

Water Engineering: Issues and Management (Series 3)

Editors:

Wan Afnizan Wan Mohamed

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Lai Wai Tan

Abstract: Water engineering: issues and management (series 3) consist of six chapters. Chapter 1 highlights how are of catchment influence peak runoff. This is because the delineation of water catchment can vary between methods used. The study examines the catchment of a residential area in Yong Peng, Johor. In Chapter 2, samplers are designed for macroinvertebrates sampling. These samplers are tested at the Ulu Dengar River and Gunung Belumut waterfalls, with the results presented in this book. Meanwhile, Chapter 3 focuses on the development of the calibration curve between phosphorus concentration and resistivity value. The experiments were carried out in laboratory in alkaline conditions. Chapter 4 reviews on the various methods of AN treatment in lakes in Malaysia. Advantages and disadvantages between physiochemical and biological process treatments were discussed. Chapter 5 presents results of site investigations at the coasts of Tanjung Laboh, Johor. Correlation between dept of seawater and coastal defense structure are studied for the purpose of mangrove rehabilitation. In the final chapter of the book, i.e. Chapter 6, the effectiveness of composite porous concrete slab as drain cover is reported. Experiments of the composite porous concrete (CPC) slab were conducted on site, and the results are reported here.

Keywords: water engineering, environmental management, hydraulic structures, sustainable infrastructure.

SERIES 3

Water Engineering

Issues and Management

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**WATER ENGINEERING:
ISSUES AND MANAGEMENT
SERIES 3**

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**EDITORS:
WAN AFNIZAN WAN MOHAMED
HARTINI KASMIN
LAI WAI TAN**

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CONTENTS

PREFACE		vii
CHAPTER 1	Sensitivity of Catchment Area Delineation on Peak Runoff Estimation <i>Wei Wen Ooi, Lai Wai Tan, Zarina Md Ali & Hartini Kasmin</i>	1
CHAPTER 2	The Implementation of Bio- indicator Monitoring of Macroinvertebrates Using Sampler Method <i>Aqilah Zakiah Jahani, Mohd Ariff Ahmad Nazri & Muhamad Khairul Firdaus Aslam</i>	15
CHAPTER 3	Determination of Phosphorus Concentration Calibration Curve Using Laboratory Resistivity Method in Alkaline pH Condition <i>Wan Afrizan Wan Mohamed & Muhammad Afzal Razali</i>	31
CHAPTER 4	A Review: Characteristics of Lake Water and Their Treatment, Specifically on Ammoniacal Nitrogen (AN) Removal <i>Safwan Miswan, Rafidah Hamdan & Nur Adila Ab. Aziz</i>	39

CHAPTER 5	Mangrove Rehabilitation Through Coastal Defense Structures: Lessons from Johor's West Coast <i>Thivya A/P Tamilvanan, Intan Nur-Mohd Adib Mohammad Razi, Arman Mokhtar, Saifullizan Mohd Bukari & Izzati Aini Mahamood</i>	53
CHAPTER 6	Effectiveness of Composite Porous Concrete Slab as Drain Cover <i>Muhammad Syahmi Hassan, Lai Wai Tan, Hartini Kasmin & Wei Sin Tan</i>	63
BIOGRAPHY		79
INDEX		83

PREFACE

Water is a valuable resource for human survival and is largely managed through sound engineering practices. Water engineers are essential, particularly in developing and implementing plans to address problems such as water conservation, flood prevention, more efficient water use, and the identification of new water sources. A key goal of water engineering is to ensure that everyone has access to safe, clean drinking water, in addition to providing flood control. This includes monitoring of contaminants such as pathogens, toxic substances, and chemical pollutants to ensure a clean water supply. It also involves designing and operating treatment plants and distribution networks to deliver clean water to nearby communities.

This chapter draws on ongoing research and development at the Eco Hydro Technology Research Centre (ECO-HYTECH), Geo-Structure Rehabilitation Centre (GSRC) and the Micropollutant Research Centre (MPRC) at the Universiti Tun Hussein Onn Malaysia. The three centres are working to solve current problems in water and environmental engineering. The book of Water Engineering: Issues and Management (Series 3) comprises of six chapters. Chapter 1 examines how sensitive catchment delineation is to peak runoff estimates. Chapter 2 addresses how to use the sampler method to monitor macroinvertebrates as bioindicators. Chapter 3 discusses how to implement a laboratory resistivity method to develop a calibration curve for phosphorus concentration at alkaline pH. Chapter 4 explores the different types of lake water and how to treat them, with a focus on removing ammoniacal nitrogen (AN). Chapter 5 highlights lessons from mangrove rehabilitation through coastal defense structures along

Johor's west coast. Chapter 6 explores how well composite porous concrete slabs perform as drain covers.

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Wan Afnizan Wan Mohamed
Hartini Kasmin
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CHAPTER 1

SENSITIVITY OF CATCHMENT AREA DELINEATION ON PEAK RUNOFF ESTIMATION

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1.1 INTRODUCTION

Catchment delineation establishes the boundaries of a river basin or watershed, identifying the land area contributing to water flow into a specific river or stream. This process aids in determining geomorphological characteristics such as slope, flow direction, and stream networks [1]. It is widely used in hydrological modeling and predicting water quality parameters within a basin [1],[2].

CHAPTER 2

THE IMPLEMENTATION OF BIO-INDICATOR MONITORING OF MACROINVERTEBRATES USING SAMPLER METHOD

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2.1 INTRODUCTION

Bio-indicator is widely known as biological indicator useful for monitoring the water quality in the fastest way by implementing the scoring techniques based on the tolerance of influence to the current water quality. The macroinvertebrates are known as one

CHAPTER 3

DETERMINATION OF PHOSPHORUS CONCENTRATION CALIBRATION CURVE USING LABORATORY RESISTIVITY METHOD AT ALKALINE pH CONDITION

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3.1 INTRODUCTION

Phosphorus (P) is an essential plant nutrient that accounts for approximately 0.2 % of plant dry weight [1][2]. Specifically, phosphorus in the environment is critical in supporting the growth of living organisms and developing a healthy ecosystem and they are necessary to all living systems. Phosphorus is a DNA and RNA component and indispensable for the energetic metabolism (ADP/ATP) of the living ecosystem [3]. In aquatic ecosystems low P concentrations benefit the biological productivity of freshwater lakes, reservoirs, and rivers [3]

CHAPTER 4

A REVIEW: CHARACTERISTICS OF LAKE WATER AND THEIR TREATMENT, SPECIFICALLY ON AMMONIACAL NITROGEN (AN) REMOVAL

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4.1 INTRODUCTION

This chapter presents about lake water in Malaysia and studies on previous studies about characteristics of lake water. The standard also explained in this chapter such National water quality standards for Malaysia (NWQS), Water Quality Index (WQI) and Parameters of water quality standard based on Environmental Protection Agency (EPA). Besides, this chapter also reviews on treatment, specifically on ammoniacal nitrogen (AN) removal by previous studies.

CHAPTER 5

MANGROVE REHABILITATION THROUGH COASTAL DEFENSE STRUCTURES: LESSONS FROM JOHOR'S WEST COAST

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5.1 INTRODUCTION

The coastline in Peninsular Malaysia covers about 1,972 km in length. It largely includes sandy beaches (91%) on the east coast, followed by muddy beaches over 70% on the west side of

CHAPTER 6

EFFECTIVENESS OF COMPOSITE POROUS CONCRETE SLAB AS DRAIN COVER

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6.1 INTRODUCTION

Road drainage is a system placed to allow surface water to drain away into ground instead of ponding on road surface. Conventional road drainage systems, typically constructed with concrete or steel road drain cover. It provides access to underground drainage systems for maintenance and inspection.

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