.00
3	Protein	(g)	2.70	1.22
4	Lipid	(g)	3.40	3.10
5	Carbohydrate	(g)	24.90	20.18
6	Minerals	(g)	103.90	80.24
7	Beta – carotene	(µg)	124.00	84.12
8	Vitamin B 1 (Thiamin)	(mg)	0.10	0.10
9	Vitamin B 2 (Riboflavin)	(mg)	0.13	0.08
10	Vitamin C	(mg)	23.30	25.20
11	Fiber	(g)	3.12	3.16

(Source: Analysis at Experimental analysis Center, 2024).

In the Table 3, after having a flood, many ingredients of durians change, too, the quality is not delicious, not tasty [14].

5. Conclusion

The Mekong River Delta is evaluated a place which has a potential about the natural resources, it contains a quantity of silt and remarkable seafoods. However, we pay attention to 2 factors: the flood water and the salinity.

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. We must have a prevention of diseases; make gardens meticulously, carefully; select suitable planting soil [15].

The salinity: (we had a last report).

6. Petition

By many inconveniences in the Mekong River Delta, we would have petitions about many methods against

the flood: Firstly, everyone has an immigration of the people who live in the riverwalk, here is a flood; at some gardens having a deep flood, the farmers do not plant: longan, orange, tangerine, jackfruit, papaya... if they want to plant them, they must mound planting; everyone builds a system of dikes, canals.; at the deep flood very much, everyone increases to make the embankments, everyone plants water hyacinth, too , and the farmers do not use the chemical fertilizers, herbicides [16]; everyone plants the trees of forests, a renovation and a protection... are very necessities, especially, we do not use the chemical fertilizer [11].

7. Benefit Conflict

The author agrees that it has not one benefit conflict which is relative with the publishing result.

Contribution of the Author

An Nguyen Thi Ngoc: The author observed, investigated, searched everywhere about the trees, made the experiments, studies, wrote and prepared, presented a report. We guarantee to talk exactly.

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APPENDIX: Figures of the Soil Were Flooded.



Fig. 1 The torrential rain, crowd in the city, water very much.



Fig. 2 Water is round trees, houses.



Fig. 3 Persons and animals must stay on the roof.



Fig. 5 The home-garden of longan was flooded.



Fig. 4 Water is high to the abdomen of person.



Fig. 6 The home-garden of orange was flooded.