Abstract

Research Title: 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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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 (0.21±0.04), 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 dry season (7±0.00), the soil temperature is the highest. In summer (27.5±0.42°C)

As a result of the water quality study, the highest level of water transparency was in non-agricultural areas. In summer (96.8±0.42), the water temperature is highest in the area where it is cultivated. In summer (27.5±0.71), dissolved oxygen content is highest in areas where animals are grazing. Summer (11.00±1.41) 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 summer season and areas where animals are grazing in summer (7.00±0.00) 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.

Keywords: water quality, soil quality

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. ,Village No. 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 summer, which are divided into different zones according to use. Dissolved oxygen content, pH, nitrate content Iron content phosphate 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. Palian Canal 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.

Methods and Materials

Materials and equipment and methods of conducting research

1) Water transparency measuring tube
2) Alcohol bulb thermometer
3) Dissolved oxygen content test kit
4) Water alkalinity test kit
5) Aqueous nitrate content test kit
6) Universal indicator paper
7) Water iron content test kit
8) Digital thermometer
9) Incubator
10) Soil fertility test kit
11) Beaker
12) Tassel-shaped bottle
13) Measuring cylinder
14) Dropper
15) Glass rod stirring substance
16) Substance Weighing Machine
17) Glass cone
18) Filter paper
19) Distilled water
20) Distilled water bottle
21) Test tube
22) Glass rod stirrer substance
23) Spoon
24) Tile cup
25) Hoe digging the ground
26) Specimen collection container

Defining Study Points

Areas where farming is carried out Palian Canal Area ,Village No. 1, Palian Subdistrict, Palian District, Trang Province The field will be conducted to collect samples in 3 districts. Zones where animals are kept Non-farming districts.

How to conduct research

1. Pre-research stage

1) Set study points, choose the topic you want to study.

2) Study, research, gather knowledge and theories related to the research.

3) Determine the purpose of the study.

4) Determine the sampling point in the study area.

2. Implementation stage

1) Conduct research action planning.

2) Conduct a survey of the area to be researched.

3) Samples are collected for measurement.

By relevant factors that need to be studied Geographical coordinates Measure soil quality, moisture, soil pH, temperature, soil color, soil texture and macronutrients in the soil, and water quality, water transparency, water temperature. Dissolved oxygen content pH Nitrate content Iron content phosphase volume The study time is 06.00 - 09.00 a.m.

How to conduct soil quality measurements

1. Soil temperature measurement

1.1 Hammer the pilot iron into it to a depth of about 15 centimeters.

1.2 Bring a thermometer. For measuring the temperature at a depth of 5 centimeters and 15 centimeters, it is inserted into the prepared soil groove. Wait 1 minute, read the soil temperature value 1, record it on the data sheet.

1.3 Take 2 more readings of soil temperature, waiting for only 1 minute each.

1.4 If the readings on all 3 occasions differ by no more than 1 degree Celsius, it is considered acceptable.

2. Soil moisture measurement (baked)

2.1 Bring the soil to scale.

2.2 Bake the soil in an earthen incubator.

2.3 After baking Use a formula to calculate for moisture.

Soil moisture(g/g)=(mass of soil before baking-mass of soil after drying)/mass of soil before baking

3. Preparation of soil water samples

3.1 Determine soil sampling points

3.2 Soil samples were collected in 6 areas.

3.3 Collect soil samples in designated areas along the plane. Use a hoe to dig the soil to a depth of about 15 centimeters or about 1 screen. Put the resulting soil into a plastic bag, tie the bag mouth.

4. Soil fertility measurement

4.1 The collected soil is dissolved with distilled water, with the ratio of soil:water is 1:5.

4.2 Take the dissolved soil and filter it with filter paper.

4.3 Nitrogen, phosphorus and potassium are examined with a nitrogen, phosphorus and potassium monitoring kit by comparing them with the standard values.

5. Acid-Base Measurement

5.1 Take the collected soil in the amount of 1 tablespoon. Dissolve with distilled water, volume 20 ml.

5.2 Set aside to precipitate.

5.3 Take a piece of Universal Indicators paper dipped in the solution and soak and set for about 30 seconds.

5.4 Compare the color with the standard value on the side of the box.

How to Conduct Water Quality Measurements

1. Water temperature measurement

1.1 Dip the thermometer in water about 10 centimeters deep for 3 - 5 minutes.

1.2 Take a thermometer reading at eye level. The thermometer bulb must be in water.

1.3 Dip the thermometer for 1 minute for the 2nd and 3rd measurements by changing the thermometer reader.

2. Determination of pH Base of Water

2.1 Pour the sample water into the beaker.

2.2 Dip in Universal Indicator Paper In water samples

2.3 Compare the measured value with the color bar on the side of the box, do it 3 times, and record the result.

3. Measurement of dissolved oxygen

3.1 Rinse the specimen cylinder with the sample water 2-3 times and fill the sample with water. Close the lid to prevent air contamination.

3.2 Gently open the lid of the dropper #1. 2 drops Solution #2 Close the lid and shake. Notice that a yellow-brown precipitate will be formed. This means that oxygen is present.

3.3 Wait for the sediment to settle to the bottom of the cylinder and open the lid of 5 drops of solution #3. Wait for the sediment to completely dissolve and the sample to turn yellow.

3.4 Pour the resulting sample into a new cylinder of 5 ml.

3.5 Add the #4 solution drop by drop, shake well, drip continuously until the sample is a faded yellow color. By counting the number of drops used.

3.6 2 drops of #5 solution, the sample will turn blue.

3.7 Drop Solution #4 with a drop count until the sample is colorless.

3.8 Count the number of droplets counted, read the values from the test kit table, and record the results.

3.9 Repeat this process until all water samples are complete.

4. Water Transparency Measurement

4.1. Slowly pour the water sample into the transparency measuring tube bit by bit. Notice the black and white on the round plate at the bottom of the tube and continue pouring until the visible white and black fade away as the team leaves.

The mouth of the tube measures transparency to the white and black palette at the bottom of the tube. The transparency tube should also be rotated at the same time to see the difference between white and black on the plate at the bottom of the tube.

4.2. Save readings Repeat 3 times to find the average.

4.3. Make measurements of water transparency like this on every water sample.

5. Water alkalinity monitoring

5.1 Rinse the bottle 3 times.

5.2 Take a water sample near the point where the water temperature is measured.

5.3 Open the cap of the sample collection bottle.

5.4 Rinse the sample bottle, then collect 5 ml of sample water and close the lid.

5.5 Add 1 drop of Bromophenol blue indicator, shake gently to combine.

5.6 Titration with TITRANT HI3811-0

5.7 Read the amount of titrant used and multiply by 300 to get the alkalinity of water, in mg/l (ppm) $CaCO_3$.

5.8 Save the result Repeat 3 times in each water sample until complete.

6. Monitoring the nitrate content in the water

6.1 Collect water samples

6.2 Add the 1st substance

6.3 Add the 2nd substance to change the color of the solution.

6.4 Read the nitrate content by comparing the color from the color calibration plan available in the test kit.

6.5 Repeat all 3 checks until all water samples are completed.

7. Checking the amount of iron contained in water

7.1 Rinse the test tube with the sample water and add 5 ml of sample water.

7.2 Add 2 scoops of #1 powder and shake well.

7.3 Drizzle 5 drops of test solution #2 and close the shaking lid.

7.4 Open the lid and compare the color readings after 10 minutes. Color readings should be taken outdoors (avoid strong sunlight).

8. Monitoring the amount of phosphate contained in water

8.1 Rinse the test tube with the sample water and add 20 ml of sample water.

8.2 Drop 6 drops of test solution #1 and shake gently.

8.3 Drop 6 drops of test solution #2 and shake gently.

8.4 Fill the bottle with powder. #3 1 scoop Cover and shake, leave for 5 minutes.

8.5 Open the lid against the outdoor stripes of paint (avoid strong sunlight).

8.6 If it shows light blue or colorless, it means that there is not much phosphate in the water. This indicates that the phosphate value reaches 2.0 mg/L or beyond.

8.7 To know how much phosphate exceeds 2.0 mg/L, dilute the sample with distilled water according to the ratio under the color band and retest it.

Analysis and conclusion of findings

1) Use the acquired data to analyze and compare relationships. average Standard deflectors used in data analysis include soil quality, moisture, soil pH, temperature, soil color, soil texture and macronutrients, and water quality, water transparency, water temperature. Dissolved oxygen content pH Nitrate content Iron content phosphate volume Alkalinity content.

2) Make a graph showing the comparative data mean (from the bar chart, the value number is 1=Non-farming zone, 2=Animal grazing zone, 3=Farming zone and red bar chart=summer blue bar chart= rainy season).

3) Conclusions Geographical coordinates Study of water sources and soil in the Palian Canal Area ,Village No. 1, Palian Subdistrict, Palian District, Trang Province which consists of 3 districts, has coordinates as shown in Table 1.

Table 1 Geographical coordinates

Area	Geographical coordinates	
	Latitude (N)	Longitude (E)
Non-farming districts	7.32064	99.80244
Zones where animals are kept	7.31838	99.80080
Cultivated fields	7.31617	99.79932

Results and Data

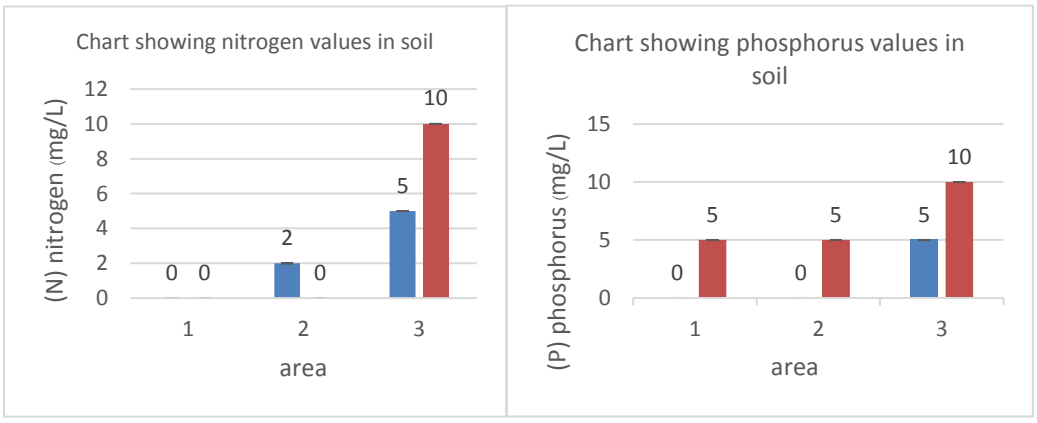
1.Soil Quality Research Results

Soil fertility

Nitrogen determination In the rainy season, areas where there is no farming. No nitrogen value Areas where animals are grazing have low nitrogen values. Areas where farming is carried out It has a moderate nitrogen value. In summer Non-farming areas There is no nitrogen value in areas where animals are raised. No nitrogen value Areas where farming is carried out It has a high nitrogen value.

Phosphorus determination In the rainy season, areas where there is no farming. No phosphorus value Areas where animals are kept No phosphorus value Areas where farming is carried out It has a moderate phosphorus value. In summer Non-farming areas It has a moderate phosphorus value. Areas where animals are kept It has a moderate phosphorus value. Areas where farming is carried out It has a high phosphorus value.

Potassium testing in the rainy season in areas without agriculture No potassium value in areas where animals are raised. There is no potassium value in areas where agriculture is practiced. It has a moderate potassium value. In summer Non-farming areas No potassium value in areas where animals are raised. It has a moderate potassium value. Areas where farming is carried out It has a high potassium value.



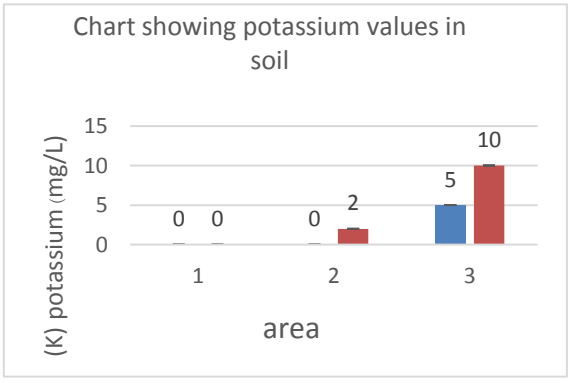
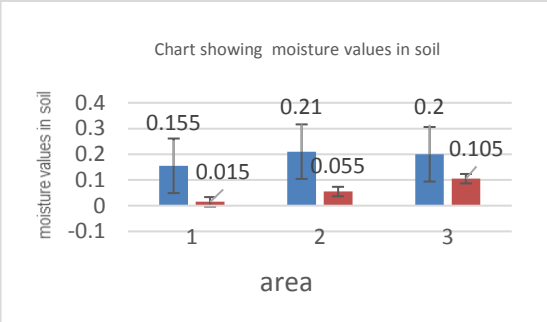


Chart 1 shows the soil fertility values.

Soil moisture and pH values

Based on the results of the study of moisture and pH values in the soil. It was found that in the rainy season, the soil in the non-agricultural zone had a moisture value (0.16 ±0.11) and the pH is (6.00±0.00). Grazing areas have a moisture content (0.21±0.04) and the pH is (6.00±0.00). Agricultural areas have a moisture content (0.20±0.00) and the pH is (6.50±0.00).,In summer. Soils in non-agricultural areas have a moisture content (0.02±0.02) and a pH of (7 ±0.00), soils in grazing areas have a moisture content (0.06±0.04) and a pH value of (7±0.00), soils in agricultural areas have a moisture content (0.11±0.05) and a pH value of (6.50±0.00) shown in chart 2.



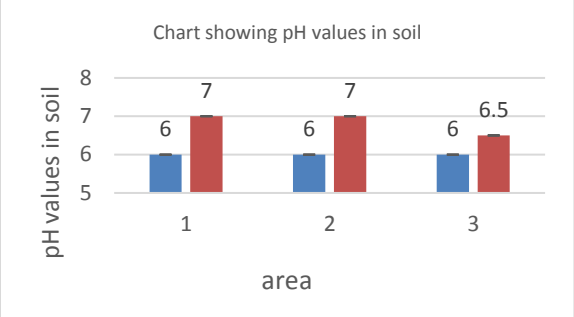


Chart 2 shows the moisture and pH values in the soil.

Soil temperature

In the rainy season, the non-agricultural zone has an average temperature (26.8±0.78°C), the zone where animal husbandry has an average temperature (26.7±0.78°C), and the vegetable growing zone has an average temperature (26.2±0.49°C). Non-agricultural zones have an average temperature (27.4±0.21°C), grazing zones have an average temperature (27.5±0.42°C), and vegetable growing areas have an average temperature (26.9±0.57°C) in summer. Displays the values as shown in chart 3.

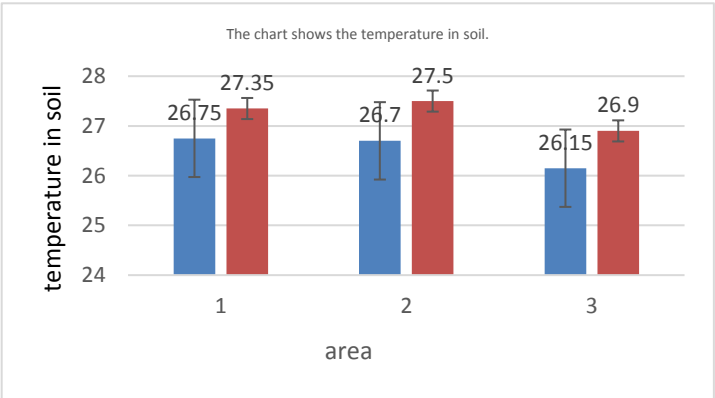


Chart 3 shows the soil temperature values.

Soil structure, soil color Adhesion of soil and soil texture.

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. Displays the values as shown in Table 2.

Table 2 Soil color and soil characteristics

Area	Soil color		Soil fixation		Ground beef		Soil structure	
	rainy season	summer	rainy season	summer	rainy season	summer	rainy season	summer
Districts that don't do agriculture	Yellow -red	Yellow -red	Crumbly	Crumbly	Loam	Loam	Single tablet form	Single tablet form
Zones where animals are kept	Hazel	Black	Crumbly	Crumbly	Loam	Loam	Single tablet form	Single tablet form
Cultivated fields	Black	Black	Crumbly	Crumbly	Loam	Loam	Single tablet form	Single tablet form

2.Water properties

Water transparency

Studies have shown that water transparency values in the rainy season the water in non-agricultural areas have a water transparency value of (90.00±2.12cm),y the water in grazing areas have a water transparency value of (48.00±4.24cm), the water in cultivated areas have a water transparency value of (43.60±2.62cm). In the summer, the water in non-agricultural areas have a water transparency value of (96.80±0.42cm), the water in grazing areas have a water transparency value of (95.40±0.07cm), the water in cultivated areas have a water transparency value of (76.40±17.20cm), shown in Chart 6.

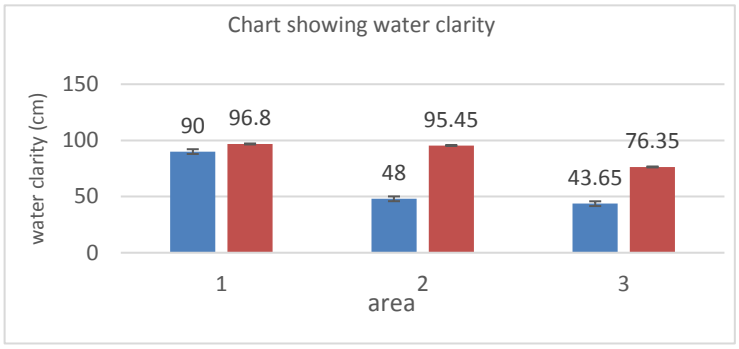


Chart 6 shows the water transparency value.

Water temperature

The study found that in the rainy season, the average water in non-agricultural areas has an average temperature (25.00±0.00°C), the average temperature in the grazing zone is (25.50±0.71°C), the water where the cultivation is raised has an average temperature (27.00±1.41°C), in the summer, the water in the non-agricultural zone has an average temperature (26.50±0.71°C), the water where animal husbandry has an average temperature (27±1.41°C), and the water where the crop is raised has an average temperature (27.5±0.71°C) shown in Chart 7.

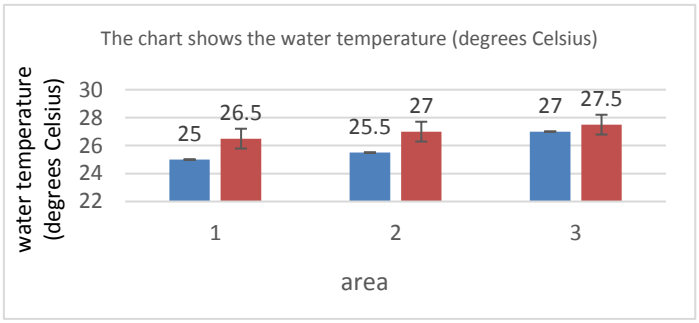


Chart 7 shows the water temperature value.

Dissolved oxygen content

Studies have shown that the amount of oxygen in the rainy season the water in non-agricultural zone contains (9.50±0.71mg/L), the water in grazing zone contains (10.50±0.71mg/L), the water in cultivated zone contains (9.50±0.71mg/L), oxygen content in summer the water in non-agricultural zone contains (10.75±1.06 mg/L), the water in grazing zone contains (11.00±1.41mg/L), the water in cultivated zone contains (10.50±0.71mg/L) shown in Chart 8.

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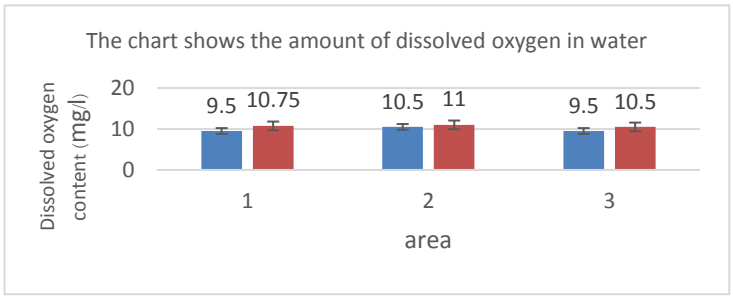

Chart 8 shows the amount of dissolved oxygen in water.

pH of water

Studies have shown that the pH value of water In the rainy season, the water in the non-agricultural area has a pH of (7.00±0.00), the water in the grazing zone has a pH of (6.00±1.41), the water in the cultivated area has a pH of (6.00±0.00), in the summer, the water in the non-agricultural zone has a pH of (7.00±0.00), the water in the grazing zone has a pH of 7.00±0.00, the water in the cultivated area has a pH of (6.67±0.71) shown in Chart 9.

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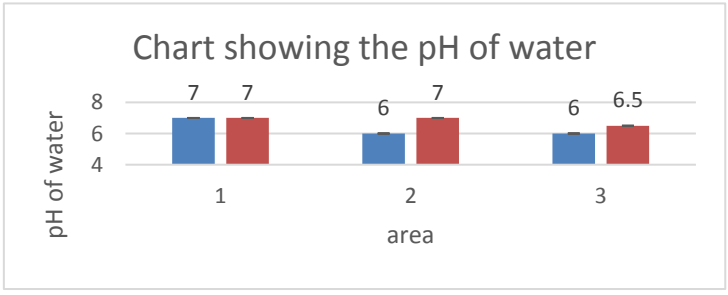

Chart 9 shows the pH value of water.

Nitrate value in water

Studies have shown that nitrate values in water In the rainy season, the water in non-agricultural areas does not contain nitrates. The water in the zone where animals are grazing does not contain nitrates. The water in the cultivated area does not contain nitrates. In the summer, the water in non-agricultural areas does not contain nitrates. The water in the zone where animals are grazing does not contain nitrates. The water in the cultivated area has a nitrate value of (0.50±0.35mg/L) as shown in Chart 10.

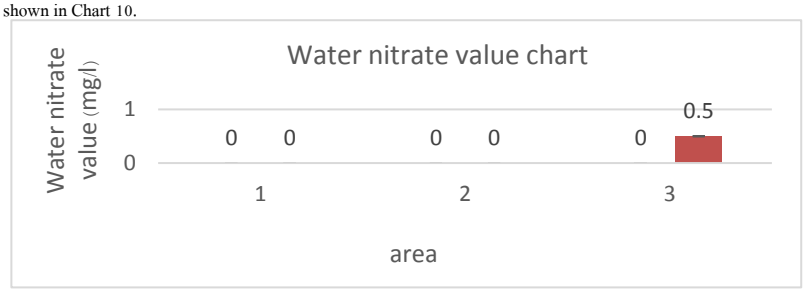

Chart 10 shows the nitrate value of water.

Phosphate value in water

Studies have shown that phosphate values in water in the rainy season, the phosphate value of the water in the non-agricultural zone is (0.50±0.00mg/L), the water in the grazing zone has a phosphate value is (1.00±0.00 mg/L), and the water in the cultivated area has a phosphate value of (1.05±0.71mg/L). Non-agricultural soils have a phosphate value of (1.00±0.00mg/L). The phosphate value of the water in the grazing zone is (0.75±0.35mg/L), the water in the cultivated area is (0.75±0.35mg/L), shown in chart 11.

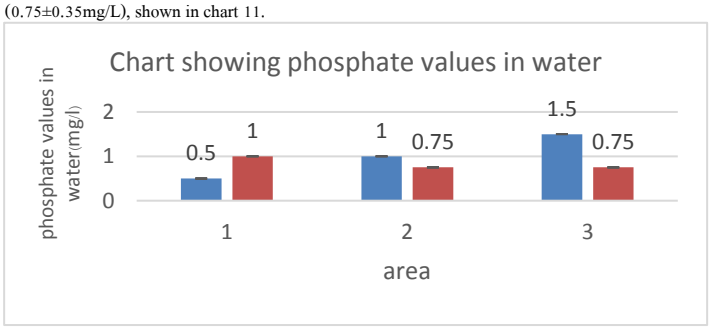

Chart 11 shows the phosphate value in water.

The cost of iron in water

Studies have shown that the value of iron in water In the rainy season, the water in the non-agricultural zone has an iron value of (0.10±0.00 mg/L), the soil in the grazing zone has an iron value of (0.10±0.00mg/L), the water in the area where the iron value is (0.10±0.00mg/L). The water in non-agricultural areas has an iron value of (0.63±0.53mg/L), the water in areas where animals are grazing has an iron value of (0.38±0.18mg/L), the water in areas where iron value is (0.38±0.18mg/L), shown in chart 12.

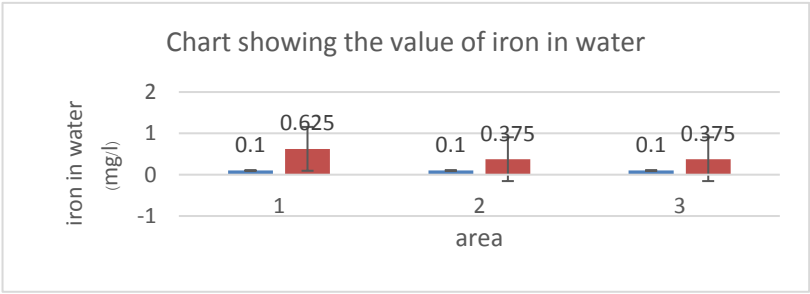

Chart 12 shows the value of iron in water.

Water hardness value

Studies have shown that the alkalinity in the water in the rainy season in the water in non-agricultural areas has an alkalinity value of (93.50±12.02mg/L). In the summer , the alkalinity of the water in the non-agricultural areas is (93.5±0±12.02mg/L), the alkalinity of the water in the non-agricultural areas is (93.5012.02mg/L), the alkalinity of the water in the grazing zone is (102.00±0.00 mg/L), the alkalinity of the water in the cultivated areas is (93.50±12.02mg/L), the values are shown in Chart 13.

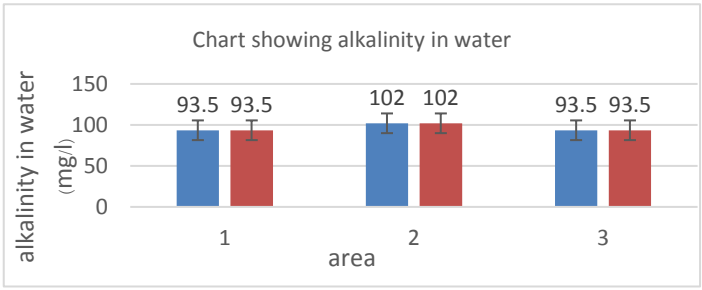

Chart 13 shows the alkalinity in water.

Discussion and 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 .

Soil quality has the following effects: From the study of soil fertility, it was found that the soil areas with the highest nitrogen values are those that are cultivated in the dry season (10.00±0.00). Soils with the lowest nitrogen values are those without farming in summer and rainy seasons and areas where animals are grazed in the summer (±0.00±0.00). Soils with the lowest phosphorus values are those where agriculture is not practiced in the rainy season and those where animals are grazed in the rainy season (0.00±0.00). Soils with the highest potassium content are those that are cultivated in the summer (10.00±0.00). Soils with the lowest potassium values are those that do not have rainy season farming and areas that are farmed in summer because fertilizers are used to increase growth and increase yields. As a result, there is still more nutrients in the soil than in the unfertilized, but during the rainy season there is low fertility due to being washed away by rain to other areas.

There is not much difference in soil moisture values in grazing zones, non-farming zones, and non-farming zones in the summer due to similar physical characteristics.

Ground beef characteristics Non-agricultural areas are yellow-red. The soil around the grazing zone is reddish-brown. The soil around the cultivated area is black. The soil texture is entirely loamy, unlike a study by Atta Prapasorn, which found that soil that has been farmed for a long time will cause less porosity and free proportion of the soil, resulting in a greater soil density than in non-agricultural areas.

Effects of water quality. The highest water temperature is in the summer (27.50±0.71). The lowest water temperature is in areas where there is no farming in the rainy season (25.00±0.00). This is in line with the results of a study by Chamneer and Nivati (1981) that found that the water temperature in streams with different types of land use varies with air temperature or seasonality. Therefore, it does not affect life in water bodies.

The highest dissolved oxygen content is in the summer (11.00±1.41). The lowest amount of dissolved oxygen is in the rainy season (9.50±0.71). During the period of harvesting the way crops. Agriculture will have plant residues. When it rains, the remnants of these plants are washed overboard. These humus are considered important organic substances that cause dissolved oxygen values to decrease in water because microorganisms in water use dissolved oxygen to decompose the organic matter contained in water.

The highest water pH is in areas where agriculture is not practiced in the rainy season. Non-farming zones in the summer and zones with animal husbandry in the summer (7.00±0.00) The lowest water pH is in the rainy season and in the rainy season (6.00±1.41).

The highest water nitrate values are those cultivated in the summer (0.50±0.35). The lowest water nitrate values are those where agriculture is not practiced in the rainy season. Zones where animals are grazed in the rainy season Fields where cultivation occurs in the rainy season zones without farming in the summer and zones with grazing in the summer (0.00±0.00) The cultivation of agricultural crops where nitrogen-based fertilizers are used and when contamination occurs into water sources is more valuable than areas where fertilizers are not used. Nitrate nitrogen comes from fertilizers that contain nitrogen elements, and these two fertilizers can be utilized by plants in the form of nitrate nitrogen. When fertilizers are applied, it also indirectly adds nitrate nitrogen to the watershed. On average, the nitrate nitrogen content is not higher than 5.0 milligrams per liter. This is within the water quality benchmarks in surface water bodies.

The highest phosphase values in water are those that are cultivated in the rainy season (1.05±0.71). The lowest phosphase values in water are those without farming in the rainy season (0.50±0.00). The highest water hardness values are in areas where animals are grazing in the rainy season and zones where animals are grazing in the summer (102.00±0.00). The lowest water hardness is in areas where there is no farming in the rainy season. Fields where cultivation occurs in the rainy season Non-farming zones in the summer and those cultivated in the rainy season (93.50±12.02) are classified as water with hardness values above 100 milligrams per liter. It is classified as hard water compared to the water quality benchmark in surface water bodies, which is not more than 100 milligrams per liter. In line with Karnika (1982), water hardness was divided into four levels: less than 75, 75-150, 150-300 and more than 300 milligrams per liter of $CaCO_3$, respectively. This is followed by agricultural land and forest area.

Acknowledgements

This research was successfully completed due to the generosity of the research. Thank you to Director Yongyut Pukhao, Director of Wichianmatu School, for approving the budget for educational research.

Thank you to Mr. Jiraporn Sirirat, the project consultant, for facilitating the equipment and operation process to run smoothly and without interruption. as well as providing advice and advice. Suggest to correct and improve the error that occurred. We would like to express our sincere gratitude to Wichian Matu School for supporting the equipment and scientific laboratories in conducting research that facilitates research work and makes this research successful. Finally, we hope that the research will compare soil quality and water quality under various agricultural land uses. Palian Canal, Village No. 1, Palian Subdistrict, Palian District, Trang Province.

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