STABLE CHANNEL OF RECLAIMED TIDAL LOWLAND ON TELANG IN BANYUASIN DISTRICT

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Abstract. This study aimed to develop models of the operation and maintenance in the reclaimed tidal marsh area to get a stable channel. The research location is reclaimed tidal delta area Telang I Primary 8 representing land typology A/B and a survey conducted in 13 South Secondary schemes following existing tertiary Telang I.
MIKE - 11 computer models used to analyze the movement of sediment in the channel in both the Primary channel 8, SPD, SDU and tertiary channels in block 13 South. Calibration model with multiple channels in the field of physical parameters has been performed to obtain results close to the results of measurement modeling sediment movement in the channel. The integration models of MIKE - 11 models with various scenarios are used to model the operation and maintenance of the channel in the tidal marsh area to get a stable channel.
According to the scheme P8 – 13S, OP models obtained 75 percent, in which the secondary channel (SPD/SDU) and built flap gate in tertiary channel, get a well prototype model of the stable channel (equilibriums), where the average erosion on P8 at a distance of 3,200 m in the amount of 4,472,049 m^3 and the mean sedimentation in the SPD of 963,836 m^3 and mean of sedimentation in the tertiary channel of 3,508,213 m^3. Similarly, on average erosion P8 by 4,135,649 m^3 and the mean sedimentation in the SDU of 681,304 m^3 and the mean sedimentation in the tertiary channel of 3,454,345 m^3.

Keywords: Mike-11 models, sediment transport, prototype model

I. INTRODUCTION

Indonesia has the potential for agricultural land area of approximately 162.4 million ha, most of the potential field is composed of the swamp area covering 33,393 million ha, divided into 20,097 million ha of tidal marsh and 13,296 million ha of lowland swamps spread over an area of Sumatra island of 9.37 million ha Kalimantan area of 11.707 million hectares, an area of 1.793 million ha Sulawesi and Papua, covering 10.522 million ha. Marsh area that has been reclaimed by the government has reached 1.8 million ha by the private and the public about 2.1 million ha for a total of 3.9 million ha, but land productivity achieved is still low at an average of 3 tons per ha [11]. This is due to the lack of attention to the Operations and Maintenance (OM) where the activities carried out at this time is limited to micro-scale maintenance done on the initiative of farmers in tertiary channels without building doors valve [12].

Study data inventory swampy areas west and east, it is concluded that the total area of reclaimed swamp area of 1.8 million ha are included 0.8 million ha of wetlands that have been abandoned or unused land.

The land is caused by many things, including a network of existing water system is less than optimal, because the existing system is not the appropriate flow. In addition, the condition of the water channel and the building also has not been rehabilitated plus not optimal maintenance of good channels on the micro scale and macro water system [4].

Currently, for the evaluation of the condition of the water system in the network as the supply and disposal capacity has been developed computer simulation models DUFLOW where DUFLOW models capable of providing practical recommendations in terms of improving the network and operating system of water management [11].

To perform the analysis and simulation in this study need numerical model MIKE-11simulation hydraulic one-dimensional program, in which the output of this program is a matter of schematization hydraulics will channel network which is the average value at each cross-section of the channel [3].

II. METHODS

A. Location Research

This research was conducted in the Delta region Telang I which is a swamp area in South Sumatra province, also second generation reclaimed followed the design of double-grid layout (Rib System) along with Telang II, Delta Saleh and Sugihan. (Bogor Agricultural University, 1976). The next design to the open channel system prepared by the Institute of Technology Bandung (ITB). This system consists of a main channel (also used for navigation), secondary and tertiary canals channels. (Figure 1. Map of the location study).

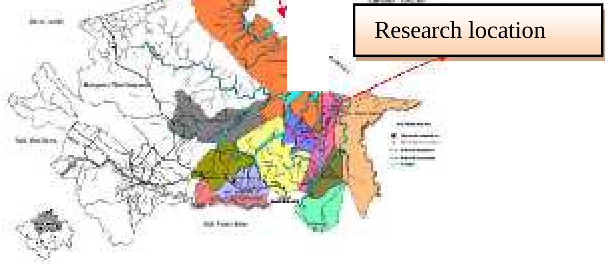

Fig.1. Research location [9]

Geographically, the region Telang I is located at 020 29' to 020 48' LS and 1040 30' to 1040 52' east longitude. In general Telang I is located in the northern strait of Bangka, south bordering the Sebalik river, the east with the west of the Musi river and is bordered by the Telang I river (Figure 2).

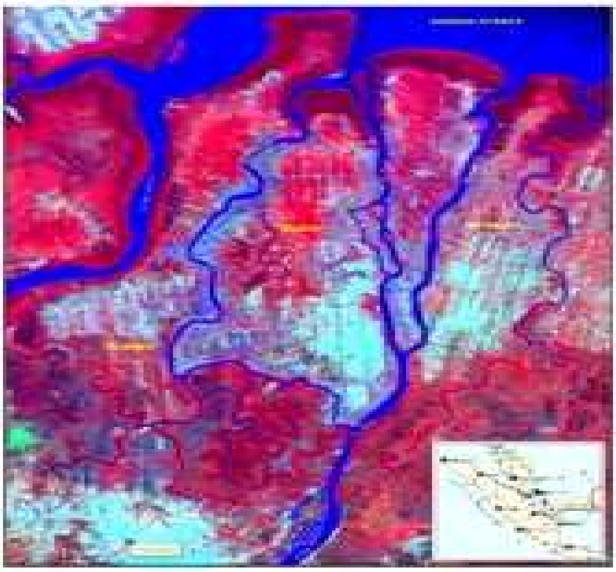

Fig. 2. Geographic location of Delta Telang I

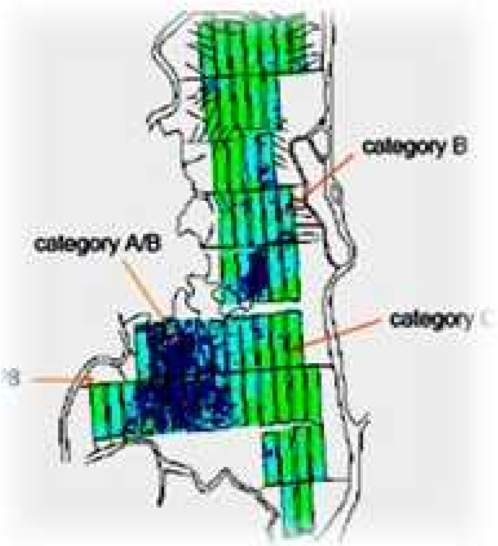

Fig. 3. Hydro- Topographic conditions of Delta Telang I

Hydrologically, Telang I area is an area that is surrounded by tidal rivers. Eastern region bordering the Musi river, west of the border with Telang river, south of the Strait of Bangka and the north is bordered by the Sebalik river.

Figure 3 shows the layout of hydro-topographical conditions in the Telang I area. Hydrology of the block is determined by the adjacent channel conditions, the status of water in each channel, the operation of the flap gate, the influence of the tides, and the climatic conditions such as rainfall and evapotranspiration [5].

B. Tools and Materials Research

The tools will be used in this study are shown in Table 1.

TABLE 1.
LIST OF THE TOOLS USED IN THE STUDY

No.	Tools	Unit	Uses
1	Meter	1 unit	Measuring distances manually
2	Water pass (WP)	1 unit	Measuring distances vertical and horizontal directions to the survey line
3	Peil scale	2 pieces	Measuring water level in the channel
4	Stop watch	2 pieces	Calculating the lenght of time the current flow of up and down
5	Stationery	2 pieces	Data recording results
6	Computer (RAM 2 GB)	1 unit	Perform general modeling
7	Printer	1 unit	Displaying writing in the report form
8	Software MIKE-11 Model, MS-Excel,	1 pieces	To perform modeling and data processing
9	Dongle (lisensi program)	1 pieces	To activate the software MIKE-11
10	Laptop	1 pieces	Assist to make report
11	Sieve multilevel • Oven • Digital scales	1 pieces	Determine the diameter of granular material
12	Software SPSS versi 16.0	1 pieces	To analysis statistical data

Source: author’s propose, 2014

III. RESULTS AND DISCUSSION

A. Schematization Model

SPD scheme and SDU without building flap gate, SPD scheme and existing buildings SDU flap gate, and SPD scheme, SDU and no building tertiary canals flap gate as in Table 2.

TABEL II.
SCENARIO MODELLING

Scenario	OM (%)	Description
I	25	SPD and SDU without flap gate
II	50	SPD and SDU with flap gate
III	75	SPD, SDU and tertiary channels with flap gate

Source: author's propose, 2014

B. Movement of sediment in the Channel

In this scenario, the channel is better in maintenance when compared to the condition of the conditions in scenario I and scenario II. This means that the shape of the channel refers to the channel plan and expected no more grass growing along the channel. In cross-section of the channel portion of secondary and tertiary channels will have the same dimensions. In this condition taken manning coefficient value of n is greater than the value of the coefficient in scenario I and scenario II. The value used as input values in the various cross-section on the model and scenario used manning coefficient n is 0.035. (Figure 4).

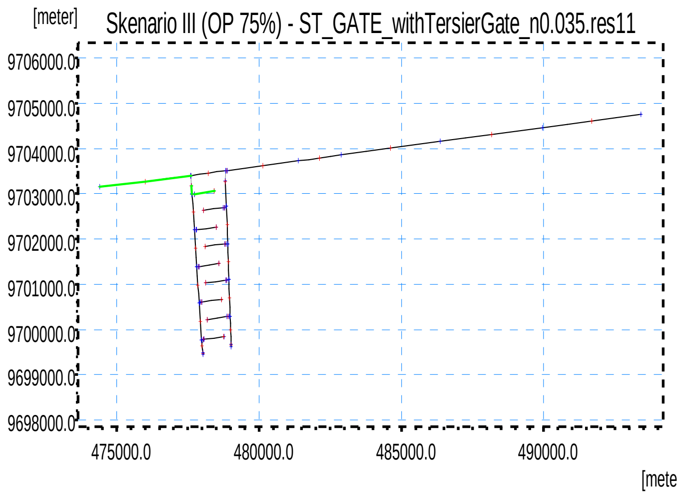

Fig.4. Schematization channel model for the movement of sediment existing tertiary flap fate in the channel tc-1 with scenario III (OM 75%)

In Figure 4 shows that the movement of sediment accumulation that occurs in channel P8, SPD and tertiary channels (tc-1) which at a distance of 3,200 m from the start line P8 until the beginning of the SPD erosion of 4,360,35 million m3 then at the beginning of the SPD up to scratch tertiary channel tc-1 is at a distance of 200 m by 953,826 m3 sedimentation. At the beginning of the channel tc-1 up to a distance of 750 m at the end of the channel experienced sedimentation of 3,470,461 m3.

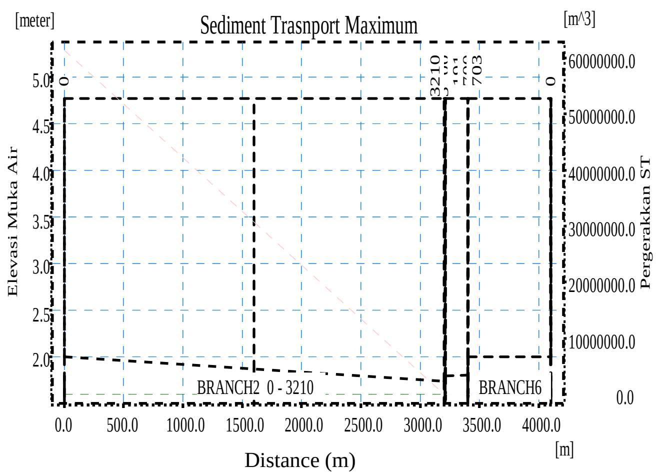

Fig.5. The move sediment in the channel tertiary tc-1 no flap gate

IV. CONCLUSIONS

Based on the research results OM model 75%, where the secondary channel (SPD / SDU) and tertiary canals built flap gate, get a prototype model of the channel condition is stable (equilibrium) and according to P8-13S scheme. It was proven that the average erosion in the channel at a distance of 3,200 m P8 is equal to 4,472,049 m3 and sedimentation average of 963,836 m3 in the SPD as well as in tertiary channel sedimentation average of 3,508,213 m3. Similarly, in P8 erosion average of 4,135,649 m3 and sedimentation average of 681,304 m3 in the SDU and the average sedimentation in tertiary channels of 3,454,345 m3.

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