DETERMINING THE LOCATION OF THE FLOODGATES ON THE MIXING OF BRACKISH WATER IN TAMBAK IRRIGATION

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Abstract

Brackish water mixing channel is a channel mixing freshwater and seawater required to meet the needs of aquaculture fish. Fresh water available in the river with a certain height and discharge sea water while flowing through the mouth of the sea by tidal conditions.

The amount of water needs to use a mixer channel design calculations cropping pattern of the milkfish taking into account the need to maintain salinity water fish farming. And for freshwater availability, data reliability by calculating 80% of fresh water discharge in the river Buyuk to support the needs of aquaculture fish. As for the sea water, sea levels obtained with the tide of data in June 2015 and processed by software HecRas.

Freshwater boundary conditions 2 m^3 / sec. And the height of the tide from April to July 2015 (from a high need of water, which is 2 meters). Tides water level recorded was procceded. Expected channel mixer is operated properly. And channel mixer with the gate of the water will be effective as a carrier channel to split water into the pond tertiary channels. This mixer channel as well as the Ma nagement of irrigation systems can be run in an orderly and organized.

Keywords: Tambak Irrigation, channel mixing, tides, freshwater, brackish water.

INTRODUCTION

General Background

Complementary building water distribution is the floodgates and gauges. at the time of discharge is low then the face of the water going down, the necessary floodgates to raise the back face of the water until the required limits. Operating system distribution of water in irrigation area of embankment still use

the traditional system often inflict negative impact that is not the Ma ximum yield of ponds. Floodgate is a building of hydraulic structures built cut channels or streams that serve as a regulator of water for irrigation and drainage, (Sosrodarsono, 1984). Aside from good floodgates design, the more important thing is the placement of the gates on the place or the right position can affect the accuracy of the height of the water needed Planning the use of floodgates so that it can support the distribution of irrigation water and optimize allocation system to Ma ke it more regularly and can increase productivity of farmed land.

Explanation about literature study

Ancillary building floodgates at one dam irrigation and flood control dam is needed to regulate the use of water distribution in irrigation service area. But often the operation of sluice on areas of irrigation ponds is not working to its full potential due to a variety of problems. These problems are like a type of door that is used quickly suffered damage, sedimentation, materials door that is not resistant to corrosion due to the womb salinity.

The research aims to know the type of material the door for irrigation ponds, and knowing the place the position of the placement of the door corresponds to the high water conditions. High up-front conditions water needed to plan a sluice is a water height can be automatic open and close.

The floodgates selections are based on the results of the survey, observation, and measurement on site studies. A type of floodgates for irrigation ponds that are recommended are automatic water door. Automatic floodgates will simplify and accelerate the performance of floodgates and can control the flow of the tides sea water. Another consideration of the elections is location of automatic water door position the floodgates that will operate normally located away from the settlement and near the mouth of the sea, so it is necessary to use the automatic sluice so that the gates can be operated automatically adapts to the conditions of high of water. Automatic gates can open and close automatically due to the high difference in the height of water in upstream and downstream buildings. Layout valve gates can be arranged to enter the water at the time of

install and holding at the time retroactively or otherwise. Valve can be installed so that the water in the channel and on the land. When valve opens to the inside, the door is open at the time of install and closed on time to recede so that water could not have signed out. Valve also can be mounted so that the throw away water from the channel. When valve gate opening out, water cannot enter at the time of install, but discarded at the time of low tide. And gates, can also be withdrawn so that valve not covered.

Materials forming gates of valve can be Ma de of several types. A.k.a. door material Ma de from fiber resin corrosion resistant and light, has been fully tested by *Puslitbang Pengairan* (Agung Sabur, 2012). On its application in the field, the door is easily applied, head to the difference of ± 2 cm, the door is already can be operated. Maintenance and repair of relative door is easy. On network system of water governance, with a separate water intake of the exhaust channels then the replacement of water will be ensured.

The Theory Of Hydrostatic Head

$$p = \rho g h A$$

When :

P = hydrostatic Head (N/m^2)

ρ = density of fluid (kg/m^3)

g = acceleration of gravity (m/det^2)

h = depth (m)

A = vast areas of the door (m^2)

1) **Archimedes law, great buoyancy equal to the weight of the water is replaced or moved by the door**

$Fb = Vol_{dp} \times \rho water$

When :

Fb = buoyancy (N)

Vol_{dp} = the volume of the door (m^3)

ρwater = density of water (kg/m^3) (Triatmodjo, 1995)

This type of flow that occur when the door opens and the magnitude of the discharge through the door is hanging off the face of the water downstream and upstream of the door, generally three types of flow that may occur:

a). No Flow Q =0 : for hu

b). Free Flow Q = C1 x B x (hu+hp) x 1,5 : for hd

c). Sinking Flow : Q =C2 x B x (hu-hp) x (2g x (hu-hd)) x 0.5 : for hd>hp

When

Q = the discharge (m^3/det)

hu = high water downstream (m)

hp = high elevation of the threshold (m)

hd = high water in downstream of gates (m)

C1=C2 = the coefficient of flow passing through the gate

Specific gravity of material

Fiber glass has the specific gravity varies or in accordance with required i.e. ranges 0,5 t/m^3 – 1,5 t/m^3.

Methodology of Study

Calculation of hydraulics and the analysis will use the aid program HEC-RAS ver. 4.1. Existing conditions the system channel mixer with tidal influence. The data used in this study come from the secondary data, among others, the following

1. Topographical map scale 1 : 25.000
2. The data network of Tambak irrigation Sidoarjo
3. Irrigation network topography measurement data embankment Sidoarjo
4. Beach tidal data Pasuruan June 2015
5. Previous studies of data the study planning embankment Sidoarjo.

RESULTS AND DISCUSSION

Dimensions of Gates and buildings Complement

To specify the dimensions of the doors are automatic and building valve complement are based upon data obtained as:

1) Image location map, cross section lengthwise and transverse drainage plan of the location of the placement of the valve door.

From this data the next door design work done a.k.a. building construction complete with complement. The planning by considering the condition of the existing water level based on the results of the measurements of fluctuations in water level on the location.

Determination of the height of the face of the water by using HecRas Software with basic data input is:

a) geometric data channels: channel scheme, cross section, and the long building water door

b) discharge data: hydrograf inflow from the most upstream channel system

c) tidal data: elevation of sea tides in most downstram system the channel.

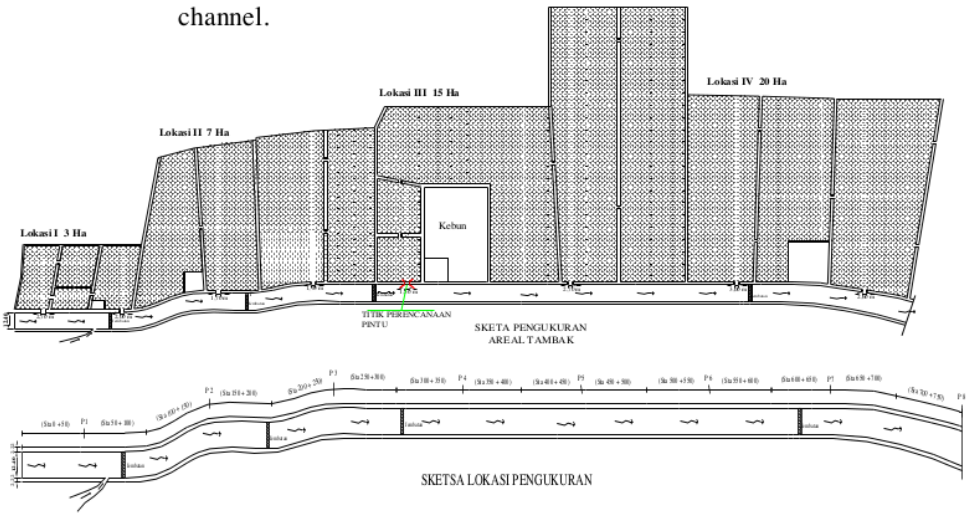

Figure 1. Scheme determination of the location of the door regulator mixing water

The location of the embankment Area studied is the village of tambak Permisan area supplied by Afv. Buyuk, Avf. Kedondong, Kendil channels and Effluent Buyuk. Pond Water Mixer channel is the main channel of water pemasuk Afv. Buyuk South pond area Ds. Permisan, Afv. Kedondong up to the River North area Kendil embankment Permisan Village. Suppliers of fresh water

discharge is Discharge of fresh water coming into the system that originates from the upper Afv. Buyuk and Afv. Kedondong. Changes occur at a point approximately 2 km, the change is due to a meeting with channel effluent Buyuk. With the dimensions of the ducts that is wide, and transverse cuts of existing channels, then generate high air about 2.8 metres until the end of line length effluent Buyuk.

Figure 2. The influence of the tides in the Afv. Buyuk on P38 or 3.8 km from BB Permisan)

Based on the results of data processing with the condition limits the available freshwater 2 m3/sec, and tidal data is sea water in June 2015, then the resulting high water needs on a peg P38, namely on the Canal branching Channels Buyuk so on the area provided for the operation of the mixing water door with door openings minima l 5 cm. with the opening of the floodgates of 5 cm and is done at high tide the highest June 15, 2015, 4 morning , so high there will be differences between fresh water and sea water 13 cm of height the tallest water fresh water with debit 2 m^3/sec. With the height difference, planning the floodgates by using fiber risen valve gates is acceptable.

CONCLUSION AND RECOMMENDATION

1. Channel Mixer will be effective and works well in channels preserved and operated properly.

2. Mixer channels serve as the application to hold the irrigation pond into an irrigation system, which later became the technical irrigation can greatly increase productivity allowing embankment and increase farmer income as well as maintaining regional potential as an area of ponds.
3. Mixer channel can be a target in water resource management to support the sustainable and synergistic

4. The placement of the floodgates are at different heights with 38 p at least 5 cm. Then the floodgates Valve can be recommended to arrange for the circulation of fresh water and sea water for irrigation ponds in Sidoarjo.

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