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**Preliminary Assessment of Seawater Intrusion in Phuket Island,  
Thailand**

**Sakanann VANN**

**A Thesis Submitted in Fulfillment of the Requirements for the  
Degree of Master of Science in Earth System Science  
(International Program)**

**Prince of Songkla University**

**2020**

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**Thesis Title** Preliminary Assessment of Seawater Intrusion in Phuket Island,  
Thailand

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I hereby certify that this work has not been accepted in substance for any degree, and is not being currently submitted in candidature for any degree.

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## **ABSTRACT**

Seawater intrusion can gradually cause a severe problem by contaminating freshwater aquifers and causing a lack of fresh water.

## **ACKNOWLEDGMENT**

First of all, I must express my very profound gratitude to my family for providing me with unfailing support and continuous encouragement throughout my years of study.

Sakanann VANN

**CONTENTS**

	<b>Page</b>
<b>ABSTRACT</b>	v
<b>ACKNOWLEDGEMENT</b>	vi
<b>LIST OF CONTENT</b>	vii
<b>LIST OF FIGURES</b>	viii
<b>LIST OF TABLES</b>	ix
<b>CHAPTER</b>	
<b>1 INTRODUCTION</b>	1
1.1 Heading	1
1.2 Heading	1
2.1.1 Sub- Heading	3
<b>2 LITERATURE REVIEW</b>	3
<b>3 METHODOLOGY</b>	5
<b>4 RESULTS</b>	7
<b>5 DISCUSION AND CONCLUSIONS</b>	7
<b>REFERENCES</b>	9
<b>VITAE</b>	10

## LIST OF FIGURES

<b>Figures</b>		<b>Page</b>
1.1	Flow Patterns of Groundwater and the Dispersion Zone in Coastal Aquifer.	2
1.2	Flow Patterns of Groundwater	2

**LIST OF TABLES**

<b>Table</b>		<b>Page</b>
1.1	Number of Groundwater Wells and Amount of Allowed Water Consumption in Phuket in 2012.	3
1.2	Soil Sample Preparation	3

## CHAPTER 1

### INTRODUCTION

#### 1.1 Background of the Study

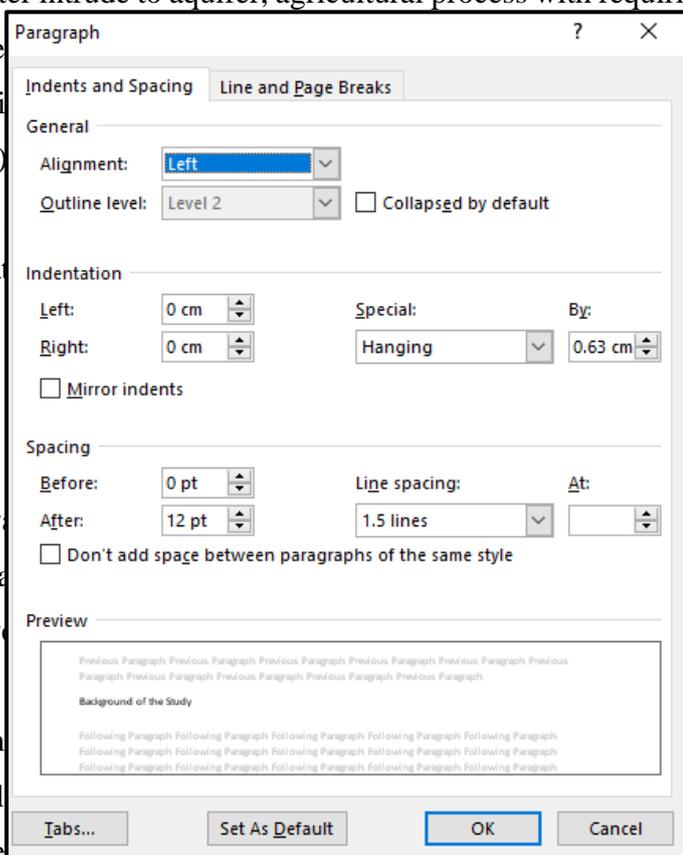
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There are some main factors causing seawater intrusion, the movement of saline water into underground freshwater aquifers, along coastal areas such as rising of seawater level caused by global warming, high consumption of freshwater that can cause the shortage of freshwater, over-pumping from aquifer that can reduce water pressure and then let the seawater intrude to aquifer, agricultural process with requiring lots of amount of fresh water knowledge as well. The salinity (resistivity and self-potential) geophysical, geochemical, and between freshwater and seawater set up.

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#### 1.2 Statement of Problem

While the seawater intrusion is a global problem, it is also a local problem in parts of the world, it is also a problem in Thailand. Phuket island is a well-known island with 10 million visitors in 2013 and 12 million in 2014 (unpublished tourist data from Phuket Tourism Board). The rapid increases in population and increased water demands in the island have led to over-exploitation of groundwater and 32% surface water (DGR, 2015). Overuse of groundwater near the coast contributes to intrusion by seawater. Consequently, the groundwater close to the coast shows a relatively high salinity. Seawater intrusion is globally a common problem in the coastal areas by the sea. It is normally caused by prolonged changes in coastal groundwater levels, and seawater intrusion is the main cause of high groundwater



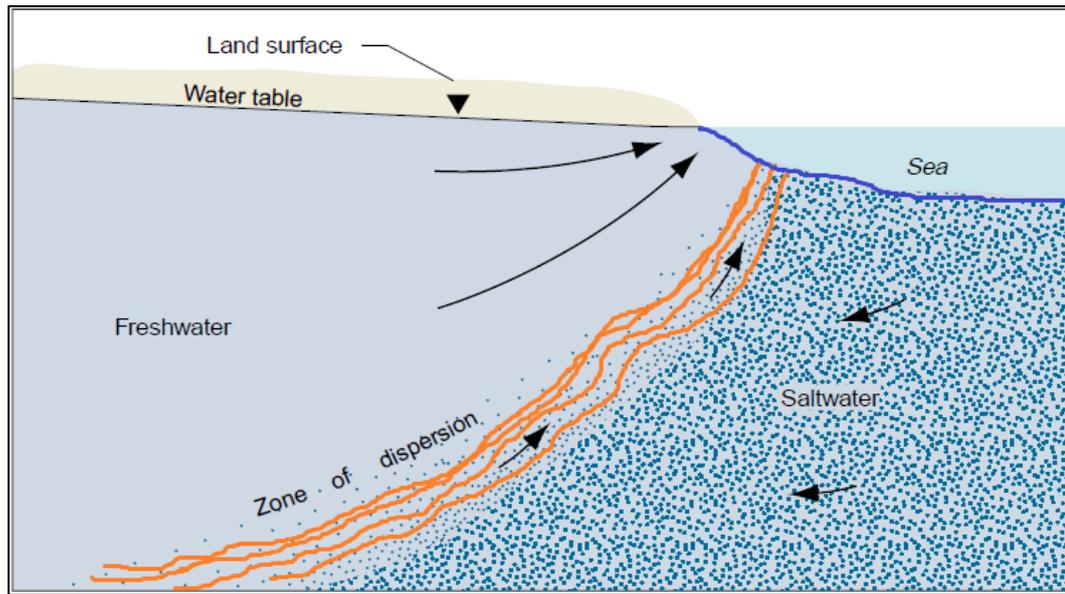


Figure 1.1 Flow Patterns of Groundwater and the Dispersion Zone in Coastal Aquifer.  
(USGS, 2000)

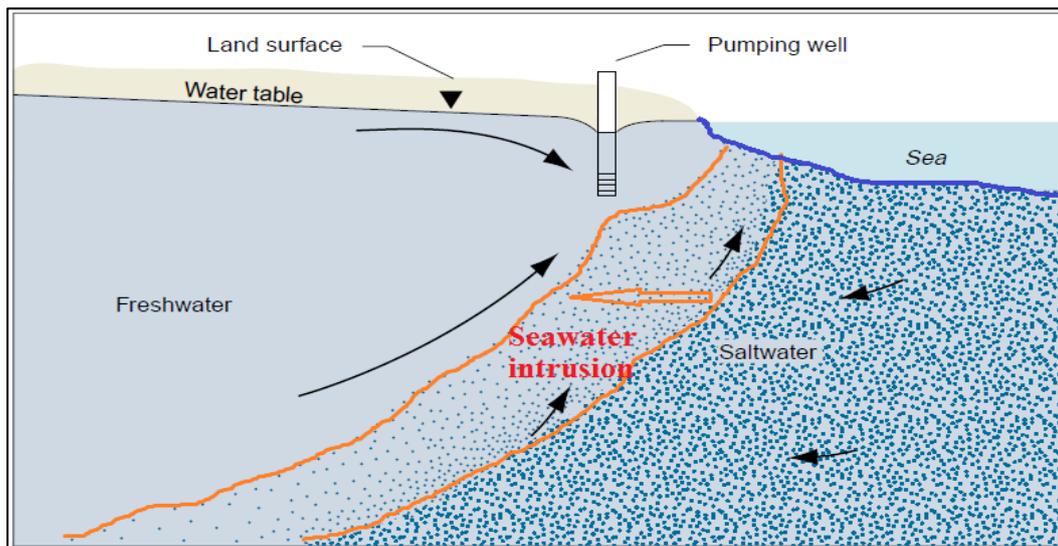
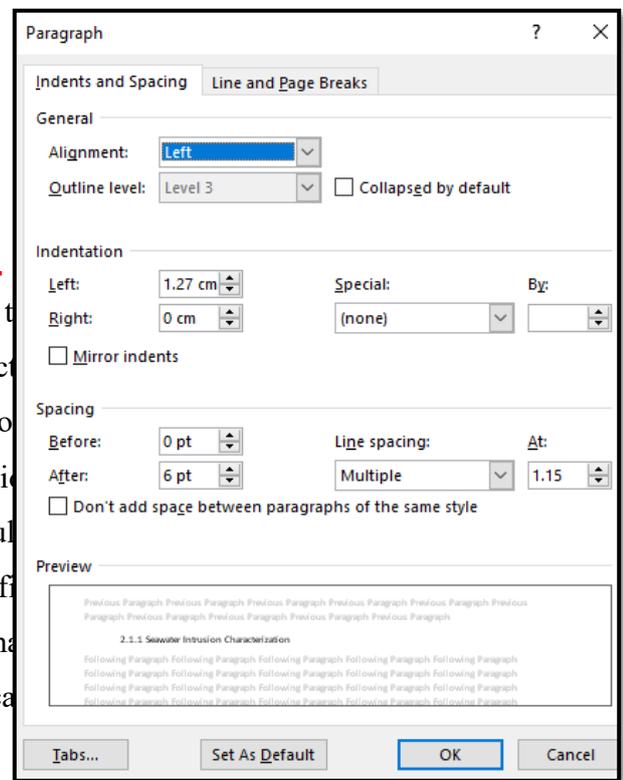


Figure 1.2 Flow Patterns of Groundwater

### 1.2.1 Seawater Intrusion Characterization

The consequences are then applied to the intrusion dynamics, which are able to assist an effective management of the long lasting impacts of rising of sea-level on coastal aquifers (1999) have, furthermore, specifically clarified the relationship between contamination in an unconfined aquifer and the resulting plume location and zone of dispersion. In addition, it is identified that the sediment that was deposited during the Tsunami can affect marine resources. Increasing the magnitude of seawater intrusion, it can lead to various pollution problems.



#### 1.2.1.1 Groundwater Quality and Pollution

Seawater composition around the world remains stationary; otherwise, the fresh groundwater composition in aquifers probably seasonally change.

Table 1.1 Number of Groundwater Wells and Amount of Allowed Water Consumption in Phuket in 2012. (ISET *et al.*, 2013)

Activities	Number of wells	Amount of allowed water consumption(m <sup>3</sup> /day)
Agriculture	6	325
Business	567	34,881
Business service	14	470
Industrie	2	220
Local	282	2,881

Table 1.2 Soil Sample Preparation

Soil Sample	Seawater	Distill water
1	100%	0%
2	75%	25%
3	50%	50%
4	40%	60%
5	20%	80%