



Comparative study of soil and water quality under various agricultural land uses Palian Canal Area Village No 1, Palian Subdistrict, Palian District, Trang Province

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Introduction

Water and soil are common in various parts of the planet and are abundant and important to the environment. Water resources and soil are utilized for livelihoods. Animal husbandry, cultivation, farming, and consumption vary according to the seasons as most farmers prefer to use pesticides. As a result, residues remain on plants and soil surfaces. When it rains and carries toxic residues into rivers and canals, it can pollute water and soil.

The Palian Canal is located in the area. Moo 1 Palian Subdistrict, Palian District, Trang Province There is a community located in that area. Most of the people in the community are engaged in farming and animal husbandry. By using soil and water in the Palian Canal area for continuous consumption and consumption, the area has changed its structure and function, resulting in a change in water quality.

Therefore, the researcher wanted to study the water quality and soil in agricultural areas and the use of water for consumption. The research team divided the school district into 3 districts to study in 2 areas, namely the rainy season and the dry season, which are divided into different zones according to use. Dissolved oxygen content, pH, nitrate content Iron content Fotphase volume Alkalinity content and Soil quality, moisture, soil pH, temperature, soil color, soil texture and macronutrients are indicators of soil quality in each school district so that the data obtained can inform changes in water quality in relation to land use and activities.






Research Objectives

1. To compare water and soil quality between agricultural and grazing areas. Non-agricultural areas
2. To study the impact of different land uses on soil and water quality. Khlong Palian Area, Palian District, Trang Province
3. To obtain useful background information for watershed management planning and apply it in other watersheds with similar land use.

Research Questions

1. What are the differences in soil quality and water quality in different land use zones of the Palian Canal?
2. What is the difference in soil quality and water quality in different land use zones in the rainy and summer seasons of the Palian Canal?

Research hypothesis

1. Soil quality and water quality in different land use zones will result in different water quality and soil quality.
 2. Soil quality and water quality in different land use zones in the rainy season and summer with different uses will result in different water quality and soil quality.
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The Study Area

The study area are in Khlong Palian, Palian Subdistrict, Palian District, Trang Province, Thailand



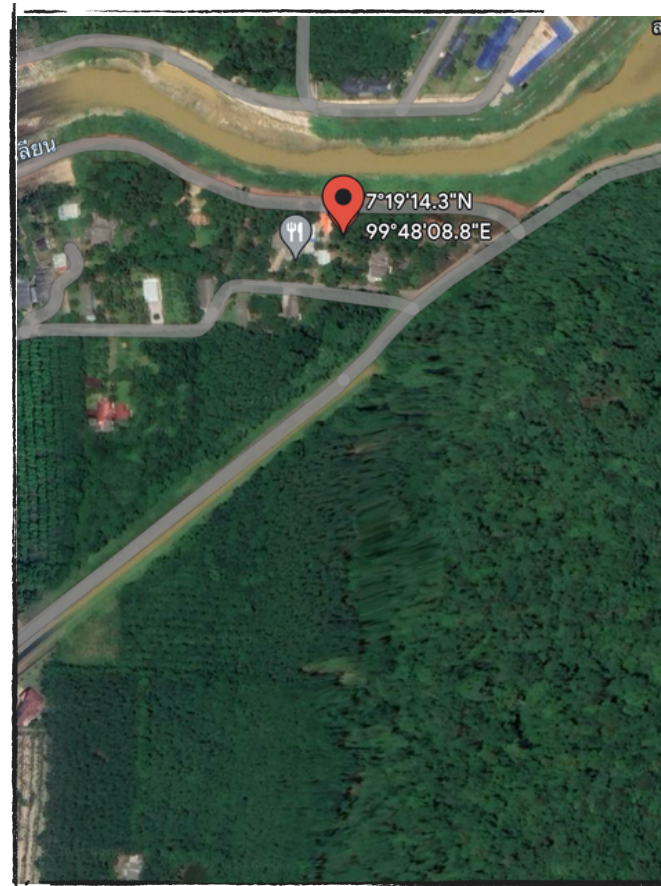
Area 1



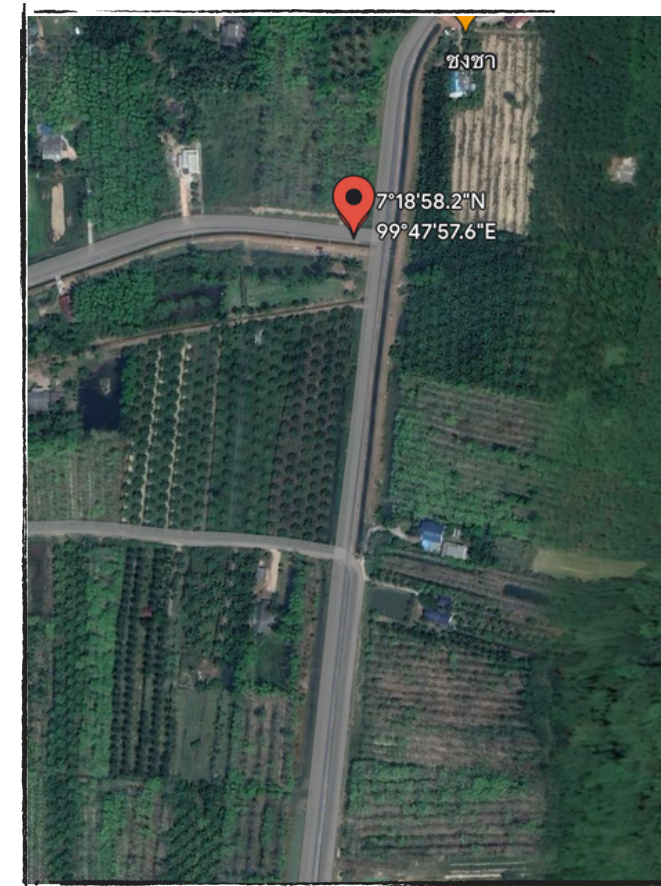
Area 2



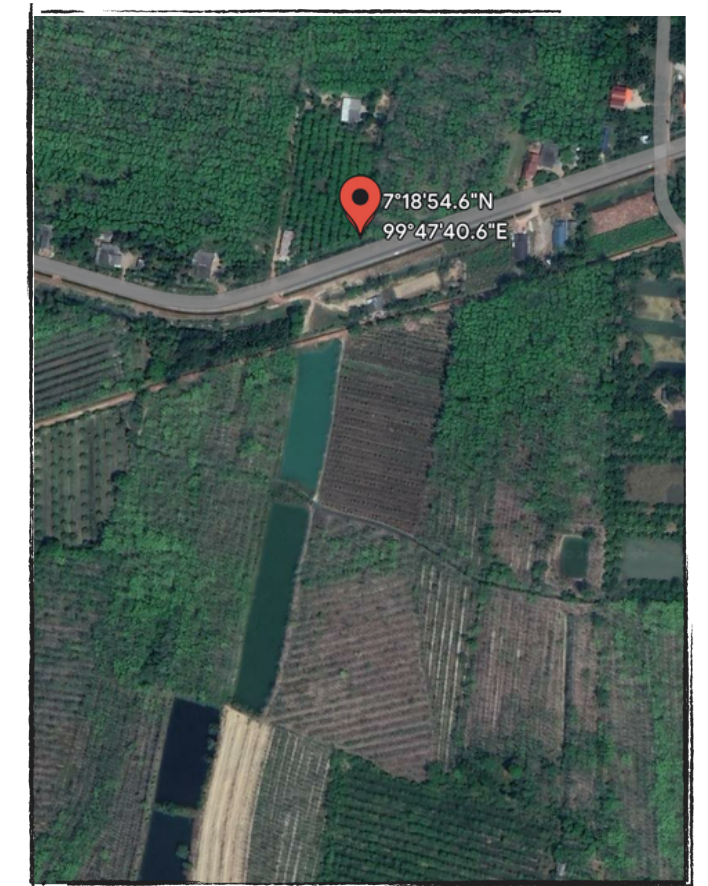
Area 3



Area 1



Area 2



Area 3

Materials and equipment and methods of conducting research

- 1) Water transparency measuring tube
- 3) Dissolved oxygen content test kit
- 5) Aqueous nitrate content test kit
- 7) Water iron content test kit
- 9) Incubator
- 11) Beaker
- 13) Measuring cylinder
- 15) Glass rod stirring substance
- 17) Glass cone
- 19) Distilled water
- 21) Test tube
- 23) Spoon
- 25) Hoe digging the ground

- 2) Alcohol bulb thermometer
- 4) Water alkalinity test kit
- 6) Universal indicator paper
- 8) Digital thermometer
- 10) Soil fertility test kit
- 12) Tassel-shaped bottle
- 14) Dropper
- 16) Substance Weighing Machine
- 18) Filter paper
- 20) Distilled water bottle
- 22) Glass rod stirrer substance
- 24) Tile cup
- 26) Specimen collection container

Globe Protocol



Hydrosphere



Pedosphere(Soil)

Research Methods

conduct soil quality
measurements

- Soil temperature measurement
- Soil moisture measurement (baked)
- Preparation of soil water samples
- Soil fertility measurement
- Acid-Base Measurement

Conduct Water Quality
Measurements

- Water temperature measurement
- Determination of pH Base of Water
- Measurement of dissolved oxygen
- Water Transparency Measurement
- Water alkalinity monitoring
- Monitoring the nitrate content in the water
- Checking the amount of iron contained in water
- Monitoring the amount of phosphate contained in water

Result

Soil Quality Research Results

Nitrogen determination in the rainy season, Areas where farming is carried out It has a moderate nitrogen, Areas where animals are grazing have low nitrogen values. In summer areas where farming is carried out It has a high nitrogen value. Phosphorus determination in the rainy season, Areas where farming is carried out It has a moderate phosphorus value. In summer, Non-farming areas and Areas where animals are kept It have a moderate phosphorus value. Potassium determination in the rainy season areas where farming is practiced. It has a moderate potassium. In summer where animals are raised. It has a moderate potassium value. Areas where farming is carried out It has a high potassium value.

Area	(N) (mg/L)		(P) (mg/L)		(K) (mg/L)	
	Rainy season	Summer	Rainy season	Summer	Rainy season	Summer
Non-agricultural	0.00±0.00	0.00±0.00	0.00±0.00	5.00±0.00	0.00±0.00	0.00±0.00
Grazing zone	2.00±0.00	0.00±0.00	0.00±0.00	5.00±0.00	0.00±0.00	2.00±0.00
Agricultura	5.00±0.00	10.00±0.00	5.00±0.00	10.00±0.00	5.00±0.00	10.00±0.00



Result

Soil moisture and pH values

In the rainy season, The soil in the areas where animals are kept have the highest Soil moisture and pH values, In summer soils in agricultural areas have the highest moisture content and a pH value

Area	Soil moisture		pH	
	Rainy season	Summer	Rainy season	Summer
Non-agricultural	0.16±0.11	0.02±0.02	6.00±0.00	7.00±0.00
Grazing zone	0.21±0.04	0.06±0.04	6.00±0.00	7.00±0.00
Agricultura	0.20±0.00	0.11±0.05	6.00±0.00	6.50±0.00



Result

Soil temperature

In the rainy season, The non-agricultural zone has the highest average temperature. The vegetable growing zone has the lowest average temperature.

In the summer, The grazing zones has the highest average temperature. The vegetable growing areas has the lowest average temperature.

Area	Soil temperature(°c)	
	Rainy season	Summer
Non-agricultural	26.8±0.78	27.4±0.21
Grazing zone	26.7±0.78	27.5±0.42
Agricultura	26.2±0.49	26.9±0.57



Result

Soil structure, soil color Adhesion of soil and soil texture

Area	Soil color		Soil fixation		Ground beef		Soil structure	
	rainy season	summer	rainy season	summer	rainy season	summer	rainy season	summer
Non-agricultural	Yellow-red	Yellow-red	Crumbly	Crumbly	Loam	Loam	Single tablet form	Single tablet form
Grazing zone	Hazel	Black	Crumbly	Crumbly	Loam	Loam	Single tablet form	Single tablet form
Agriculture	Black	Black	Crumbly	Crumbly	Loam	Loam	Single tablet form	Single tablet form

It was found that in the rainy season, the soil in non-agricultural areas is yellow-red. The soil around the grazing zone is reddish-brown in color. The soil around the cultivated area is black. The soil texture is entirely loamy. It was found that in the summer, the soil in non-agricultural areas is yellow-red. The soil in the area where animals are grazing is black. The soil around the cultivated area is black. The soil characteristics are single-grained. The adhesion characteristics of the soil are loamy, and the soil texture is entirely loamy.



Result

Area	Water transparency (cm)	
	rainy season	summer
Non-agricultural	90.00±2.12	96.80±0.42
Grazing zone	48.00±4.24	95.40±0.07
Agricultura	43.60±2.62	76.40±17.20

Water transparency

In the rainy season soils in non-agricultural areas has the highest water transparency value and soils in cultivated areas has the lowest water transparency value.

In the summer, soils in non-agricultural areas has the highest water transparency value. Soils in cultivated areas has the lowest water transparency value.



Result

Area	Water temperature (°c)	
	rainy season	summer
Non-agricultural	25.00±0.00	26.50±0.71
Grazing zone	25.50±0.71	27.00±1.41
Agricultura	27.00±1.41	27.50±0.71

Water temperature

In the rainy season the area where the cultivation is raised has the highest average temperature and in non-agricultural areas has the lowest average temperature. In the summer, The area where the crop is raised has the highest average temperature .The water in the non-agricultural zone has the lowest average temperature.



Result

Area	Dissolved oxygen content (mg/L)	
	rainy season	summer
Non-agricultural	9.50±0.71	10.75±1.06
Grazing zone	10.50±0.71	11.00±1.41
Agricultura	9.50±0.71	10.50±0.71

Dissolved oxygen content

In the rainy season water in grazing zone contains the highest amount of oxygen.

In the summer, water in grazing zone contains the highest amount of oxygen. The water in cultivated zone contains the lowest amount of oxygen .



Result

Area	pH	
	rainy season	summer
Non-agricultural	7.00±0.00	7.00±0.00
Grazing zone	6.00±1.41	7.00±0.00
Agricultura	6.00±0.00	6.67±0.71

pH of water

In the rainy season water in the non-agricultural area has the highest pH value.

In the summer, In the cultivated area has the lowest pH value.



Result

Area	Nitrate value in water (mg/L)	
	rainy season	summer
Non-agricultural	0±0.00	0±0.00
Grazing zone	0±0.00	0±0.00
Agricultura	0±0.00	0.50±0.35

Nitrate value in water

In the rainy season every areas not contains nitrates.

In the summer, cultivated area has a nitrate value of (0.50±0.35mg/L) as shown



Result

Phosphate value in water

Studies have shown that phosphate values in the rainy season cultivated area has the highest Phosphate value. The non-agricultural zone the lowest phosphate values. In the summer, Non-agricultural has the highest Phosphate value.

Area	Phosphate value in water (mg/L)	
	rainy season	summer
Non-agricultural	0.50±0.00	1.00±0.00
Grazing zone	1.00±0.00	0.75±0.35
Agricultura	1.05±0.71	0.75±0.35

Result

The cost of iron in water

Studies have shown that The cost of iron in water in the rainy season have the same value every areas

In the summer, animals are grazing has the same value as the cultivated areas accept the non-agricultural areas has the highest cost of iron.

Area	The cost of iron in water (mg/L)	
	rainy season	summer
Non-agricultural	0.10±0.00	0.63±0.53
Grazing zone	0.10±0.00	0.38±0.18
Agricultura	0.10±0.00	0.38±0.18



Result

Area	Water hardness value (mg/L)	
	rainy season	summer
Non-agricultural	93.50±12.02	93.50±12.02
Grazing zone	102.00±0.00	102.00±0.00
Agricultura	93.50±12.02	93.50±12.02

Water hardness value

Studies have shown that every areas have the same value between rainy season and summer.

Non-agricultural areas in rainy season have the same alkalinity in the water as summer.

Animals are grazing areas in rainy season have the same alkalinity in the water as summer.

In the cultivated area in rainy season have the same alkalinity in the water as summer.



Conclusion

A comparative study of soil quality and water quality under various agricultural land uses. Palian Canal Area Village No 1, Palian Subdistrict, Palian District, Trang Province The objective was to study the impact of soil utilization on water quality in the Palian Canal area. Water samples were collected in months from December 2023 to February 2024 by studying 8 chemical and physical water quality parameters and soil quality.

Results from soil quality studies It was found that soil fertility values with high nitrogen, potassium (K) and phosphorus (P) were the highest. In the rainy season, the moisture content of the soil is the highest. In the rainy season, the pH of the soil with the highest values is in the non-agricultural zone. In summer and in areas where animals are kept. In the summer, the soil temperature is the highest. In summer

As a result of the water quality study, the highest level of water transparency was in non-agricultural areas. In summer, the water temperature is highest in the area where it is cultivated. In summer, dissolved oxygen content is highest in areas where animals are grazing. Summer The highest pH of water is in areas where there is no farming. In the rainy season Areas where there is no farming in the dry season and areas where animals are grazing in summer The nitrate and phosphate values in the water are highest on average. The water hardness value has an average water value that does not walk more than the standard value. The water coming from the water source area is classified as a Category 1 surface water source because it is a natural quality water source. Agricultural waters and livestock watersheds Water is classified as a Category 2 surface water source because it is a water source that receives effluent from certain types of activities that must undergo a general water quality improvement process before being used for consumption.

