International Journal of Current Science Research and Review
ISSN: 2581-8341
Volume 07 Issue 09 September 2024
DOI: 10.47191/ijcsrr/V7-i9-18, Impact Factor: 7.943
IJCSRR @ 2024
www.ijcsrr.org

An Assessment of Water Quality and Identification of Problems: A Case Study of Maritimepattu Divisional Secretariat, Northern Province

Vainavi Sivarajah
Department of Geography, University of Colombo, Sri Lanka.

ABSTRACT: The Maritimepattu Divisional Secretariat (DS), located in Sri Lanka's dry zone, is underlain by Miocene limestone, which is considered to have aquifer properties favourable for groundwater storage and discharge. Given that groundwater serves as the primary water resource for domestic, industrial, and agricultural purposes, maintaining its quality is a significant concern. This paper aims to assess the water quality in the region, identify associated problems, and investigate potential causes and preventive measures. A purposive sampling method was employed to select six sample Grama Niladhari (GN) divisions. In addition, 100 questionnaires were administered, and 36 water samples were collected for the study. These water samples were tested based on eight major water quality parameters: Electrical Conductivity (EC), Salinity, pH, Total Dissolved Solids (TDS), Fluoride (F-), Nitrogen (N), Phosphorous (P), and Turbidity (Tn). Furthermore, secondary data were gathered from previous literature. Both primary and secondary data were analysed using Minitab and Geographic Information Systems (GIS). The measurements were then compared to the desirable limits set by the Sri Lanka Standards Institute (SLSI). This study revealed that the highest recorded values for EC, Salinity, pH, TDS, F-, N, P, and Tn were 2480 µS/cm, 1254 ppm, 8.6, 632 ppm, 1.1 ppm, 7,9 ppm, 3.8 ppm, and 36.7 NTU, respectively. These values exceed the standard limits set by the Sri Lanka Standards Institute (SLSI). The pollution in the area can be attributed to various factors, including topographical conditions, improper agricultural practices, inadequate sanitation methods, dumping sites, war activities, and industrial waste. As a result, these issues have led to serious health problems, reduced crop yields, insufficient drinking water, and the degradation of groundwater resources. Therefore, this study recommends the adoption of green agriculture practices, the installation of water treatment plants, the promotion of rainwater harvesting systems, and the enforcement of land and irrigation-related laws. Moreover, hazardous waste material must be disposed of at designated sites to protect water resources.

KEYWORDS: Contamination, Desirable Limit, Nitrate, Post-war, Water Quality.

INTRODUCTION

Since the existence of mankind, water has remained a major resource for human survival. UNESCO's 2021 World Water Development Report reveals a sixfold increase in global freshwater usage over the past 100 years, with an annual growth rate of approximately 1% since the 1980s. As water consumption continues to rise, water quality faces significant challenges. Water pollution is defined as changes in water's physical and chemical properties. This study aims to analyze water pollution and related issues in the Maritime Pattu Divisional Secretariat, which is situated in the coastal area of the Mullaitivu District.

LITERATURE REVIEW

Water pollution can be generally identified based on changes in odor, colour, and taste. For instance, if the water exhibits a bluish-green or green colour, it may indicate pollution or the presence of high levels of copper, lead, zinc, or other trace metals. The quality of drinking water is crucial for human health, and thus many countries have established various physical, chemical, and biological standards to ensure safe drinking water.

In 1963, the World Health Organisation (WHO) introduced a set of guidelines outlining the desirable quality of drinking water. Afterwards, the Sri Lankan Standards (SLS) Institution, serving as the country's quality control agency, established several standards for drinking water quality in 1983. Physical characteristics such as odour and colour are important indicators for identifying water pollution. According to SLS guidelines, freshwater with a color value of 30 units and a clarity of eight Jackson units is considered suitable for consumption. Furthermore, specific chemical parameters have been established: the pH should range between 6.5 and

8.5, and the electrical conductivity (EC) should not exceed 750µS/cm. In addition, the permissible levels for chlorine (Cl_2), nitrogen (N), fluoride (F-), phosphate (PO_4), Total hardness, and iron (Fe) are 0.2mg/L, 3mg/L, 0.01mg/L, 2.0mg/L, 250mg/L, and 0.3mg/L, respectively (Sri Lanka Standards Institute, 2013).

Water quality plays a crucial role in the health and well-being of animals. For water bodies to be considered safe for animal consumption, certain parameter levels should be maintained: nitrate at 100 mg/L, fluoride at 1 mg/L, cadmium at 0.08 mg/L, chromium at 0.05 mg/L, lead at 0.1 mg/L, mercury at 0.003 mg/L, zinc at 50 mg/L, aluminium at 5 mg/L, copper at 0.5 mg/L, and total dissolved solids at 3000 mg/L. For fisheries activities, water with a pH level between 6.5 and 8.0 and a dissolved oxygen concentration of 5 mg/L is considered suitable. In addition, chlorine, aluminium, and iron levels should be kept below 0.09 mg/L, 0.01 mg/L, and 0.1 mg/L, respectively. Other factors, such as water hardness and salinity, are also important considerations when assessing water quality for fisheries activities.

Water pollution arises from a variety of natural and anthropogenic factors, with human activities generally having the most significant impact on pollution levels. Natural processes such as rock weathering, re-transformation, and wind deposits can alter water quality. However, anthropogenic activities play a more substantial role in affecting water quality. These activities include improper irrigation methods, deforestation, the use of fertilisers and pesticides in agriculture, industrial emissions, mining, tourism, and domestic sewage (Nitasa K. & Sanjiv T., 2014).

Northern and Northwestern Sri Lanka are situated on an extensive carbonate platform. The water table in the Jaffna region of northern Sri Lanka shows high concentrations of Total Dissolved Solids (TDS), ranging from 1200 ppm to 1900 ppm, with water hardness varying between 0 and 60 ppm (Dissanayake & Weerasooriya, 1985).

Water extraction in Northern province after post war period caused to higher TDS, Also Total Hardness, Salinity and Alkalinity (Meegahakum & Nadeeshani, 2023). Sri Lanka was severely impacted by the 2004 tsunami, which resulted in significant saline intrusion into many freshwater bodies across the northern, eastern, and southern regions (Sri Lanka Standards Institute, 2013). Calculations made for the maximum permissible water extraction in each administrative division of Jaffna demonstrate that less than 3 h of daily extraction per well is likely in some districts. This situation to an increasing pressure on groundwater resources in the district (Aditya et al, 2015).

Other studies carried out at Karainagar Island in Northern Province suggest that Cumulative rainfall around 652-892mm required to recharge the groundwater, and 739mm rainfall registered during 2020-to-2023-year period. This potential rainfall contributed to groundwater discharge but recent increase of tube-wells extraction method contributing in the groundwater depletion and salinity level increase in the Island (Kartiga et al, 2023). Dug wells and Tube wells are the most common water serving method in Thunukkai division in the Mullaitivu District. 50% of collected water samples revealed high EC, Salinity, TDS and Hardness compared to the SLS standard and 120 people were affected by chronic kidney diseases in the district (Kalaivani et al, 2020)

Contamination of Nitrate and E. coli is clearly indicating the raw sewage contamination with groundwater resource. Simple pit latrine (Septic tank) uses by most households in the Jaffna District. These are constructed with sand blocks and cement but not sealed in the bottom. Hence, Pit Latrines allowing fecal matters to contaminate with the groundwater (Saravanamuttu, 2024). Most water bodies are contaminated with Nitrogen, coliform and E. coli also not within the desirable limit (Mahagamage et al, 2019).

Sri Lanka should implement several actions to minimize water pollution. Industries should be required to submit annual emission reports, adopt waste management practices, and implement water purification techniques. In addition, controlling deforestation is essential. The Sri Lankan government must take proactive measures to protect natural resources in a sustainable manner (Keshani Y.H.N., 2021).

International Journal of Current Science Research and Review
ISSN: 2581-8341
Volume 07 Issue 09 September 2024
DOI: 10.47191/ijcsrr/V7-i9-18, Impact Factor: 7.943
IJCSRR @ 2024
www.ijcsrr.org

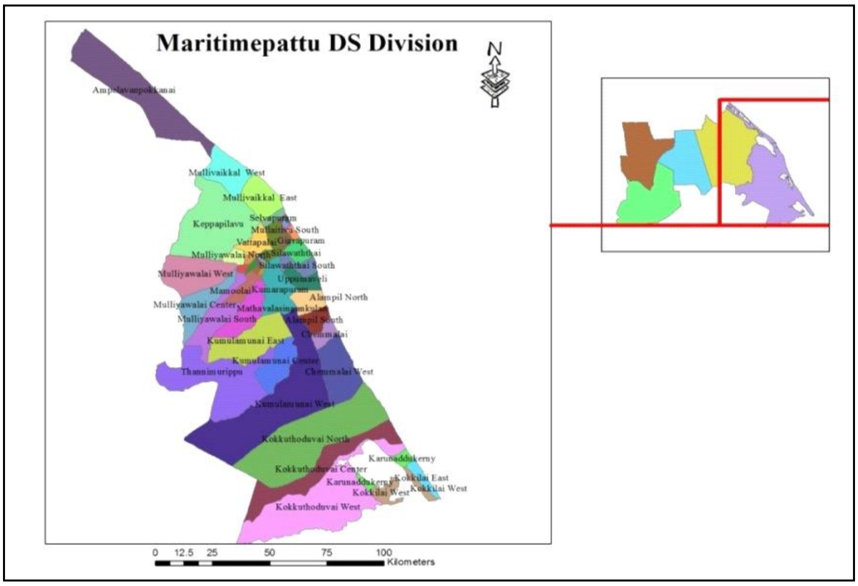


Figure I: GN Divisions of Maritimepattu DSD

Water pollution is also a significant issue in Sri Lanka's north-central dry zone. Factors such as drought, atmospheric conditions, and agricultural practices contribute to this problem (Keith Smith, 1996). Among natural factors, heat is one of the most common influences on water pollution in the region. According to the World Health Organisation, 110,000 people suffer from a lack of drinking water, while 380,000 people experience water-related issues in this area (WHO, 2011).

STUDY AREA

The study area is located within the dry zone climatic region of Sri Lanka, specifically in the Mullaitivu District, which is divided into five Divisional Secretariat Divisions, one of which is Maritimepattu. Maritimepattu is situated at an elevation of 5 feet above sea level and is further subdivided into 46 Grama Niladhari administrative units. The area receives an annual rainfall of 1,577 mm, primarily during November and December, due to the North-West Monsoon. The average annual temperature in the region is 32.5ºC. The division encompasses both forested and freshwater areas, covering a total area of 728.6 km², which accounts for 28% of the district's land. In addition, it accommodates 3,157 agricultural families and contains approximately 7,150 acres of agricultural land.

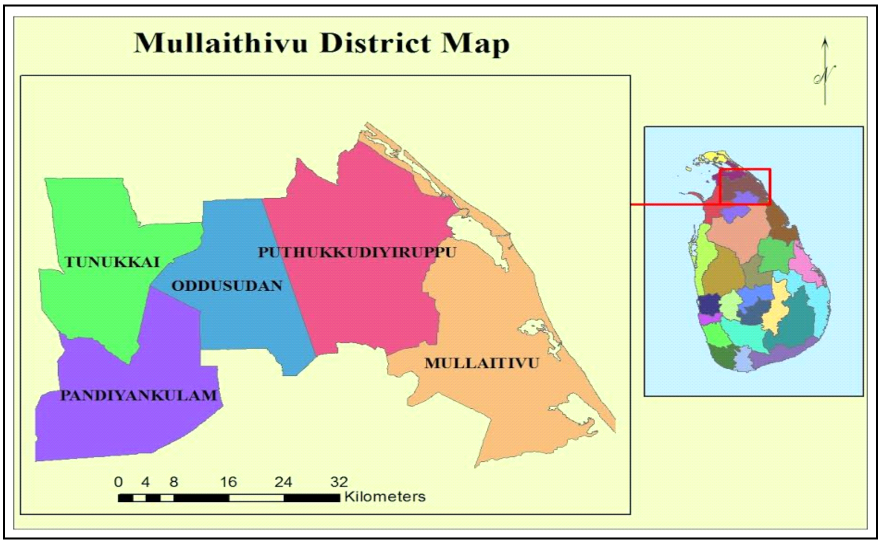


Figure II: Location Map of Maritimepattu

Source: Survey Department of Sri Lanka, Digital Data.

International Journal of Current Science Research and Review
ISSN: 2581-8341
Volume 07 Issue 09 September 2024
DOI: 10.47191/ijcsrr/V7-i9-18, Impact Factor: 7.943
IJCSRR @ 2024
www.ijcsrr.org

OBJECTIVES

I. Main Objective

To assess the water quality and associated problems in the Maritimepattu Divisional Secretariat, Northern Province.

II. Sub Objective

- Assess the water quality in the study area.
- Identify the causes of water pollution.
- Investigate the associated socio-environmental issues.

RESEARCH METHODOLOGY

I. Research Design:

This study investigates water pollution and its socio-environmental problems in the Maritime Pattu Divisional Secretariat of the Mullaitivu District. The research adopts a social science approach and is designed as a qualitative study, incorporating both qualitative analysis and computational methods.

II. Data Source:

The data sources employed for this research are primarily classified into primary and secondary categories. Primary data were collected through questionnaires, direct observations, discussions, interviews, and laboratory tests. Interviews were conducted with key informants, including the Medical Officer of Health (MOH). In addition, inspections were carried out in areas affected by water pollution within the study area, along with assessments of the impacted populations.

III. Data Collection:

For this research, 100 questionnaires were distributed, targeting both villages affected by water pollution and those not affected. The survey was conducted in six Grama Niladhari divisions within the Divisional Secretariat. To assess water quality, 36 water samples were collected from various sources, including open wells, tube wells, pipelines, and ponds. Next, these samples underwent laboratory testing to scientifically analyse the physical and chemical properties of the water in the research area. In addition, direct observations were made, and interviews were conducted with 10 individuals.

IV. Data Analysis:

The data collected from the questionnaires were analysed using statistical methods with the assistance of Microsoft Excel and SPSS. Statistical techniques were employed to interpret the findings and gain insights from the data.

Analytical

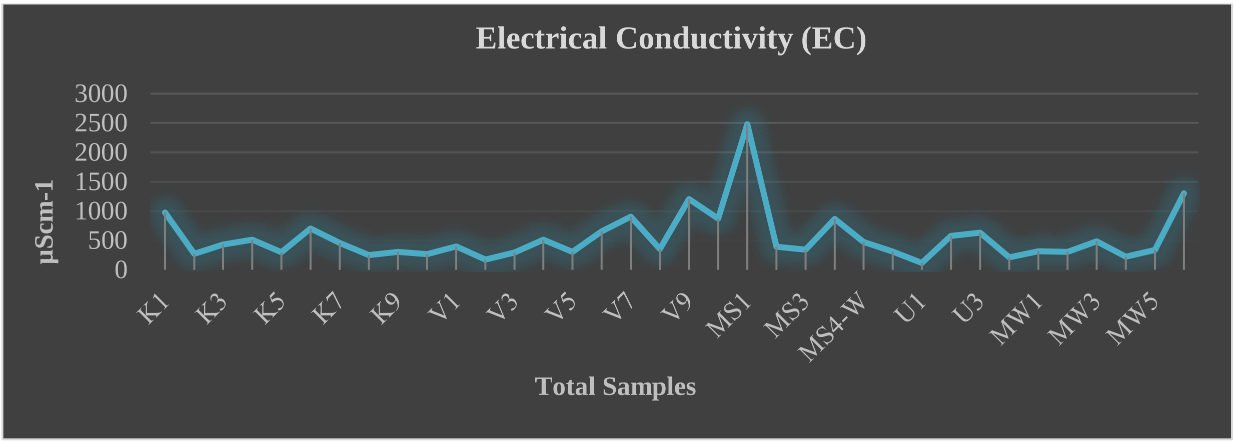
This analysis is based on both primary data and secondary data collected through questionnaires, interviews, experiments, and discussions conducted during the field survey. In addition, findings from the literature review were incorporated, compared with the collected data, and applied where relevant to strengthen the analysis.

Quality of Water

I. Electrical Conductivity (EC)

The measured values of Electrical Conductivity (EC) in the water samples ranged from 117.3 µS/cm to 2480 µS/cm. When comparing the test results to the desirable limits set by the Sri Lanka Standards (SLS) certificate, 80.6% of the water bodies (29 samples) were found to be suitable for use. However, 19.44% of the water bodies (7 samples) exceeded than acceptable limits of 750 µS/cm and were deemed unsuitable for usage.

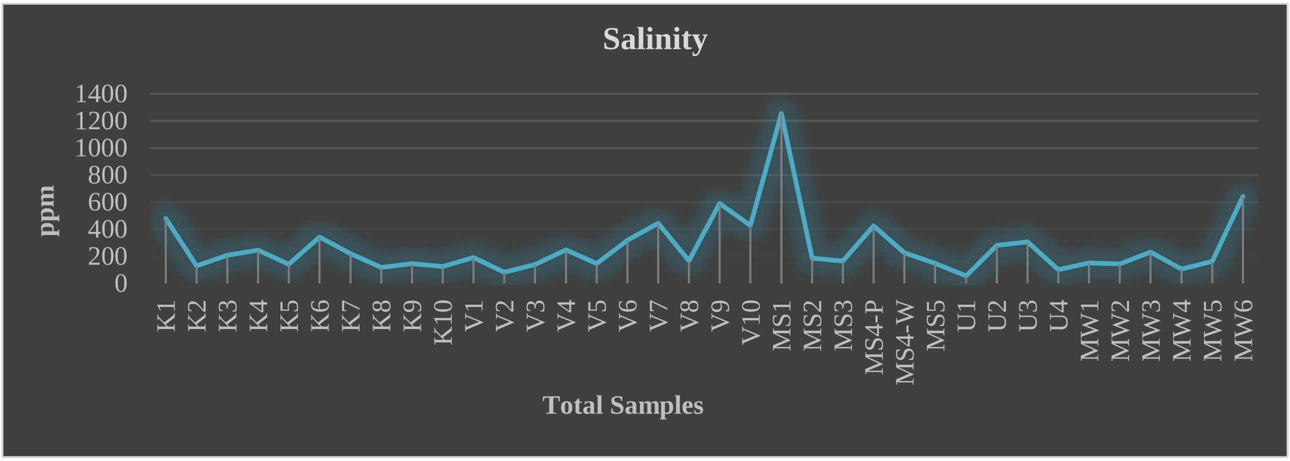
International Journal of Current Science Research and Review
ISSN: 2581-8341
Volume 07 Issue 09 September 2024
DOI: 10.47191/ijcsrr/V7-i9-18, Impact Factor: 7.943
IJCSRR @ 2024
www.ijcsrr.org



Graph I: EC Value
(Source: Field Survey)

II. Salinity

According to the Sri Lanka Standards Institute, the desirable limit for salinity in water is 150 ppm. Water exceeding this salinity level is considered unsuitable for use. All 36 water samples in the research area showed high salinity levels. The laboratory test results show that 36% of the water bodies had salinity levels below 150 ppm, which renders them suitable for use. However, 64% of the water bodies had salinity levels exceeding 150 ppm, which makes them unsuitable for use. 590 ppm is the highest recorded salinity values in the study area.

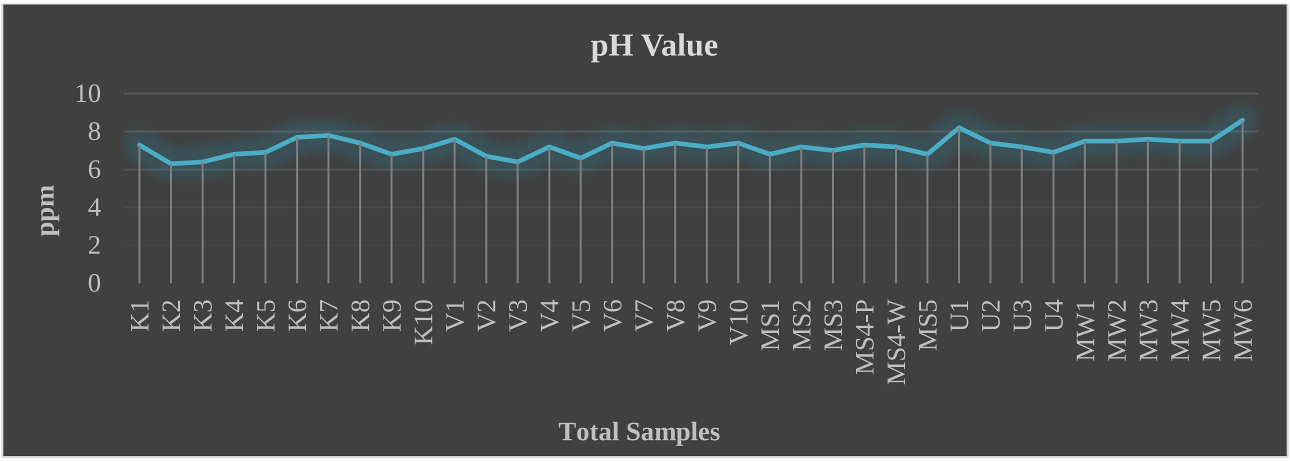


Graph II: Salinity Value
Source: Field Survey

III. pH Value:

The pH value is a key indicator that reflects the concentration of hydrogen ions in water, which is in contrast to the concentration of nitrogen gas. According to the Sri Lanka Standards (SLS) quality certificate, water suitable for use should have a pH value between 7.0 and 8.5. However, due to water's ability to dissolve various substances, pure water with a neutral pH is rarely found. In the research area, approximately 88.89 of the water bodies (25 samples) had pH values within the desirable range of 7.0 to 8.5, while 31% of them had pH values either below 6.5 or above 8.5, which makes them unsuitable for use.

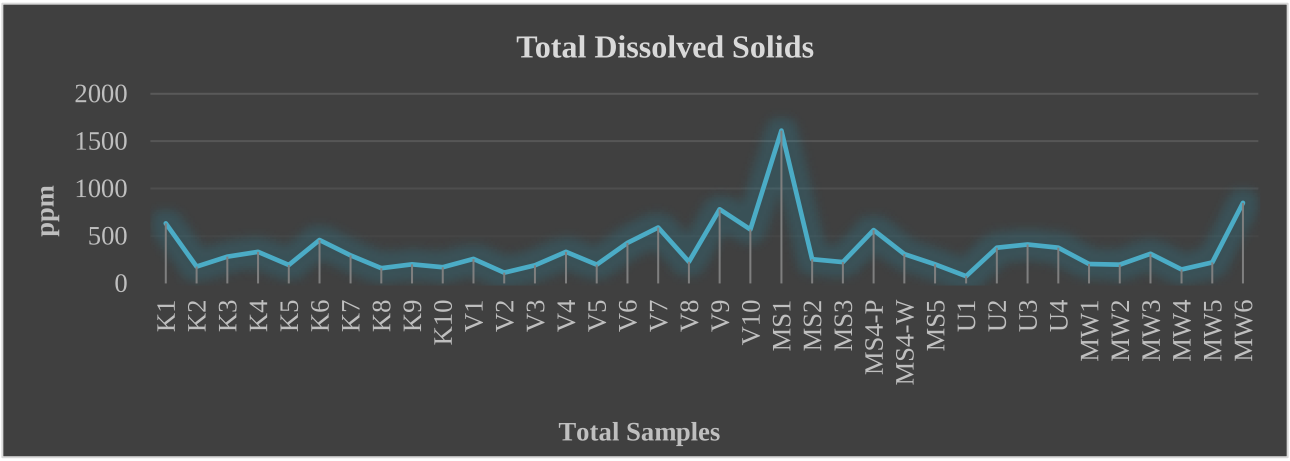
International Journal of Current Science Research and Review
ISSN: 2581-8341
Volume 07 Issue 09 September 2024
DOI: 10.47191/ijcsrr/V7-i9-18, Impact Factor: 7.943
IJCSRR @ 2024
www.ijcsrr.org



Graph III: pH Value
Source: Field Survey

IV. Total Dissolved Solids (TDS):

Total Dissolved Solids (TDS) refers to the measure of organic and inorganic substances present in water. Sources contributing to TDS include agricultural runoff, waste currents from rivers and high mountains, and industrial waste. When the TDS level exceeds the specified limit, it can lead to various ecological problems. According to the Sri Lanka Standards (SLS), the desirable limit for TDS in water is up to 500 ppm. The TDS concentration in the collected water samples varied from 76.3 ppm to 848 ppm. Based on the findings, 81% (29 samples) of the water samples had TDS levels within the desirable limit of 500 ppm, which makes them suitable for use. However, 20% (7 samples) of the water bodies had elevated TDS levels, which indicate high salinity and unsuitability for use.



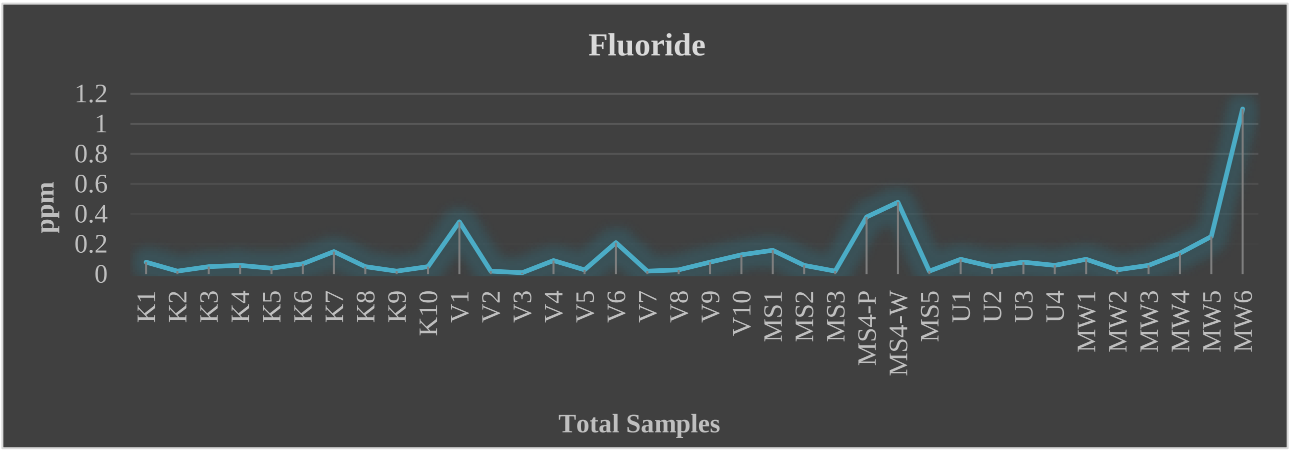
Graph IV: Total Dissolved Solids Value
Source: Field Survey

The WHO classifies water quality based on the concentration of Total Dissolved Solids (TDS) as follows: water with TDS levels below 300 ppm is considered of very high quality; water with TDS levels between 300 ppm and 600 ppm is classified as fair; and water with TDS levels between 600 ppm and 900 ppm is regarded as somewhat substandard. According to the analysis, 56% of the water bodies in the research area fall under the category of very high quality, 8% are classified as fair, and 36% are considered to be of poor quality. As the TDS concentration increases, water hardness also rises. As a result, this hard water becomes unsuitable for consumption and general use.

International Journal of Current Science Research and Review
ISSN: 2581-8341
Volume 07 Issue 09 September 2024
DOI: 10.47191/ijcsrr/V7-i9-18, Impact Factor: 7.943
IJCSRR @ 2024
www.ijcsrr.org

V. Fluoride:

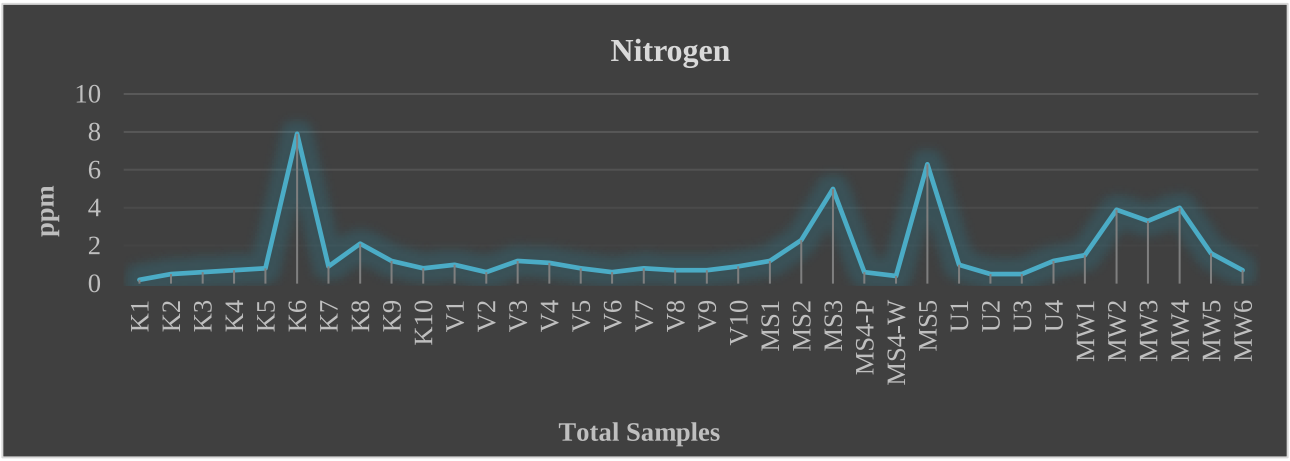
Another important compound found in water is fluoride, which plays a significant role in water quality. Higher levels of fluoride are often observed in areas with limestone surfaces and in water bodies located near regions of intensive agricultural activity. According to the Sri Lanka Standards (SLS) quality certificate, the preferred limit for fluoride in water is 1.0 ppm. In the research area, all 36 water samples (100%) tested showed 83.3% only have fluoride concentrations within the desirable limits, but 16.67% samples exposed more than 1 ppm.



Graph V: Fluoride
Source: Field Survey

VI. Nitrate:

Nitrate is an essential element that should be present in small quantities in water, as it plays a critical role in the daily activities of both animals and humans. However, increasing agricultural activities and animal husbandry have led to higher nitrogen levels in water, primarily due to runoff from fertilisers, which are generally nitrogen compounds. Nitrogen frequently transforms into nitrate or ammonia in water. When exposed to air, soil bacteria can further convert ammonium ions into nitrogen, which can contribute to water pollution. Based on the Sri Lanka Standards (SLS), the desirable nitrogen concentration in water should not exceed 3 mg/L. When nitrogen levels exceed this limit, the water is considered unsuitable for use.



Graph VI: Nitrogen Value
Source: Field Survey

Based on the analysis of water samples collected from the research area, nitrogen concentrations exceeded the desirable limit of 3 mg/L in 16.67% of the samples (6 samples). The lowest nitrogen concentration recorded was 0.5 ppm, while the highest was 7.9 ppm.

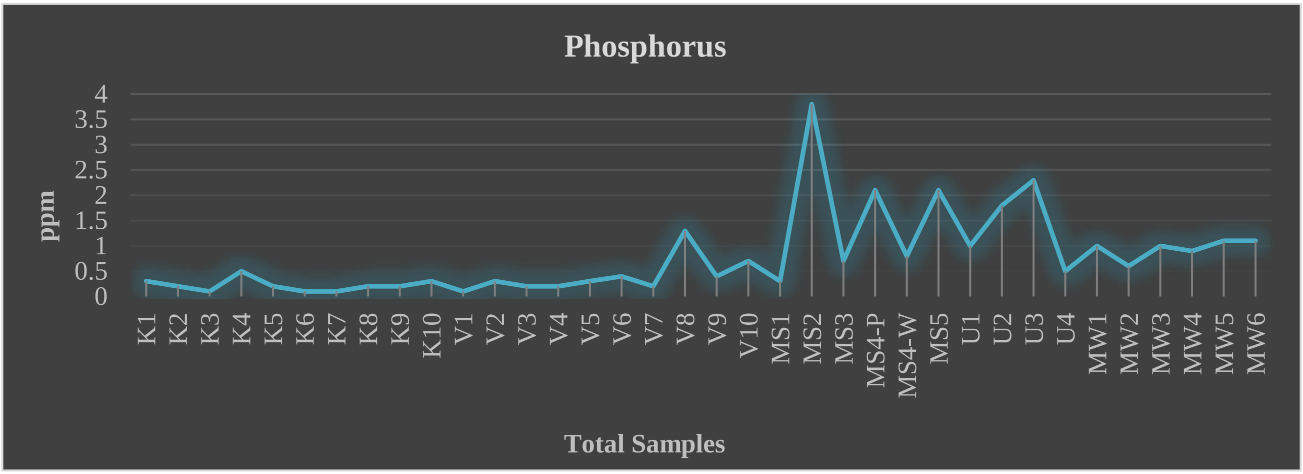
International Journal of Current Science Research and Review
ISSN: 2581-8341
Volume 07 Issue 09 September 2024
DOI: 10.47191/ijcsrr/V7-i9-18, Impact Factor: 7.943
IJCSRR @ 2024
www.ijcsrr.org

Despite the sandy upper soil composition in the region, large quantities of nitrogen-based fertilisers are applied during agricultural activities, which, along with groundwater pumping, result in higher nitrogen levels. In coastal areas, nitrogen concentrations ranged from 0.5 ppm to 6.5 ppm, which was likely influenced by past war operations. In the interior regions of the study area, nitrogen levels varied between 0.2 ppm and 7.9 ppm. They were driven by intensive agriculture, which was the main economic activity in these areas. The classification of water quality based on nitrogen concentration is as follows: water with less than 1 ppm is considered partially usable, water with concentrations between 1 ppm and 3 ppm is deemed dangerous, and water with levels exceeding 3 ppm is considered highly dangerous. According to this classification, 45% of the water samples in the research area are partially usable, 34% fall into the dangerous category, and 21% are classified as highly dangerous, with nitrogen concentrations above 3 ppm.

VII. Phosphorus

Phosphorus is a key nutrient found in fertilisers that is essential for plant growth. Unlike nitrogen, phosphorus does not readily dissolve in water. Instead, it combines with ions such as calcium, magnesium, aluminum, and iron in the soil to form stable compounds. However, when the amount of insoluble phosphorus in the soil exceeds a certain threshold, it becomes saturated. Therefore, water bodies easily wash away additional phosphorus fertilisers, which increase the phosphorus levels in the water. In the research area, phosphorus concentrations in water samples varied between 0.1 mg/L and 3.8 mg/L.

According to the Sri Lanka Standards Institute, the desirable phosphorus concentration in water is 2 mg/L, with a maximum permissible limit of 2.0 ppm. When compared to these standards, 88.88% (32 samples) of the water bodies in the research area were found to be suitable for use, with phosphorus levels below 2 mg/L. However, 11.11% (4 samples) of the water bodies had phosphorus concentrations exceeding 2 mg/L, which makes them unsuitable for use.



Graph VII: Phosphorus Value
Source: Field Survey

Physical Features of the Water Bodies

I. Colour

Various colour differences can be observed in the water bodies across the study area, with noticeable reflections of brown, dust, and grey tones. In particular, 57% of respondents noted changes in the colour of water bodies in the study area, while 33% did not observe such changes. It is important to note that this area was resettled only after 2011, following the civil war in the country. In some coastal parts of the study area, oil deposits were also observed on the surface of water bodies. These deposits are likely the result of dust particles, toxic gases, and emissions from heavy vehicles and mechanical equipment mixing with water bodies during the war period.

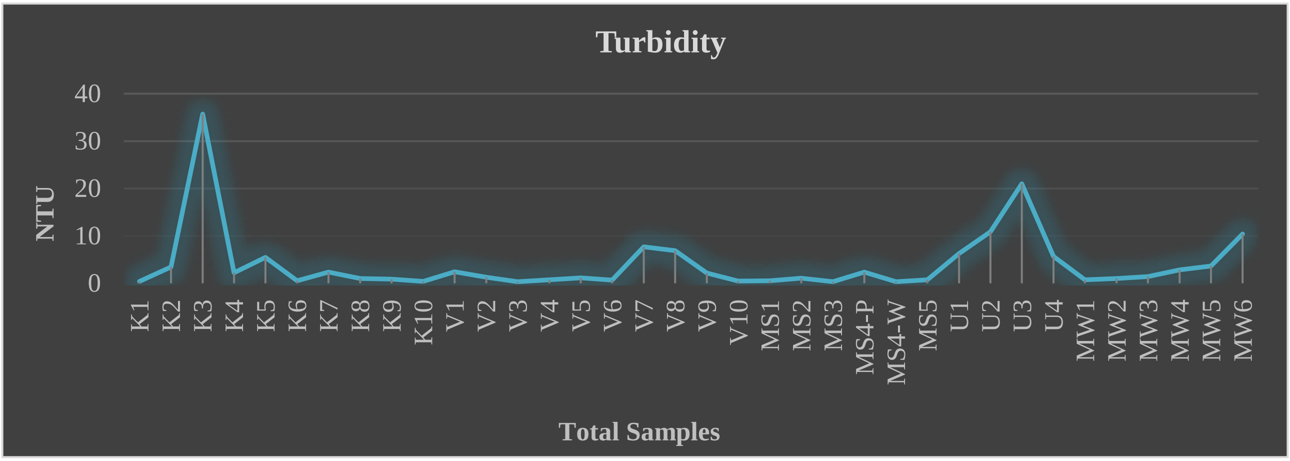
International Journal of Current Science Research and Review
ISSN: 2581-8341
Volume 07 Issue 09 September 2024
DOI: 10.47191/ijcsrr/V7-i9-18, Impact Factor: 7.943
IJCSRR @ 2024
www.ijcsrr.org

Water bodies with colour variations in the study area;

II. Turbidity

Brown **Dust** **Grey**

When phytoplankton growth is stimulated in water, it can lead to increased turbidity. Other contributing factors include agricultural runoff, construction activities, and high levels of siltation. According to the Sri Lanka Standards Institute, the desirable turbidity limit is 2 NTU. Based on the analysis of water samples from the research area, 53% (19 samples) of the water bodies were found to have turbidity levels within the permissible limit, which makes them suitable for use. However, 47% (17 samples) of the water bodies exhibited high turbidity levels, which renders them unsuitable for use.



Graph VIII: Turbidity Value

Source: Field Survey

Turbidity levels in the research area were found to range from 0.37 NTU to 35.7 NTU. Spatially, turbidity values increase as one moves from the northern to the southern parts of the area. In the coastal regions, the highest recorded turbidity value in the coastal area was 10.4 NTU, while the interior areas exhibited a maximum turbidity of 35.7 NTU. Areas with high turbidity levels were notably associated with intensive agricultural and fishing activities, as well as regions that were heavily affected by the war.

III. Smell

The presence of certain smells can also indicate pollution in water bodies. In the study area, some water bodies emit unpleasant odours, such as bad smells and iron-like odours. These smells are attributed to the aftermath of war activities and flooding, which are common in the region's sloped landscapes.

Causes and Effects

Water is one of the most critical resources on Earth for sustaining life. To effectively address water pollution, it is crucial to understand the underlying causes, which can stem from both natural and anthropogenic factors. In the Maritimepattu division, which is located on S Miocene limestone, the geological characteristics of this sedimentary rock contribute naturally to high levels of TDS in the water table. Limestone is a highly porous and permeable rock, and it can easily break down into tiny particles due to its relatively weak structure. As a result, this could lead to higher TDS levels in water bodies. Some of the collected water samples in the study area exhibited very high TDS concentrations, with values reaching up to 900 ppm, along with high salinity levels.

In addition, the coastal location of the study area has been affected by the 2004 tsunami, which caused seawater to intrude up to 1 km inland. This intrusion contaminated freshwater sources, including wells and ponds, which resulted in increased salinity levels. Agricultural intensification in the region also plays a significant role in water contamination.

The majority of the population in the study area engages in agriculture, which uses substantial amounts of fertilizer and pesticides to increase crop yields. Approximately 55% of farmers use well water for the agriculture activities while others using tanks, tube-wells and rainfall.

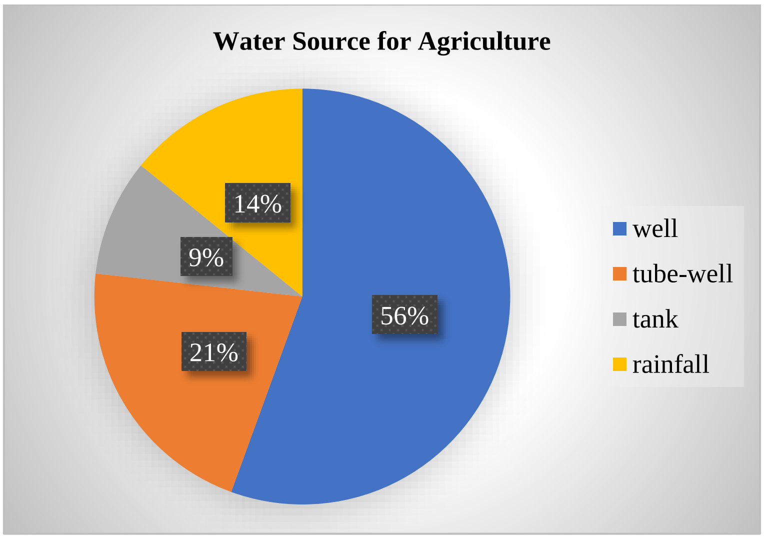


Chart I: Water Source for Agriculture in Sri Lanka
Source: Field Surve

34% of the water bodies are situated near agricultural land, and 76% of the agricultural activities depend heavily on groundwater resources, particularly well and tube-well water. As a result, this over-extraction of groundwater can lead to depletion. For instance, 94% of farmers in the area pump water to their crops on a daily basis, which worsens the strain on groundwater resources.

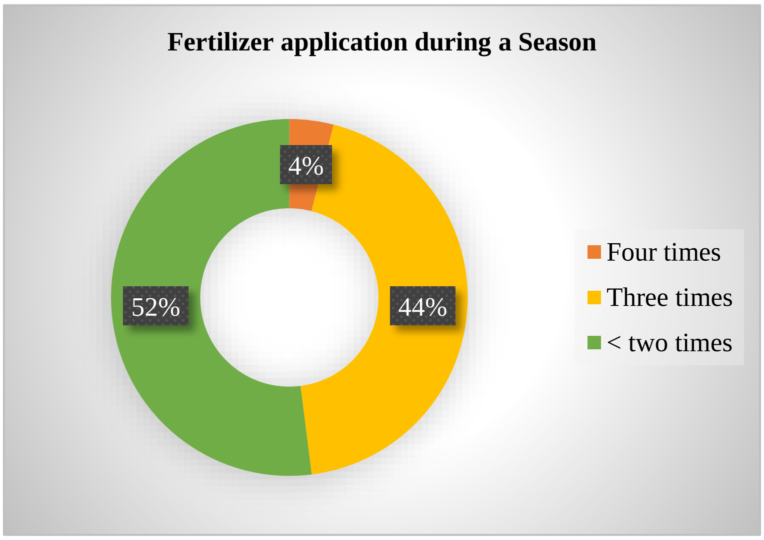


Chart II: Fertilizer application in Agriculture
Source: Field Survey.

According to the findings, 83% of farmers in the study area use chemical fertilizers, with 44% applying them three times per season, including fertilizers such as urea, ammonia, and sulfate. In addition, 40% of farmers apply pesticides three to four times in a single

International Journal of Current Science Research and Review
ISSN: 2581-8341
Volume 07 Issue 09 September 2024
DOI: 10.47191/ijcsrr/V7-i9-18, Impact Factor: 7.943
IJCSRR @ 2024
www.ijcsrr.org

season. Despite the Sri Lankan government's ban on certain harmful chemical pesticides, many farmers in the study area continue to use them on their agricultural lands.

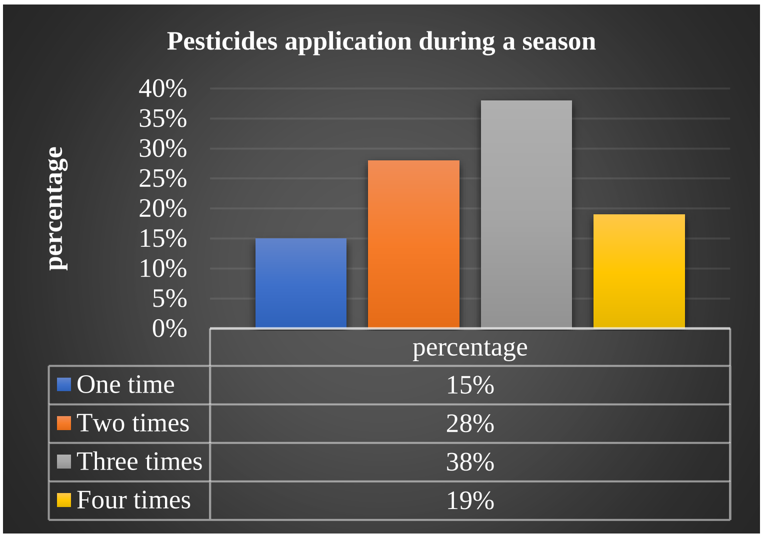


Chart III: Pesticide application during Agriculture
Source: Field Survey

Furthermore, the field survey observed improper waste management practices, including the dumping of garbage and household waste, and the cleaning of vehicles in ponds and canals. These activities contribute to water contamination and are linked to the transmission of waterborne diseases such as cholera, diarrhea, typhoid, and hepatitis A. The construction of pit latrines on limestone bedrock further exacerbates the risk of groundwater contamination. Coliform bacteria and viruses from these latrines can easily leak into the groundwater. Government regulations mandate that pit latrines be built at least 30 meters away from freshwater sources; however, in the study area, 50% of the pit latrines are located only six to nine meters away from water bodies. As a result, this could significantly increase the risk of groundwater contamination.

Photo 1: log-tube well in study area.
Source: Field Survey

The study area has also been affected by severe war activities over the past three decades, with resettlement occurring only recently. During the war, various prohibited weapons, vehicles, and explosive devices were used and buried in the water bodies, which led to contamination by substances such as zinc, oil, arsenic, and cadmium.

Furthermore, the local population, which has a low income, struggles to meet basic needs and lacks awareness of environmental protection. As a result, they resort to unsustainable water extraction methods, such as the use of log-tube wells (Photo: 1).

These wells are a low-cost water supply method created by temporarily digging pits in the ground and placing plastic barrels into the land. However, log-tube wells are highly susceptible to contamination from external sources, which poses a further threat to water quality.

Poor water quality poses a serious threat to agricultural activities, which can lead to issues such as gradual plant death, reduced yields, slow growth, and declining plant health. The presence of high levels of soluble salts in the water can directly damage plant roots and cause the edges of plant leaves to burn due to salt accumulation. The majority of the farmers in the study area have observed significant declines in total crop yields, particularly in paddy, banana, and tomato cultivation, during the post-war period. The primary contributors to this problem are high levels of nitrogen, phosphate, and TDS.

Polluted water is create challenged to access the good quality water for drinking water purpose. Especially in the study area, 72% of household consume direct water without any filtration method. This is can led to the severe health problem in the human body.

Polluted water, combined with inadequate sanitation practices, is also related to a range of waterborne diseases, including skin rashes, kidney stones, kidney failure, nasal cancer, and diarrhea. These health issues were identified in 38% of individuals in the study area, with 7% of those affected being children. The incidence of water pollution and related health problems is notably higher in the northern part of the Divisional Secretariat division compared to the southern part.

In addition, the cost of maintaining well water has increased due to the need for more frequent cleaning, and medical expenses have significantly impacted household incomes. These environmental and social challenges have placed a significant burden on low-income communities, creating substantial obstacles to their well-being and financial stability.

CONCLUSION AND RECOMMENDATIONS

The study reveals that significant water pollution has occurred in the post-war period within the Maritimepattu Divisional Secretariat. Laboratory tests on various parameters, including Electrical Conductivity (EC), salinity, pH, Total Dissolved Solids (TDS), fluoride, nitrogen, phosphorus, zinc, and turbidity, indicate that many of these parameters exceed the desirable limits set by the Sri Lanka Standards (SLS) certification. Anthropogenic factors, such as agricultural practices and waste disposal, are major contributors to water pollution in the area.

To protect natural water resources, it is crucial to address pollution at its source. Although there is no simple solution to eliminating water pollution, several strategies can help mitigate it. Promoting environmentally friendly agricultural practices (often referred to as green agriculture) is essential by using fertilisers free from harmful substances. Denitrification, a process that directly converts nitrate into nitrogen gas, can help prevent nitrates leaching into the soil and reduce groundwater pollution.

Public education is also vital. Organizing campaigns and workshops can raise awareness about the importance of water conservation and proper sanitation practices. In addition, promoting rainwater harvesting systems can help reduce reliance on groundwater for irrigation during the dry season. The government and other organizations must enforce strict laws and regulations to protect natural water resources. Installing water treatment systems in the study area is necessary to ensure that the water is safe for human consumption. Furthermore, hazardous waste should not be dumped in water bodies, and industrial waste should be properly recycled. Therefore, these measures should be implemented to mitigate water pollution in the Maritimepattu Divisional Secretariat and ensure the long-term sustainability of water resources for the community.

REFERENCES

1. Aditya, S., Herath, M., Salman, S., Ameer, R. & Pathmarajah, S. (2015). Managing shallow aquifers in the dry zone of Sri Lanka. *Springer International Publishing Journal*, Switzerland. DOI: 10.1007/s 10661-015-4584-5.
2. Chamini, W., Gunarathna, M.H.J.P., Prabhasri. H. & Guttila, Y.J. (2018). Drinking water Quality on Chronic Kidney Disease of unknown Aetiology (CKDu) in Ullagalla Cascade, Sri Lanka. *Sabaragamuwa University Journal*. 16(1): 17.
3. Dissanayake, C.B. & Weerasooriya, S.V.R. (1985). A Geochemical classification of Groundwater of Sri Lanka. *Journal of Natural Science Council of Sri Lanka*. 13(2). Pp: 147-186.
4. Edirisinghe, K.A.N.V., Karunaratne, G.R.R.,l Hidayathulla, M.S.M., Kumara, I.G.C.I., Thilakarathna, I.A.N.D.P., Gunasekara, J.D.C., Rathnayaka, S.S.K. & Priyadarshane, K.S.G.S. (2014).

5. Gunawardena, E.R.N. & Pabasara, P.K.D. (2016). A framework for Groundwater policy in Sri Lanka. *Groundwater availability in the dry zone of Sri Lanka*, Kandy, Sri Lanka.
6. Inthirakumaran, K., Ponnambalam, R., Balachandran, K. (2023). Groundwater mapping and locally engaged water governance in a small island terrain: Case study of Karainagar island, Northern Sri Lanka. *World water policy*. (9). Pp: 456-480.
7. Jeyaruba, T. & Thushyanthy, M. (2009). The effect of Agriculture on Quality of Groundwater: A Case study. *Middle-East Journal of Scientific Research*. 4 (2). Pp 110-114.
8. Jinadasa, K.B.S.N., Wijewardena, S.K.I., Dong, Q.Z., Richard, M.G., Kalpage, C.S., Soon, K.T., Jing, Y.W & Wan, J.N. (2012). Socio-Environmental impact of water on the Mid – Canel, Sri Lanka. *Journal of water resource and protection*. (4), Pp 451-459.
9. Kalaivani, G., Prabagar, S., Uthpala, A.J., Gobalarajah, R., Sittampalam, R. & Jasotha, P. (2020). Impact of water quality on chronic kidney disease ofv unknown etiology (CKDu) in Thunukkai Division in Mullaitivu district, Sri Lanka. *BMC Nephrology*, (21): 507.
10. Keshani, Y.H.N. (2022). Impacts of water pollution in Sri Lanka. *Journal of Research Technology & Engineering*. 3(1). Pp: 19-26.
11. Kumara, G.M.P., Perera, M.D.D., Wijekoon, W.M.S.M., Pathamarajah, S., Diyawansa, N.D.K., Mowjood.M.I.M. & Galagedara, L.W. (2015). Water pollution in a natural stream and its impacts on society and Environment: A review of studies on Meda Ela, Sri Lanka. 6th International conference on structural Engineering and construction management. Kandy, Sri Lanka.
12. Kumari, M.K.N. (2020). Evaluation of Groundwater Quality Index for Drinking water in Tank Cascade Landscape. *International Journal of Latest Technology in engineering Management and Applied Science (IJLTEMAS*), IX (VIII).
13. Mahagamage, M.G.Y.L., Pavithrani, S. & Pathmalal. (2019). Water Quality and microbial contamination status of groundwater in Jaffna Peninsula, Sri Lanka. *Journal of Water and Land development*. 40(I-III). P:3-12.
14. Mutu, T.O.V.P. & Navarethnam, G. (2022). Impact assessment of land use on water scarcity in urban areas: case of Jaffna peninsula, Sri Lanka. *Water policy*, 24(7): 1146-1165.
15. Nitasha, K. and Sanjiv, T. (2014) Influences of Natural and Anthropogenic Factors on Surface and Groundwater Quality in Rural and Urban Areas. *Frontiers in Life Science*, 8, 23-39.
16. Prabagar, J., Prabagar, S. & Thuraisingam. (2020). Nitrate contamination of groundwater: An issue for livelihood in Jaffna Peninsula, Sri Lanka. *African Journal of Agricultural Research*, 16(7), Pp:1025-1032.
17. Saravanamuttu, S.S. (2024). Parch land and contaminated well in the Northern Province, *Daily News*, Sri Lanka.
18. Suresh, I., Yuansong, W., Titus, C., Tharindu, R.,m Jinadasa, K.B.S.N., Sujithra, S.K. & Rohan, W. (2022). Groundwater - based Drinking water supply in Sri Lanka: Status and Perspectives. *MDPI*, Basel, Switzerland.
19. Thushyanthy, M., Barathithasan, R. & Saravanan, S. (2010). Irrigation water quality based on Hydro Chemical analysis, Jaffna, Sri Lanka. *American – Eurasian J.Agric. & Environ. Sci*., 7(1): 100-102.
20. Thushyanthy, M., Meththika, V., Pathmarajah, S., Sutharsiny, A., Ranjith, A. & Manthrithilake, H. (2013). Hadrochemical characterization in Jaffna's aquifer system in Sri Lanka., *International Water Management Institute (IWMI)*.
21. Wanasinghe, W.C.S., Gunarathne, M.H.J.P., Herath, H.M.P.I.K. & Jayasinghe, G.Y. (2018). Drinking water quality on Chronic Kidney Disease of unknown A etiology (CKDu) in Ulagalla Cascade, Sri Lanka. *Sabaragamuwa University Journal*, 16(1), Pp: 17-27.
22. World Health Organization. (2011). Guidelines for Drinking-water Quality. *World Health Organization*. Geneva, Swtzerland. (4).