

Water QUALITY OF THANLWIN AND ATTARAN RIVERS

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Abstract

Water has existed on earth as early as 3000 million years ago. It is the commonest fluid in nature. Water pollution may be divided into five categories on the basis of sources and storage of water: ground water pollution, surface water pollution, lake water pollution, river water pollution and sea water pollution. Today the accelerated pace of development rapid industrialization and population density have increased demand of water resources. Water quality refers to the chemical, physical, biological and radiological characteristics of water. It is a measure of the condition of water relative to the requirements of one or more both species and or to any human need or purpose. This report presents water quality data collected two locations from March 2015 to April 2016 and analyzed by using eleven parameters at the water quality laboratory, Mawlamyine Univesity. The results were discussed in three parameters such as pH, turbidity and electrical conductivity. The water quality of Attaran River was good characteristics than Thanlwin River. So, raw water from Attaran River could be used for producing tap water in Mawlamyine, Mon State.

Keywords: Water quality, Thanlwin River, Attaran River, parameter, tap water

Introduction

- Water is made up of two Hydrogen atoms and one oxygen atom
- Oxygen has six frontier electrons
- Four of these electrons come in pairs of two: the other two electrons are unpaired

Water quality assessment

- parameters and permissible levels, Hydrologic Cycle,
Sources of water pollution

Pollution indicators

- physical, chemical, and biological
- Description of physical parameters: alkalinity, hardness, DO,
BOD, COD

Drinking water

- sources and characteristics, standards, impurities and their
sources
- Change in water quality downstream of a flowing river

Water Quality Parameters

- Water quality is determined by assessing three classes of attributes: physical, chemical, and biological
- There are standards of water quality set for each of these three classes of attributes

Physical Parameters of Water Quality assessment

- Colour
- Odour
- Turbidity
- Temperature
- Conductivity

Chemical Parameters for Water Quality

assessment

- pH
- Acidity
- Alkalinity
- Hardness
- Solids

Harmful Chemicals

- Chlorides
- Sulphates
- Iron
- Nitrates
- Heavy Metals
- Pesticides

Alkalinity

- Capacity to neutralize acid
- Presence of carbonates, bi-carbonates and hydroxide compounds of Ca, Mg, Na and K
- Alkalinity is determined by measuring the amount of acid needed to lower the pH in a water sample to a specific endpoint; the results are usually reported in standardized units as milligrams CaCO_3 per liter

- Carbon dioxide dissolves in water to form carbonic acid , which dissociates and is in equilibrium with bicarbonate and carbonate ions



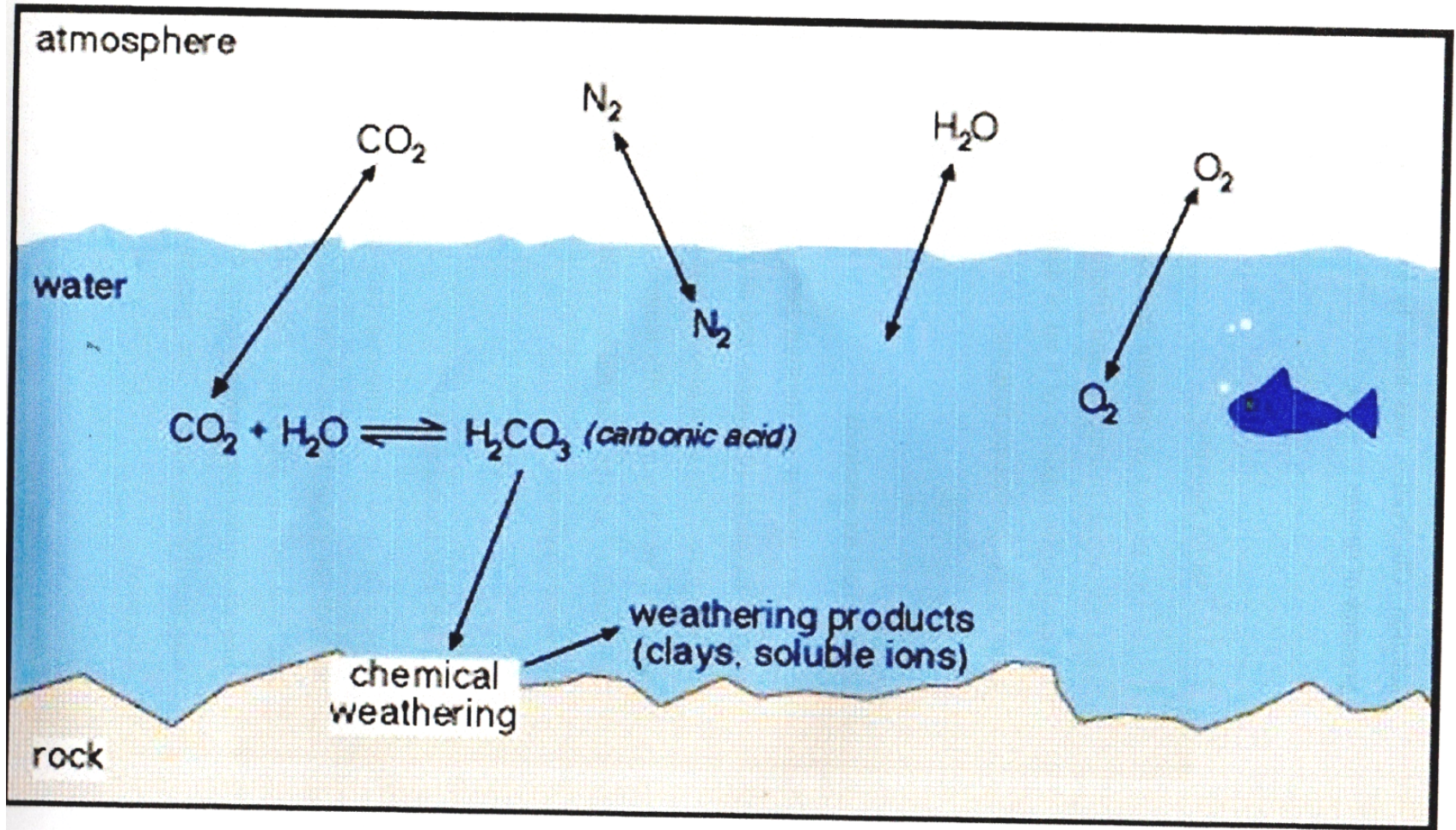


Figure 1. Carbonate cycle in water

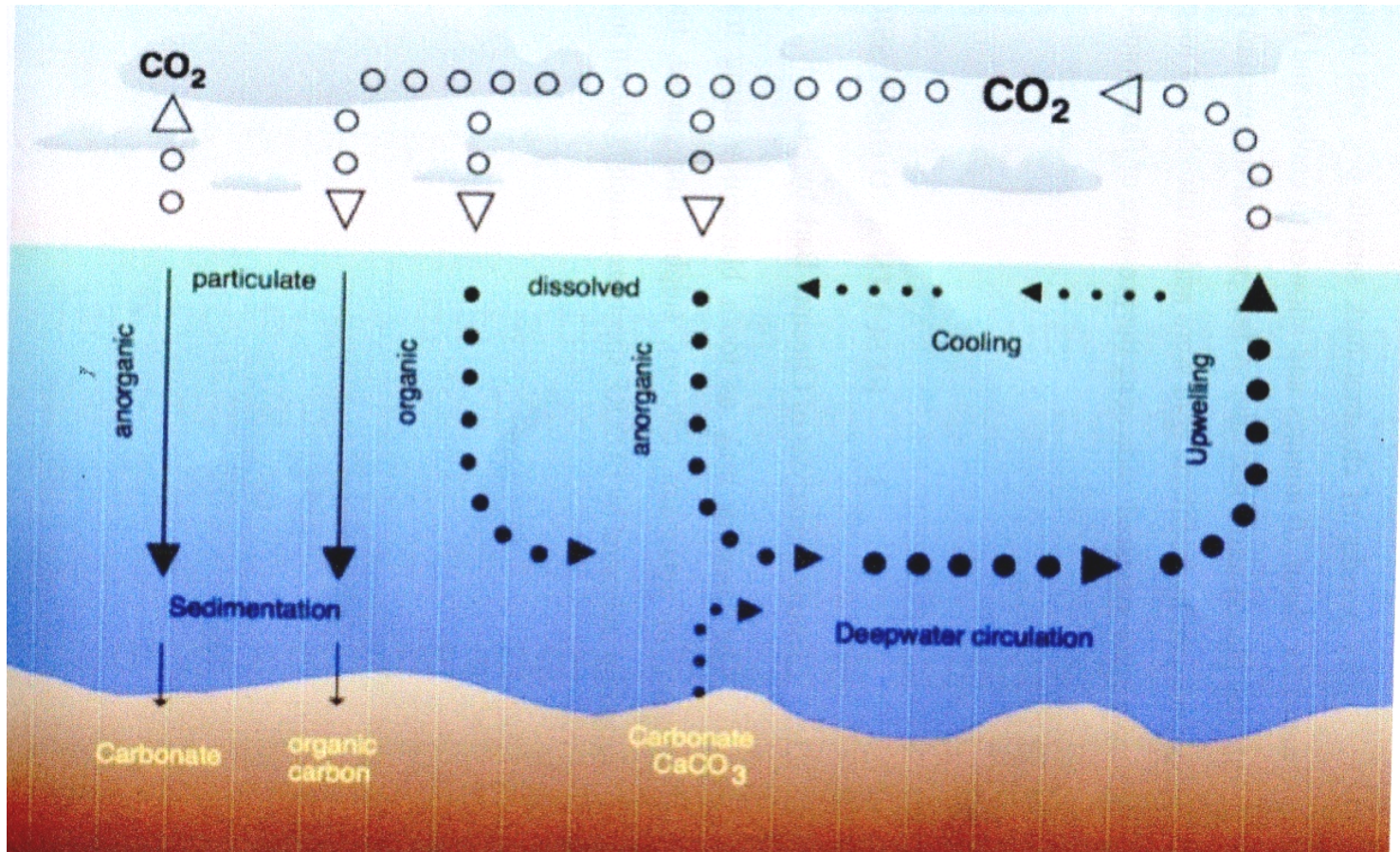


Figure 2. Biological and physical pumps of CO₂

Hardness

- Capacity of water for reducing and destroying the lather of soap
- **It is total concentration of calcium and magnesium ions**
- **Types**
- Temporary –Bicarbonates of Calcium and Magnesium
- Permanent –Sulphates , chlorides and nitrates of calcium and magnesium
- **Impact**
- Causes encrustations in water supply structures

Total Hardness

- **Total Hardness:** total concentration of metal ions expressed in terms of mg/L of equivalent CaCO_3
- Primary ions are Ca^{2+} and Mg^{2+}
- also iron and manganese
- **Total Hardness approximates total alkalinity**

Alkalinity vs. Hardness

- Possibility of 3 cases
- Alkalinity = Hardness
 - Ca and Mg salts are present
- Alkalinity > Hardness –
 - presence of basic salts, Na, K along with Ca and Mg
- Alkalinity < Hardness –
 - neutral salts of Ca & Mg present

Common problems

| Visible effects | Reasons |
|-----------------------------|-----------------|
| water turns black, smell | Waste water |
| Acidic taste | Low pH |
| Alkaline taste | High pH |
| Boiled Rice hard and yellow | High Alkalinity |
| White deposits on boiling | Hardness |

| Visible effects | Reason |
|---|--------------------|
| Iron taste, change in color after exposure to atmosphere, change in color of clothes & utensils Oily appearance on top of water body | Iron |
| Soap not lathering | hardness |
| Brownish black streaks on teeth | Flouride |
| Growth of Algae | Nitrate, phosphate |
| Fish kills | Low pH, less DO |
| Salty taste | chloride |

Material and Methods

Water Sampling Locations

- The five water samples were collected from rivers in different places
- Sampling locations are written below

Table 1. Water Sampling Locations in Mawlamyine in Mon State

| Type | Description | Location |
|---------------|----------------|----------------------------|
| Surface water | ThanLwin River | Mawlamyine (Myeik Bridge) |
| Surface water | ThanLwin River | Mawlamyine (Mupon) |
| Surface water | Attaran River | Mawlamyine (Kyaikmaraw) |
| Surface water | Attaran River | Mawlamyine (Zayar Thiri) |
| Surface water | Attaran River | Mawlamyine (Painhnel Gone) |

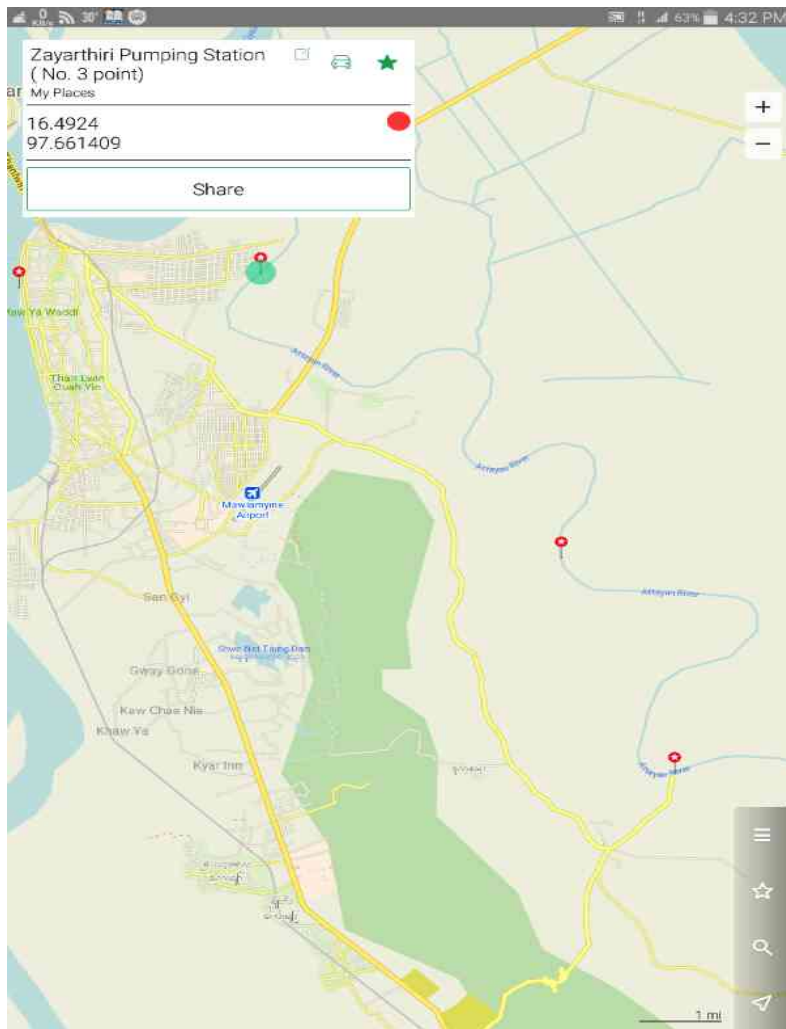


Figure 3: Map of sampling location at Attaran River(Zayar Thiri)

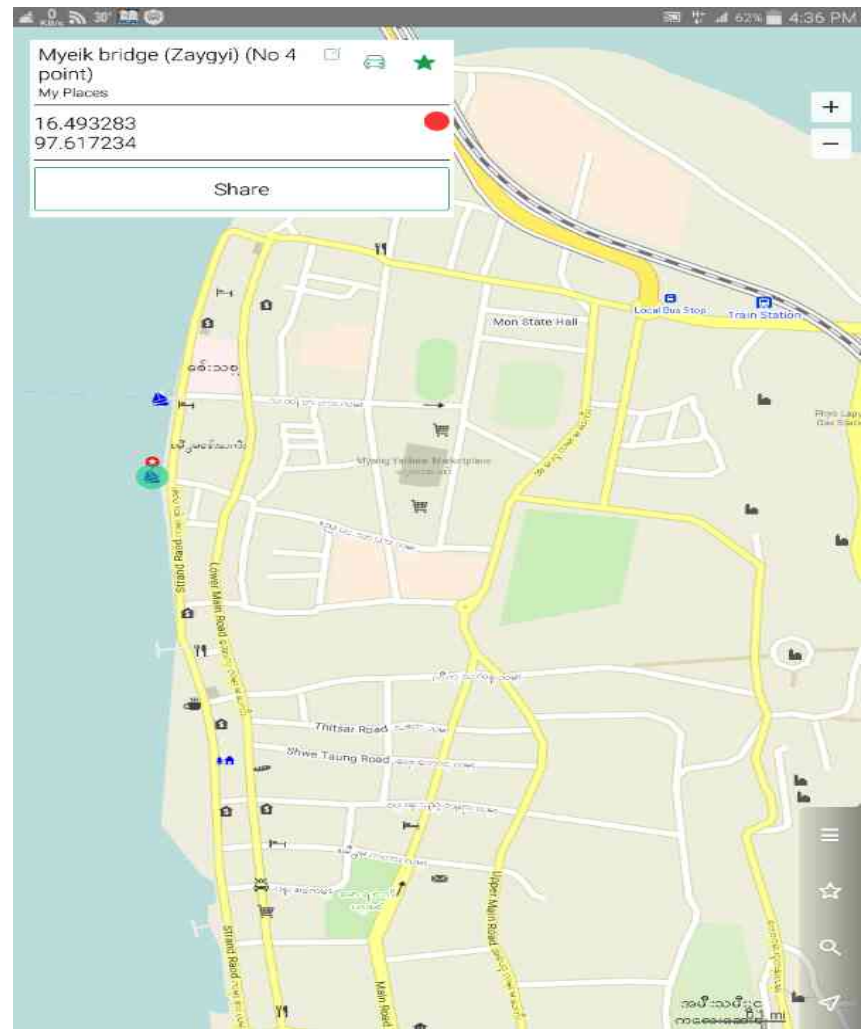


Figure 4: Map of sampling location at Thanlwin River(MyeiBridge)

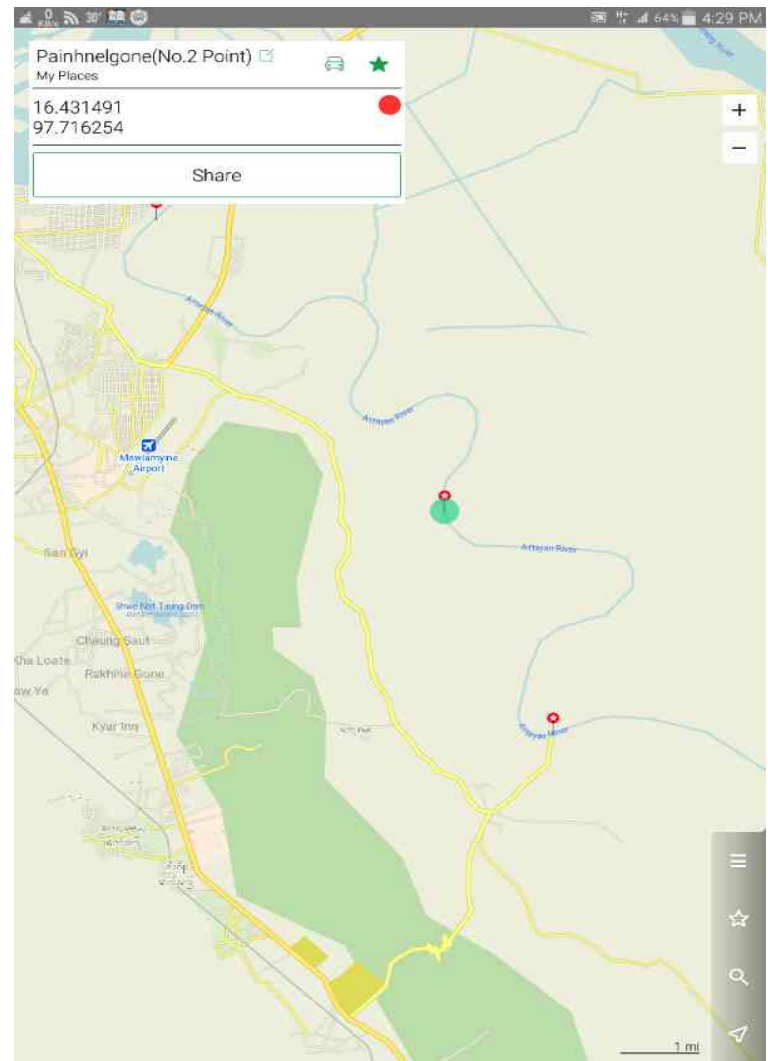
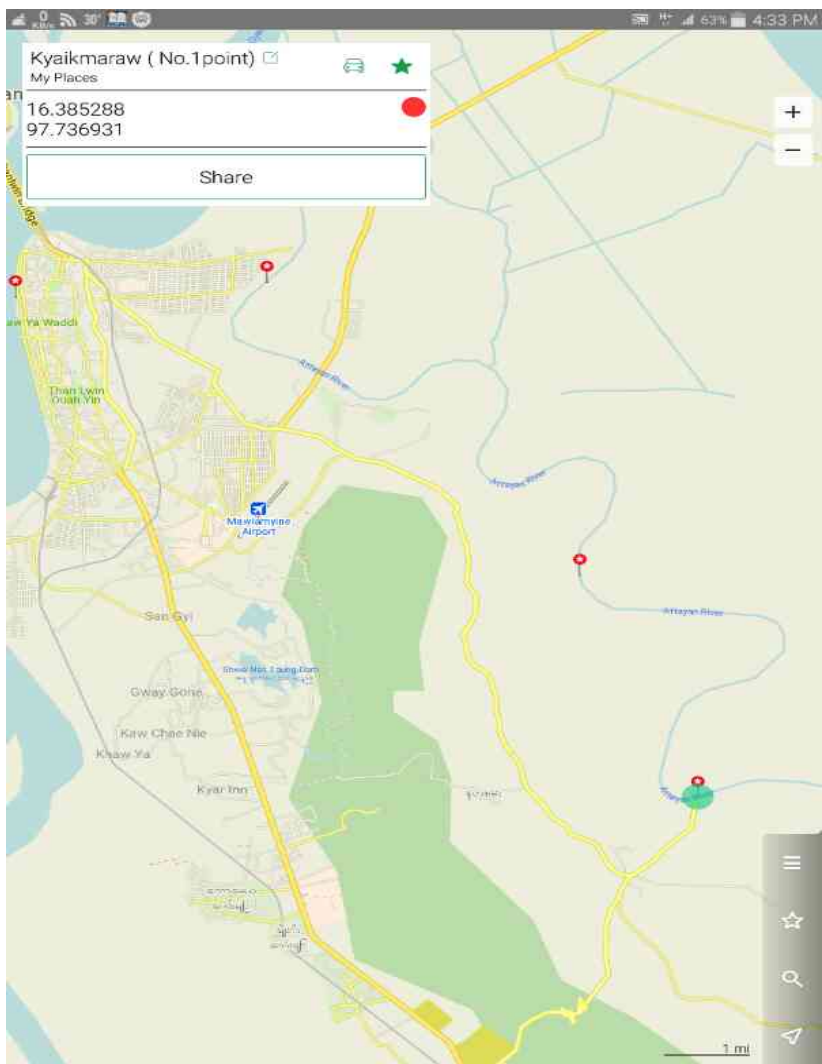


Figure 5: Map of sampling location at Attaran River (Kyaikmaraw and Painhnel Gone)



Figure 6: Filtration of water for testing true colour

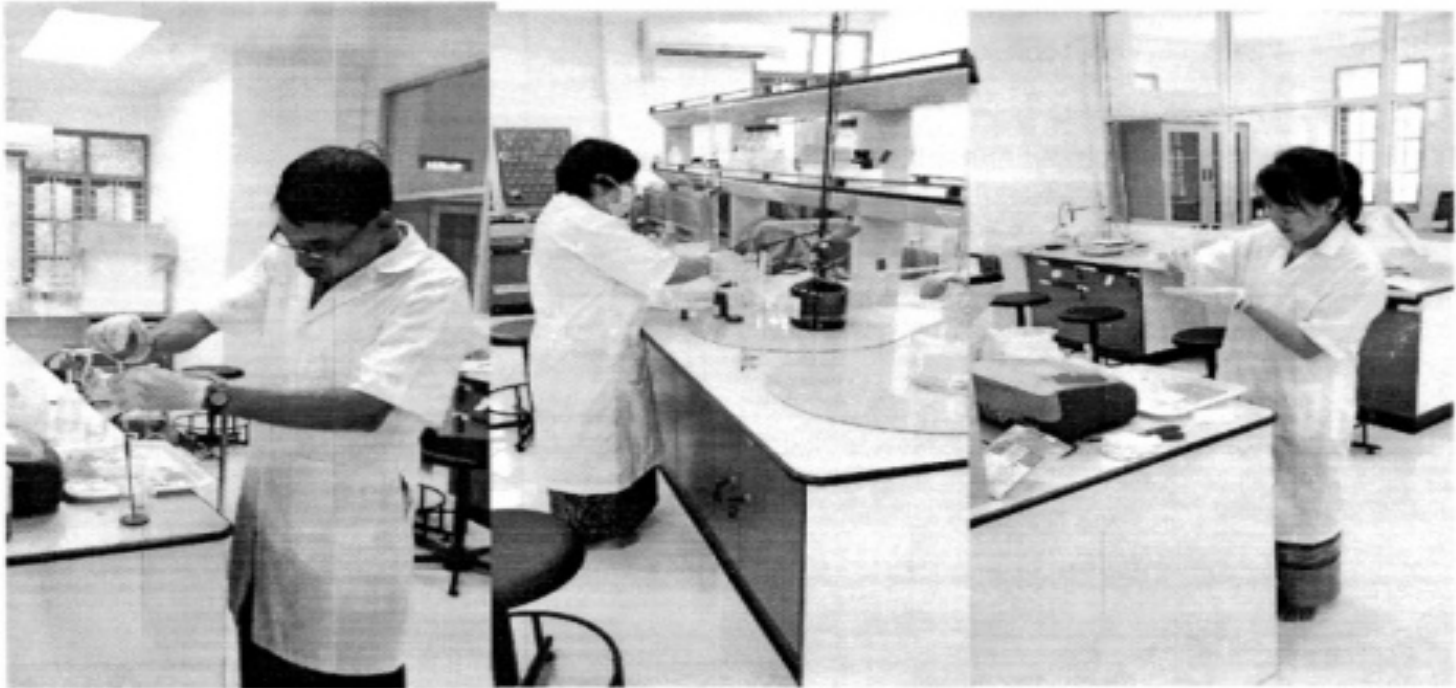


Figure 7: Water sampling and water testing

Period

- The water sampling were collected and analyzed during March 2015 – April 2016 by teacher staffs of Mawlamyine University

Parameter and Test Methods

- The selection of parameter of water testing is solely depend upon the purpose of using water such as pH, True Color, Turbidity, Electrical Conductivity, Iron, Manganese, Sulfate, Fluoride, Alkalinity, Total Hardness and Chloride

Table 2. Parameter and Test Methods

| No | Parameter | Unit | Methods |
|----|-------------------------|-------------------------|--------------------------------|
| 1 | pH | - | Electrometric method |
| 2 | Turbidity | NTU | Turbidity Meter |
| 3 | True Color | Pt-Co Unit | Visual Comparison method |
| 4 | Electrical Conductivity | $\mu\text{S}/\text{cm}$ | Electrical Conductivity method |
| 5 | Iron | mg / L | FerroVer method |
| 6 | Manganese | mg / L | PAN method |
| 7 | Sulfate | mg / L | SufalVar Turbidimetric method |
| 8 | Fluoride | mg / L | SPADNS method |
| 9 | Alkalinity | mg / L | Titration method |
| 10 | Total Hardness | mg / L | EDTA Titrimetric method |
| 11 | Chloride | mg / L | Argentometric method |

Results and Discussion

Comparison of the water quality of Thanlwin River and Attaran River

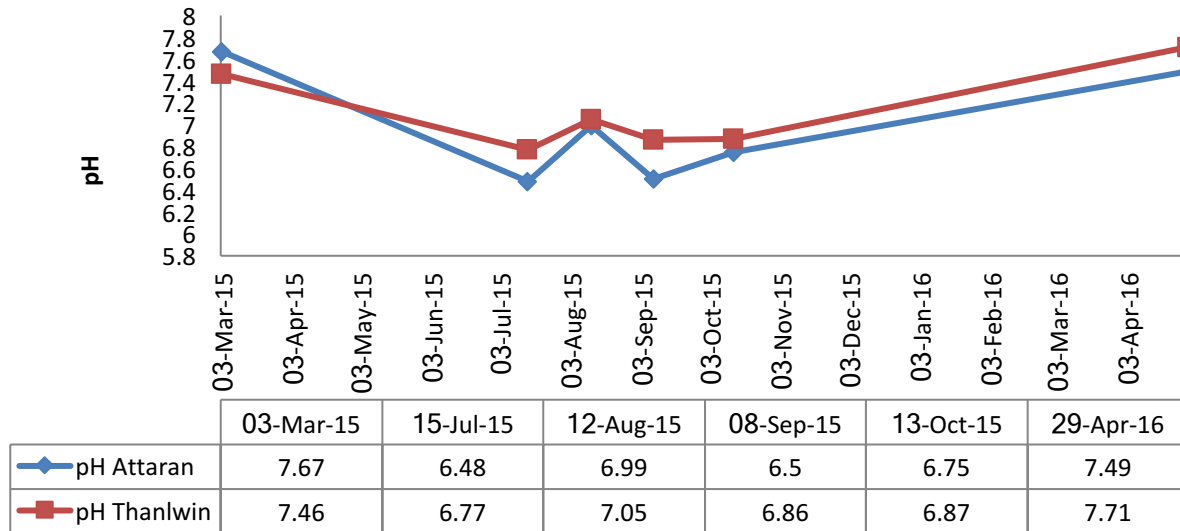
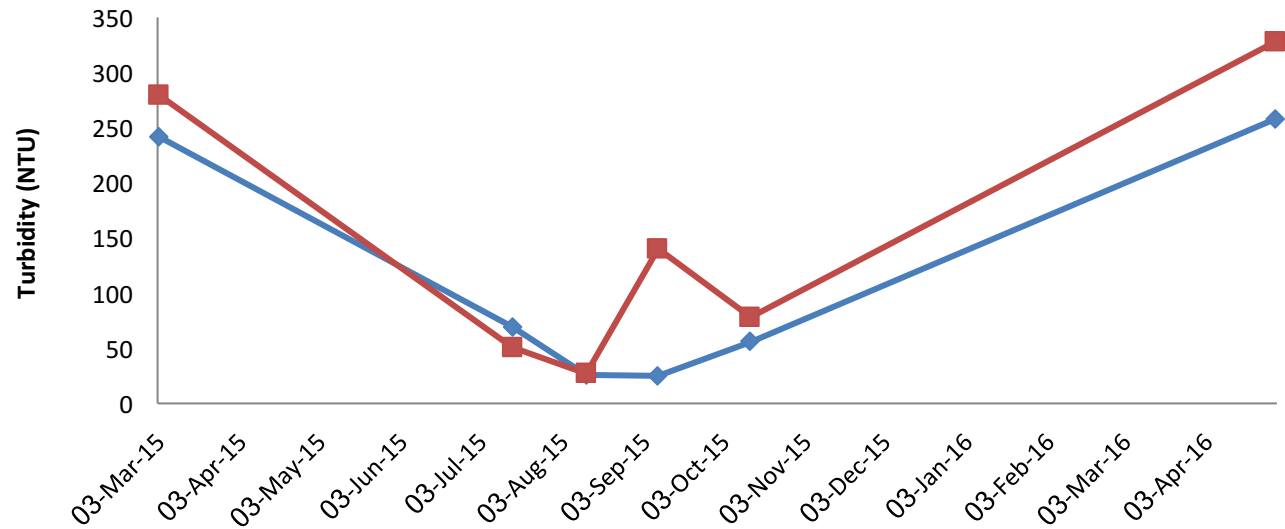
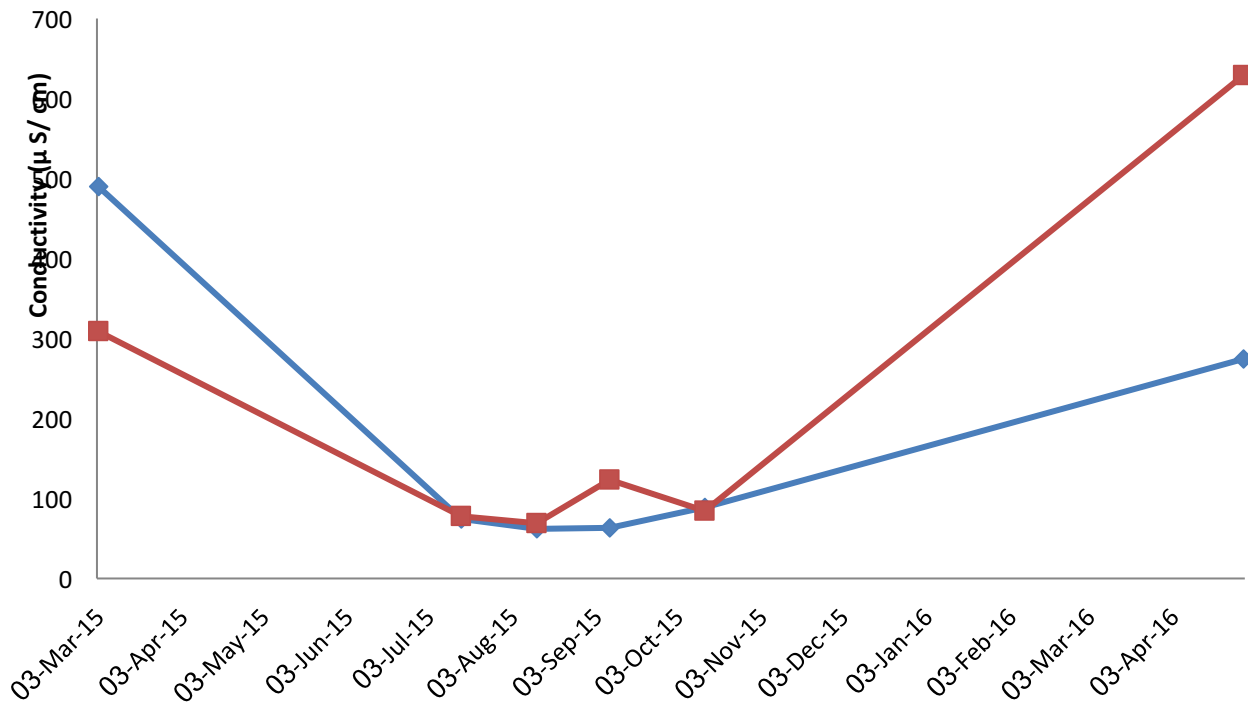


Figure 6: Comparison of water quality of Attaran River and Thanlwin River; pH



| | | | | | | |
|-----------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| | 03-Mar-15 | 15-Jul-15 | 12-Aug-15 | 08-Sep-15 | 13-Oct-15 | 29-Apr-16 |
| ◆ Turibidity Attaran | 242 | 69 | 26 | 25 | 56 | 258 |
| ■ Turibidity Thanlwin | 280 | 51 | 27 | 140 | 78 | 328 |

Figure 7: Comparison of water quality on Attaran River and ThanLwin River; turbidity



| | 03-Mar-15 | 15-Jul-15 | 12-Aug-15 | 08-Sep-15 | 13-Oct-15 | 29-Apr-16 |
|-------------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| ◆ Conductivity Attaran | 490 | 74 | 62 | 63 | 89 | 274 |
| ■ Conductivity Thanlwin | 309 | 78 | 69 | 123 | 84 | 629 |

Figure 8: Comparison of water quality on Attaran River and ThanLwin River; conductivity

- The pH ranges from 6.48 to 7.67 and 6.86 to 7.71 in Attaran River and Thanlwin River. It complies with water quality standards for water sources WHO (6.5 to 8.5). The minimum pH value of Attaran River and Thanlwin River were recorded in July and September.
- The turbidity of Attaran River and Thanlwin river fluctuate from 25 to 258 NTU and 27 to 328 NTU in Attaran River and Thanlwin River. The maximum turbidity value of both Attaran and Rivers were recorded on March, 2015 and April, 2016. They may be due to deplete water in March, 2015 and April, 2016.
- The value of electrical conductivity of Attaran River was lower than Thanlwin River in summer.

Table 3. Comparison of Water Quality between Attaran River and Thanlwin River

| Date | pH | | Turbidity (NTU) | | Conductivity (μ S/ cm) | |
|---------|------|------|-----------------|-----|-----------------------------|-----|
| | AtR | ThR | AtR | ThR | AtR | ThR |
| - | AtR | ThR | AtR | ThR | AtR | ThR |
| 3Mar15 | 7.67 | 7.46 | 480 | 309 | 490 | 309 |
| 15Jul15 | 6.48 | 6.77 | 74 | 78 | 74 | 78 |
| 12Aug15 | 6.99 | 7.05 | 62 | 69 | 62 | 69 |
| 3Sep15 | 6.50 | 6.86 | 63 | 123 | 63 | 123 |
| 13Oct15 | 6.75 | 6.87 | 89 | 84 | 89 | 84 |
| 29Apr16 | 7.47 | 7.71 | 274 | 629 | 274 | 629 |

Conclusion

Water quality of Thanlwin River and Attaran River was carried out at TTW laboratory in Mawlamyine University from March 2015 to April 2016.

The results were discussed in three parameters such as pH, Turbidity and Electrical conductivity. The pH ranges of Thanlwin River and Attaran River were agreed with WHO standard.

The pH of Thanlwin River was quite higher than Attaran River. Moreover, The turbidity of Thanlwin River was 328 NTU and 258 NTU on Attaran River in April, 2016.

The electrical conductivity of Thanlwin River was 629 $\mu\text{S}/\text{cm}$ and 274 $\mu\text{S}/\text{cm}$ on Attaran River in summer respectively. So, water quality of Attaran River was good characteristic than Thanlwin River in Mawlamyine, Mon State. Especially, raw water from Attaran River was good to produce tap water.

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Thank
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