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Yogyakarta, Indonesia

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Multi-perspective Water for Sustainable Development

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Presentation Guidelines

1. The presentation schedules of each session will be affixed at each room.
2. All presenters should plan on arriving at the room in which their talks are scheduled 15-20 minutes before the start of the session. A student volunteer will be present to help load presentations on the laptop before the session begins. We suggest the presenters to upload the presentation materials one day before the day of the presentation.
3. **The committee will remove your presentation materials out from our laptop immediately, on the day after your presentation.**
4. Presenters for current technical sessions are allowed 12 minutes for presentations, keynote speakers are allowed 17 minutes.
5. A 3 minutes period between talks allows for questions, discussion, and introduction of the next speaker. This 3 minutes period belongs to the audience, not to the speaker, and is managed by the session moderator. Time limits will be strictly enforced by session moderators.
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7. The presenter will need to ensure that these formats are compatible with our laptops (Windows PC). Do not bring your presentation on your own laptop; as we might not be able to connect it to the LCD projector, beside, to make the time controllable.
8. The meeting room will be equipped with a dedicated LCD projector and PC laptop configured with USB 2 ports, Windows 8 or 10, and MS Office 2003. It is the presenter responsibility to make sure that the presentation will run in this system. Newer versions of PowerPoint files may not work, save your files in a format compatible with MS Office 2003.

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1. The poster must be B1 (70 cm x 100 cm) standard size paper and follow other required format
2. The poster must be printed by yourself, bring it with you to the venue, and stick it on the stand/board that is specially allocated for you. Our staffs will help you to stick your poster; do not need to bring any material such as pines, thumbtacks, nails, nor staplers.
3. The author may stick the poster on Monday 3 September 2018 within 07:00 – 10:00 a.m.
4. **The core time of the Poster Session will be conducted during the coffee breaks**. The author should present nearby his/her poster during the coffee breaks (while he/she may also enjoy the coffee breaks), and explain to the participants when necessary.
5. The author should remove and bring back his/her poster immediately after the closing ceremony of the congress.

Keynote Session 1

Monday, 3 September 2018 (10:30 – 12:00) (15:30 – 16:00)

Time	Speaker	Paper Title, Author/Co-Authors
Room 2: KASULTANAN 2 **Keynote Speech 1, 2, 3, 4, 5**		
Moderator: Istiarto		
10:30 – 10:50	Dr. Basuki Hadimulyono	THOUGHTS ON INTEGRATED AND SUSTAINABLE DEVELOPMENT OF WATER-RELATED SECTORS IN INDONESIA *Basuki Hadimulyono*
10:50 – 11:10	Prof. Roger Falconer	INTEGRATED WATER RESOURCES MANAGEMENT FOR BATHING AND SHELLFISH WATERS COMPLIANCE *Roger Falconer, Guoxian Huang, Binliang Lin*
11:10 – 11:30	Prof. Tetsuya Hiraishi	EXPERIMENT ON APPLICATION OF HYDRO-PLANE TYPE REMOVABLE BREAKWATER AS TSUNAMI ENERGY DISSIPATER FOR RIVER GATE *Tetsuya Hiraishi, Ryoukei Azuma, Hideaki Handa, Tadao Ito*
11:30 – 11:50	Prof. Tang Xinhua	
15:30 – 16:00	Prof. Junji Kiyono	GROUND MOTION CHARACTERISTIC OF THE 2016 TAIWAN KAOHSIUNG-MEINONG EARTHQUAKE, TAIWAN *Junji Kiyono, Takuto Miki, Jianhong Wu, Derher Lee*

Technical Session IAHR-APD 1

Monday, 3 September 2018 (13:00 – 15:00)

Time	Ref. No.	Paper Title, Author/Co-Authors
Room 3: KASULTANAN 3 **Subtheme 1: River Hydraulics, River Basin Engineering and River Basin Management**		
Moderator: Yasuyuki Shimizu		
13:00 – 13:15	IAHR1511186518	A NEW PERSPECTIVE ON ENERGY LOSS AT VERTICAL DROPS *Tsuyoshi TADA, Yoshimisa MIYATA*
13:15 – 13:30	IAHR1507983104	EVALUATION OF REGIME METHODS BASED ON EXTREMAL HYPOTHESIS *Ishwar Joshi, Wenhong Dai, Ahmed Bilal*
13:30 – 13:45	IAHR1511192380	SERMO RESERVOIR CAPABILITY TO PERFORM ITS FUNCTION *Dyah Ari Wulandari, Ratih Pujiastuti, Fitria Maya Lestari*
13:45 – 14:00	IAHR1511187896	EXPERIMENTAL AND NUMERICAL COMPARISON OF LOCAL SCOUR AROUND BRIDGE PIER *V.L. Manekar, Praveen Rathod*
Moderator: ***Bangyi Yu***		
14:00 – 14:15	IAHR1508068870	MEASURING EFFECT OF GRAVEL AUGMENTATION USING RADIO FREQUENCY IDENTIFICATION (RFID) IN MOUNTAINOUS AREAS OF THE TRINITY RIVER, CALIFORNIA *Kanta Kano, David Gaeuman, D. Nathan Bradley*
14:15 – 14:30	IAHR1508070933	FUNDAMENTAL 3D MODEL TEST AND NUMERICAL ANALYSIS ON RESISTANCE AGAINST PERMEABILITY IN A LINEAR RIVER LEVEE *Yoko MACHIDA, Yasuo NIHEI, Yuki KURAKAMI*
14:30 – 14:45	IAHR1508079449	RIVER DISCHARGE ANALYSIS BY USING MODIS IMAGE AND CHARACTERISTICS COMPARISON BETWEEN ESTUARY IN THE NORTHERN AND SOUTHERN COAST OF JAVA ISLAND *Hendra Ramdhani, Dwi AgusKuncoro, Wakhidatik Nurfaida*
14:45 – 15:00	IAHR1508080209	TIME OF CONCENTRATION FOR DRAINAGE DESIGN CHARACTERISTICS *Dian Noorvy Khaerudin, Donny Harisuseno, Denik Sri Krisnayanti*

Monday, 3 September 2018 (13:00 – 15:00)

Time	Ref. No.	Paper Title, Author/Co-Authors
Room 5: SRIMANGANTI **Subtheme 1: River Hydraulics, River Basin Engineering and River Basin Management**		
Moderator: Noor Azazi Zakaria		
13:00 – 13:15	IAHR1508731078	FLOW AROUND GROYNES MODELLING IN DIFFERENT NUMERICAL SCHEMES *Quang Binh NGUYEN, Ngoc Duong VO, Philippe GOURBESVILLE*
13:15 – 13:30	IAHR1509106591	PERFORMANCE IMPROVEMENT OF THE SETTLING BASINS OF KALIGANDAKI A HYDRO POWER PLANT, NEPAL *Meg B. Bishwakarma*
13:30 – 13:45	IAHR1519656162	DETERMINING SEDIMENT FLUSHING PERIOD FOR WLINGI RESERVOIR AFTER MT. KELUD ERUPTION IN 2014 *Dian Sisinggih, Fahmi Hidayat, Sri Wahyuni*
13:45 – 14:00	IAHR1508021719	ADVANCED PANDANDURI RESERVOIR RULE CURVE *M. Yura Kafiansyah, Anang M. Farriansyah*
Moderator: Iwan Nursyirwan		
14:00 – 14:15	IAHR1507983806	DOMINATING FACTORS INFLUENCING RAPID CHANNEL MIGRATION DURING FLOODS – A CASE STUDY ON OTOFUKE RIVER *Tomoko Kyuka, Yasuyuki Shimizu, Kazunori Okabe, Kho Shinjyo, Satomi Yamaguchi*
14:15 – 14:30	IAHR1508474323	EXPERIMENT ON BANK EROSION AND SEDIMENTATION IN ALLUVIAL FAN USING MIXED-SIZE AND COLOR-CODED PLASTIC MEDIA *Shigeru Mizugaki, Takuya Inoue, Susumu Yamaguchi*
14:30 – 14:45	IAHR1511190992	A MULTI-OBJECTIVE WATER ALLOCATION MODEL FOR AN INTER-ADMINISTRATIVE WATER BASIN *Syamsul Hidayat, Ery Setiawan*
14:45 – 15:00	IAHR1507941913	EVACUATION ANALYSIS IN INUNDATION AT MULTI-LAYER UNDERGROUND SPACE Keiichi TODA, Toshiyuki NISHIKORI, Taisuke ISHIGAKI

Monday, 3 September 2018 (13:00 – 15:00)

Time	Ref. No.	Paper Title, Author/Co-Authors
		Room 6: TRAJUMAS 1 **Subtheme 2: Port, Harbors, Coastal Engineering and Management**
Moderator: Qingping Zou		
13:00 – 13:15	IAHR1508065754	THE ANALYSIS ABOUT LONG TERM VARIATION IN DENSITY STRATIFICATION OF ARIAKE BAY BASED ON THE MONTHLY-OBSERVED WATER ENVIRONMENT DATA *Akira Tai, Yosuke Morimoto*
13:15 – 13:30	IAHR1507801973	CURTAIN WALL BREAKWATER ANALYSIS USING DUALSPHYSICS (CASE STUDY: PORT OF KUALA TANJUNG, NORTH SUMATRA) *Tedjo Kusumo Yohanes Adi, Nizam, Kuswandi*
13:30 – 13:45	IAHR1511194682	SPATIO-TEMPORAL VARIABILITY OF VULNERABILITY IN BANGLADESH COAST BY USING FUZZ SYNTHETIC EVALUATION METHOD *Rubaiya Kabir, Momtaz Jahan, Marin Akter, Nishat Tasnim, Anisul Haque, Md Munsur Rahman*
13:45 – 14:00	IAHR1507867797	SEDIMENT TRANSPORT AND MORPHOLOGICAL MODELLING IN SINGAPORE STRAIT *Serene Hui Xin Tay, Wen Hao Ng, Seng Keat Ooi, Vladan Babovic*
Moderator: Syamsidik		
14:00 – 14:15	IAHR1511182242	THE EFFECT OF MANGROVE DENSITY ON TIDAL DYNAMICS IN SEGARA ANAKAN LAGOON, INDONESIA *Ayi Tarya, Larasati C. Sunaringati, Nining Sari Ningsih*
14:15 – 14:30	IAHR1511153136	COASTAL FLOODING AND SEDIMENT TRANSPORT DURING EXTREME STORMS IN THE NORTHEASTERN USA IN A CHANGING CLIMATE *Qingping Zou, Dongmei Xie*
14:30 – 14:45	IAHR1513335842	CONSIDERING ECOSYSTEM VALUATION FOR COASTAL ZONE MANAGEMENT BY USING ECONOMIC VALUATION AND VISITOR PREFERENCES ON TOURISM ASPECT *Iwan Nursyirwan, Biota Fitrah, Betania Caesariratih L., Cecilia Ratna PS*
14:45 – 15:00	-	-

Monday, 3 September 2018 (13:00 – 15:00)

Time	Ref. No.	Paper Title, Author/Co-Authors
		Room 7: TRAJUMAS 2 **Subtheme 3: Environmental Hydraulics and Hydrology**
Moderator: Yasunori Muto		
13:00 – 13:15	IAHR1508065617	EFFECTS OF RAIN DROPLETS AND SEA SPRAY ON THE MOMENTUM AND LATENT HEAT FLUXES *Hiroki OKACHI, Tomohito J. YAMADA, Yasunori WATANABE*
13:15 – 13:30	IAHR1524392267	ASSESSMENT OF POTENTIAL BRACKISH WATER FOR AGRICULTURAL USE IN THE UTILIZED AQUIFERS IN KUWAIT *Amjad Aliewi, Hana'a Burezq*
13:30 – 13:45	IAHR1511259638	ESTIMATION OF ENVIRONMENTAL FLOW IN A STREAM USING PHYSICAL HABITAT SIMULATION *Seung Ki Kim, Sung-Uk Choi*
13:45 – 14:00	IAHR1507955838	AN ANALYTICAL MODEL OF THE SALT ELUTION METHOD *Qihan Qiu, Hiroaki Terasaki, Teruyuki Fukuhara, Ximan Liu*
Moderator: Joko Sujono		
14:00 – 14:15	IAHR1509373049	EVALUATION OF CIBULAKAN SPRING FLOW DISCHARGE FOR THE DEVELOPMENT OF BANDUNG DISTRICT DRINKING WATER SUPPLY SYSTEM *Mariana Marselina, Arwin Sabar*
14:15 – 14:30	IAHR1510542976	CANOPY SATURATED AND THROUGHFALL FOR ACACIELLA ANGUSTISSIMA, ARTOCARPUS HETEROPHYLLUS, PINUS MERKUSII AND ANTHOCEPHALUS CADAMBA RELATED TO RAINFALL INTENSITY Ahmad Reza Kasury, Joko Sujono, Rachmad Jayadi
14:30 – 14:45	IAHR1507866999	ESTIMATION OF HIGH TEMPORAL RESOLUTION RIVER DISCHARGE INTO SINGAPORE COASTAL WATERS FOR OPERATIONAL FORECAST *Serene Hui Xin Tay, Huong Dieu Trinh, Mengyu Wang, Vladan Babovic, Seng Keat Ooi*
14:45 – 15:00	IAHR1507790978	ASSESSMENT OF BIOENGINEERING TECHNIQUES FOR SUSTAINABLE URBAN DRAINAGE APPLICATION *Muhammad Mujahid Muhammad, Khamaruzaman Wan Yusof, Muhammad Raza Ul Mustafa, Aminuddin Ab. Ghani*

Wednesday, 5 September 2018 (10:00 – 12:30)

Time	Ref. No.	Paper Title, Author/Co-Authors
Room 5: SRIMANGANTI **Subtheme 1: River Hydraulics, River Basin Engineering and River Basin Management**		
Moderator: Shigeru Mizugaki		
10:00 – 10:15	IAHR1507712025	METHODS FOR PREDICTING DISCHARGE OF STRAIGHT ASYMMETRIC COMPOUND CHANNELS *Xiaonan Tang*
10:15 – 10:30	IAHR1510832356	INVESTIGATION OF FLOW REGIMES AND ENERGY DISSIPATION IN GABION STEPPED WEIRS *Mohammed A. Almajeed A. Alabas, Riyadh Al-Ameri, Lloyd Chua, Subrat Das*
10:30 – 10:45	IAHR1506513602	ANALYSIS OF LOCAL SCOUR AT BRIDGE PIER ON COMAL RIVER, CENTRAL JAWA, INDONESIA *Muhammad Mukhlisin, Supriyadi, Muhammad Rizal Wicaksono, Sugiarto*
10:45 – 11:00	IAHR1510644644	INVESTIGATING THE EFFECTS OF GEOMETRY ON THE FLOW CHARACTERISTICS AND ENERGY DISSIPATION OF STEPPED WEIR USING TWO-DIMENSIONAL FLOW MODELLING *Udai A. Jahad, Riyadh Al-Ameri, Lloyd Chua, Subrat Das*
11:00 – 11:15	IAHR1510886204	DISCHARGE CHARACTERISTICS FOR TRAPEZOIDAL COMPOUND LABYRINTH WEIRS *Anees K. Idrees, Riyadh Al-Ameri, Lloyd Chua, Subrat Das*
Moderator: Hatma Suryatmojo		
11:15 – 11:30	IAHR1511152328	THE EXAMINATION ON URBAN INUNDATION DUE TO HEAVY RAIN BY USING VISUALIZATION FOR TRANSPORT OF RAINWATER *Masataka Murase, Makoto Takeda, Naoki Matsuo*
11:30 – 11:45	IAHR1526541103	ANALYSIS OF SEDIMENT TRANSPORT BABARSARI-MATARAM IRRIGATION CANAL *Agatha Padma Laksitaningtyas, Sumiyati Gunawan*
11:45 – 12:00	IAHR1511019727	FIELD OBSERVATION AND NUMERICAL SIMULATIONS ON BRIDGE COLLAPSE CAUSED BY TYPHOONS DURING AUGUST 2016 IN JAPAN *Takuya Inoue, Tamaki Sumner, Kazuo Kato, Hiroki Yabe, Yasuyuki Shimizu*
12:00 – 12:15	IAHR1495011877	THE IMPACT OF FLOOD-DETENTION BASIN ON FLOOD PROPAGATION IN THE HUAIHE RIVER *Bangyi Yu, Liemin LV, Jin Ni, Jueyi Sui, Peng Wu*
12:15 – 12:30	IAHR1508070000	STUDY ON CAUSE AND MECHANISM OF HYDRAULIC STRUCTURES FAILURE IN BANGLADESH *Katzumitsu Muraoka, Koji Asai, Yosuke Osoi, Tatsuya Mochizuki*

ANALYSIS SEDIMENT TRANSPORT BABARSARI-MATARAM IRRIGATION CANAL

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ABSTRACT

Babarsari irrigation is the part of Mataram Irrigation Canal, is a main irrigation canal in Special Province of Yogyakarta. This research area contain Mataram Irrigation area at Babarsari District. Bed Load Sediment process is a simultaneous event that can make deposition sediment at the base of irrigation canal and can make of water elevation changes. It will affect the availability of water to be used for irrigation functions. To calculate the amount of bed load sediments in the irrigation canal using three methods: Schoklitsch's Formula, Meyer Peter Müller's Approach Formula and Einstein Method. Flow velocity measurement in the canal using current meters. The channel geometry is measured directly in the canal. The bed load of the channel is taken in the field by taking samples from two different location. The result of the research shows that by using the formula Schoklitsch's Formula get result of 2.49789 kg/s, whereas with Meyer Peter Müller's Approach Formula get result of 1.10042 kg/s. and Einstein's Method get result 3.99997 kg/s. The results of the analysis can be produce as an information to maintenance and dredging the bed load sediments on the canal so as not to disrupt the flow of water in irrigation canal.

Keywords:Canal, sediment-transport, Bed-Load,

1. INTRODUCTION

The irrigation canal is one of the important buildings of the irrigation system, which is very beneficial for human survival. The flow of water in irrigation canal should be free of sediment materials. The sedimentation process in irrigation canal is a simultaneous event that can cause silting at the base of the irrigation canal and elevation changes so that it will affect the availability of water to be used for irrigation, is one of the main problems in the operation and maintenance of irrigation system. High annual investments are required for rehabilitation and maintenance to maintain irrigation systems suitable for review of irrigation objectives. To reduce these costs and to conserve and then improve the performance of irrigation networks, sediment transport must be properly estimated in terms of time and space. Accurate prediction of sediment deposition along the entire canal network during the irrigation season will contribute to the repair operation of the channel in such a way that the irrigation needs are fully met and at the same time the minimum deposition is expected (Dewepeg et al 2014). Although it is difficult, to predict the amount of sediment that will be on irrigation canal, numerical modeling of sediment transport offers the possibility to predict and Evaluate sediment transport under general flow conditions (Lyn, 1987).

Bella (2014) conducted a study on the calculation of the basic sediment load on the Muara Sungai Lilin, which aims to determine sedimentation rates and sediment movement patterns in the estuary. Calculation of the amount of sediment that occurs in the Lilin River with two approaches: Shear Stress (Duboy's Method and Shield's Method) and Energy Slope (Meyer-Peter and Muller's) approach. Boangmanalu and Indrawan (2013) conducted a study on the study of sediment transport rates on the Wampu River. The study aims to calculate the sediment transport in the river. The methods used are Yang's Method, Engelund and Hansen Methods, Methods of Shen and Hung. The results of the study concluded that the method of sediment transport used is the Engelund and Hansen Methods because the results are more possible and the amount of sediment load produced is greater than other methods.

The location of velocity measurements and sediment sampling were carried out at the same point location in the Mataram Canal with a split in the Babarsari Sleman Area. Determination of the location point is taken in a relatively straight canal segment and no water building that affects except the geometry of the canal itself (Fig. 1).

Fig. 1. Location of Research (source : google maps)

1.1 Research Objectives

This study aims to knowing sediment transport in irrigation canal, so as to overcome the impact of sediment for irrigation networks.

1.2 Research Benefits

The benefits of this study are as below.
1. Knowing the quantity of sedimentlocated in the Mataram Canal Irrigation Channel.
2. Understand the transport of sediments in irrigation canal to achieve the efficiency of irrigation canal in irrigation systemsthatwill support the productivity and sustainability of irrigation systems.
3. Obtaining guidance and development of technologies thatcanbeutilized by civil society and industrial engineering.

2 LITERATURE STUDY

2.1 Discharge

This research use direct flow velocity measurement (direct) with current measuring instrument (rotating current meter). Measurement of flow velocity with current meter current meter with propeller current meter type. Measurements are made because of the particle of water passing through the vane so that it will rotate the propeller against the horizontal axis which produces the number of rounds of unity of time to be converted to flow velocity. The relationship between the number of turns per time, and flow velocity v has the following linear form :

(1)

where,
V = water velocity (m/s)
K = first constanta
N = round/s
Δ = second constanta

2.2 Sediment

According to Asdak (1995), sediment is the result of erosion processes, either surface erosion, trench erosion, or other types of erosion, although the erosion of the cliff has contributed in this section, but the portion is very small and can be considered a natural process. The sediment transported from the site of the erosion will be carried by the stream and will be deposited at a site where the velocity of the water flow slows or stops. The carrier means surface runoff and when the runoff reaches the river body, the stream is a sediment transport medium. Sediment transport by water flow can be divided into three groups: as suspended load, as a wash load, and as a bed load.

The accumulation of sediments in irrigation canal will shorten the service life of irrigation networks due to silting and decreasing the capacity of irrigation services. The accumulation of sediments in the rice fields will raise the surface of the rice fields, making it difficult for the water to reach the surface of the fields and irrigate the fields. Smooth sediment particles can even clog pores of the soil and inhibit the absorption of water by plants, though not all sediment fractions potentially damage.The characteristic of the basic sediment load has the closeness of the mass of precipitate deposited at the bottom of the canal, and the amount of the base base depends primarily on the availability of the fine particle size of the precipitate. At a given moment, the mass of loads in the river channel depends on the amount of material washed by surface runoff, the main transport mechanism in the river canal, and the prediction of sediment yields is often based only on data on drifting sediments. The effects of sediments in river flows can disrupt the life of water flora and fauna, degrading water quality for local and industrial needs; reducing the capacity of reservoirs to prevent flooding, irrigation; damage to turbines and water pumps; and hamper the shipping traffic. Sediment transport to calculate sediment on canal in this study uses the analysis as below (Yang, 1996).

2.2.1 Schoklitsch Method

The Schoklitsch equation considers from the aspect of the relationship with flowing water discharge. The equation for basement sediment discharge is as follows.

(2)

(3)

where

q_b = bed load ((kg/s)/m),

d = the particle size (mm),

q = water discharge ((m^3/s)/m),

q_c = critical discharge at incipient motion ((m^3/s)/m)

2.2.2 Metode Meyer-Peter and Müller's Approach

The Meyer-Peter and Müller's Approach equation for basement sediment transport is as follows.

(4)

where,

= specifig weights of water

= specifig weights of sediment

= hydraulics radius

d = mean particle diameter

= specific mass of water

= bed load rate in underwater weight per unit time and width

= the kind of slope

Equation (3) can also be expressed in dimensionless form as

(5)

The energy slope can be obtained from Stickler's formula

(6)

or (7)

where

(8)

2.2.3 Einstein Method

The Einstein equation for basement sediment transport is as follows.

(9)

(10)

(11)

where,

Ψ * = particle shear intensity,

Φ = sediment discharge,

q_s = bed load.

3 RESEARCH METHODS

The research procedure in this study was doing as in the flow chart shown in Fig 2.

4 RESULT AND DISCUSSION

4.1 River Discharge Measurement

Calculation Result of discharge use current meter Method shown at table 1 and table 2.

Table 1. Calculation result of discharge use Current Meter at Location 1

Point	V	A left	A right	A total	Average Discharge
	m/s	m²	m²	m²	m³/s
A	0.47945	0.18093	0.35208	0.53301	0.255552
B	0.64618	0.36675	0.39609	0.76284	0.492932
C	0.54585	0.398535	0.38142	0.779955	0.425738
Average V	**0.55716**		discharge		**1.174222**

Table 2. Calculation result of discharge use Current Meter at Location 2

Point	V	A left	A right	A total	Average Discharge
	m/s	m²	m²	m²	m³/s
A	0.47945	0.20265	0.4053	0.60795	0.291482
B	0.64618	0.45162	0.50373	0.95535	0.617328
C	0.54585	0.51531	0.49215	1.00746	0.549922
Average V	**0.55716**		discharge		**1.458732**

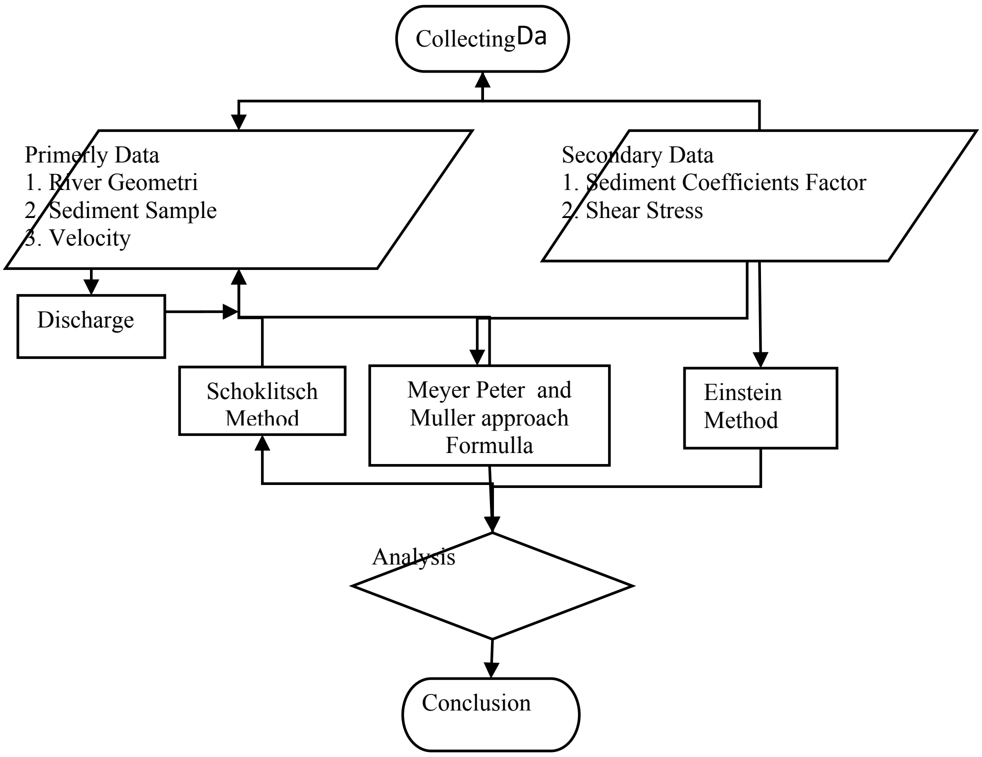

Fig 2. Flow Chart of Research

4.2 Sediment Parameters

Sediment samples taken from the Mataram Canal, then tested its parameters in the Soil Mechanics Laboratory of Faculty of Engineering, University of Atma Jaya Yogyakartathe results of testing the sediment parameters can be seen in table 3 and the grain size distribution at each locations seen in fig 3 and fig 4.

Table 3. Sediment Parameters

	Soil	**Mataram Canal of Yogyakarta**	
	Picnometer number	1	2
w1	Weight of empty Picnometerkosong	30.11	29.13
w2	Weight of Picnometer +dry soil	60.41	59.37
w3	Weight Picnometer+soil+water	99.37	98.36
w4	Weight Picnometer+water	79.61	79.06

A	w2-w1	30.31	30.24
B	w3-w4	19.76	19.30
C	A-B	10.55	10.94
G	Specific Weight	2.8737	2.7643

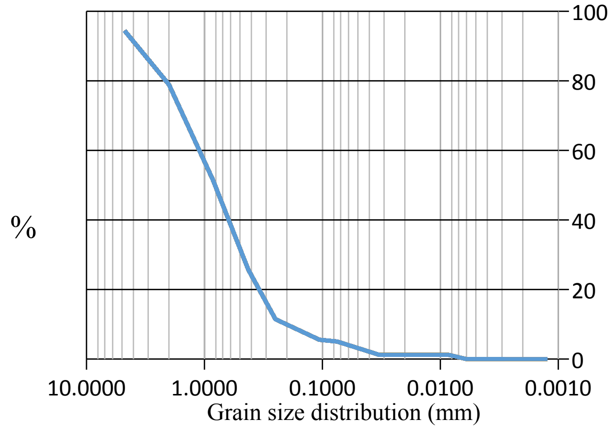

Fig 3. Grain size distribution Graph at Location 1

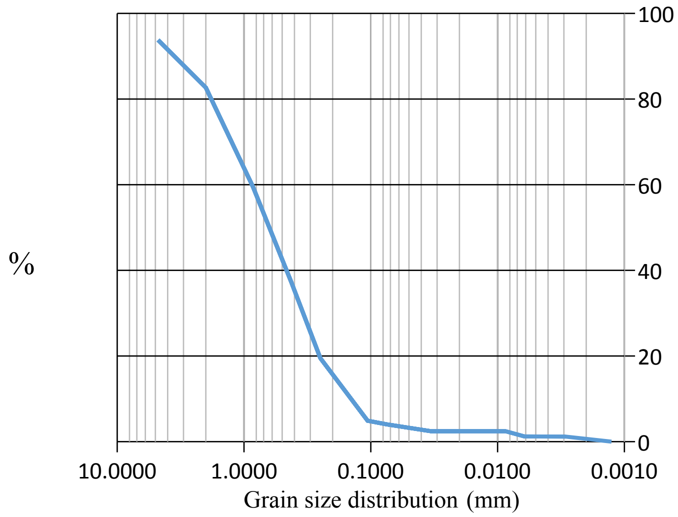

Fig 4. Grain size distribution Graph at Location 2

4.3 Bed Load Calculation

4.3.1 Schoklitsch Method Calculation

Calculation for the Schoklitsch Method with the formula corresponding to equation (5), the example calculation for location data 1 is as follows below.
Known data for location 1

$v_{average}$ = 0.55716 m^2
$Q_{average}$ = 1.156556 m^3/s
S = 0.004302
d_{50} = 0.87 mm
average width = 4.890 m

The analysis using the Schoklitsch Method is as follows in this opponent.

q_c= 0.024174 $(m^3/s)/m$

q_b = 0.457271 (kg/s/m)

for a unit lenght resulting in 2.236055 kg/s
The same calculations were performed on the results of the measurement and testing of sediment samples at location 2.

4.3.2 Meyer-Peter and Müller'sApproach Method Calculation

Calculations for the Meyer-Peter and Müller's Approach Method with the formula corresponding to equation (6), the example calculations for data location 1 are as follows.
Is known:

γ_{water} = 1 ton / m^3
ρ_{water} = 0.1019367 $tons^2$ / m^4
$\gamma_{sediment}$ = 2.65 ton / m^3
R = 6.31065m
d_{90} = 0.283 mm
g = 9.81 m^2 / s
v = 0.951327 m / s
S = 0.003604

The analysis using the Meyer-Peter and Müller's Approach Methods is as follows below.

From Equation Method Meyer-Peter and Müller's Approach get q_b = 0,003256443 kg / ms while a unit length for q_b = 0,015924 kg/ s
The same calculations were performed on the results of the measurement and testing of sediment samples at location 2.

4.3.3 Einstein Method Calculation

The calculation for Einstein Method with the formula corresponding to equation (6), the example calculation for location data 1 is as follows below.
Is known:

γ_{water} = 1 ton / m^3
ρ_{water} = 0.1019367 $tons^2/m^4$
$\gamma_{sediment}$ = 2.65 ton/m^3
R = 6.31065 m
d_{50} = 0.87 mm
g = 9.81 m^2/s
v = 0.951327 m/s
S = 0.003604
= 0,0528784

From the Einstein Method equation obtained q_b = 2.7359064 kg/ms while for Gb = 13.378582 kg/s
From the results of analysis and calculation with three methods, then the results of the calculation and analysis can be seen in table 4.

Table 4. The results of sediment transport calculations

Location	**Schoklitsch**	**Meyer Peter Möller's**	**Einstein**
	kg/s	**kg/s**	**kg/s**
1	2.23606	0.87899	4.74639
2	2.75972	1.32186	3.25356
Average	2.49789	1.10042	3.99997

5 CONCLUSIONS AND RECOMMENDATIONS

From the results of measurement, testing and analysis then concluded as below.

1. The discharge for MeterCurrent Method is at location 1 thatis 1.174222 m^3/s, and the 2nd location thatis 1.458732 m^3/s.
2. Einstein sediment transport calculationresultsgive the greatestresult for each location.

Recommendations for the research as below.

1. Dregging or flushing the canal minimal every 6 (six) months
2. Use of more variedsediment transport methods.
3. Use of more updates variedsediment transport methods.
4. Trying to do samplingresearch in more varied places so as to provide more variedknowledge on sediment transport

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