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# The Capacity Evaluation and Storage Strategy of Tami Weir's Sludge Bag for Irrigation Water Demand

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***ABSTRACT***

Tami Weir is one of the weirs that has a vital role in human life. Sandtraps have an essential role in the operation of Tami bending. The objective of the evaluation and strategy for holding the Tami Weir sandtrap for irrigation water needs is to know the capacity of the Tami Weir sandtrap, the operation of the Tami Weir sandtrap, and the performance of the Tami Weir sandtrap. The method and technique for collecting data in this research is that data analysis is carried out after all the data has been collected. The results are adjusted to the purpose of writing and presented as conclusions. The results of this research are the capacity of the sandtrap during the flushing period, namely that a sediment volume of 73,134 m3 was obtained with a flushing time of fourteen (14) days. During deposition in mud pockets, the water speed will increase, and the deposition process will begin to decrease; at that time, the sediment will enter the channel. To overcome this situation, the sandtrap must be drained. The performance of the sandtrap at Tami Dam has decreased, where there is much alluvial sediment. The performance sandtrap at Tami Weir cannot operate correctly due to the large number of sediment deposits, which are as high as the drain gate's threshold, making hydraulic draining impossible.

**Keywords:** Tami weir, sandtrap, performance.



## Introduction

The water quality at the Tami Dam is very cloudy (unclear). It contains fine sediment (kite) that can settle on irrigation canals. To prevent this sediment from settling throughout the irrigation canal, a mud bag (sandtrap) is made. (SHABRI, 2019). The mud bag building is at the primary channel's beginning and behind the intake door. The mud bag building is a complementary or part of the main building. The function of the mud bag is to precipitate sediment of the kite, especially the sand fraction with a diameter of ± 0.06 – 0.07 mm and larger so that it does not enter the irrigation network. The Tami dam has a bag of mud that can irrigate the land + 5000 Ha. (Suharto & Indarti, 2019).

Erosion and sedimentation are two interrelated problems. Sediment transport in river networks is generally the final product of erosion. The losses caused by the sedimentation process are much greater than the benefits obtained. Materials that have settled in the mud bag are then cleaned periodically (periodically) (Hermawan & Afiato, 2021). Cleaning usually uses a torrent of water to wash the sediment back into the river. In some instances, cleaning can be done in other ways, namely by rinsing or dredging. The period of sediment flushing in mud bags is only determined twice a year. The flushing is not based on evaluating the capacity of the sludge bag, which has been filled by sediment or the required discharge. (Budiman, 2018). The presence of sediment makes the flowing water discharge unable to meet the discharge needs. Sediment deposition in mud bags in full conditions can lead to a decrease in the volume of the reservoir. As for finding out the effective flushing period, "Evaluation of the Carrying Capacity of Tami Dam Mud Bags against the Flushing/Dredging Period." This is done to find out the flushing period for the Tami Dam mud bag in a year based on capacity.

## Research Methods

The location of this research was the Tami Dam in Koya, Jayapura, Papua. This research method is the steps or methods of scientifically researching a problem, case, behavior, or phenomenon to produce a rational answer. The research method is used as the basis for sequential steps based on the research objectives and is a tool used to conclude so that the expected completion can be obtained to achieve research success.

The method carried out in the data collection technique is with the following activities:

1. Primary Data

   Primary data is the collection of data from the results of direct reviews in the field, which are as follows:

   a. Documentation of the research location,

   b. Measuring the capacity of existing sludge bags

2. Secondary data

   Secondary data is obtained by comparing various literature and related agencies where the author can take all aspects and theories from the necessary formulations. The secondary data in this thesis are :

   a. Rainfall data,

   b. Temperatur rata-rata (t)

   c. Relative Humidity (RH)

   d. Average angina velocity (u)

   e. Average solar irradiation (n/N)

## Results and Discussion

### Existing Condition of Mud Bags

The mud pockets on the Tami weir do not function optimally because the sediment downstream of the drain door is as high as the threshold of the drain door, so hydraulic draining cannot be done. The intake door is never operated and always open, even during floods, so sediment enters the channel excessively (NINGRUM, 2020).

**Figure 1**
**Mud bags that do not function normally (Source: doc, 2024)**

**Hydrological Analysis**

1. Data Climatology

Based on data obtained from the Jayapura Doc II Meteorology, Climatology, and Geophysics Agency, the climatological conditions recorded at the Jayapura Doc II Meteorological Station are described as follows:

a. Rainfall Data

Annual rainfall from 2013 to 2023 ranges from 85.1 to 248.8 mm with an average of 150 mm/year, while the number of rainy days ranges from 153 to 214 days/year with an average of 179.5 rainy days per year. Maximum daily rainfall ranges from 16.2 to 248.8 mm/day, while average monthly rainfall ranges from 49.3 mm to 108.5 mm.

**Table 1**
**Annual Rainfall from 2013 to 2023 Doc II Jayapura**

| Year | Rainfall Data | | | | | | | | | | | | Total | Maks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Month | | | | | | | | | | | | | |
| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | | |
| 2013 | 177.1 | 65.5 | 134 | 48.2 | 113.7 | 91.8 | 38.6 | 73 | 42 | 24.2 | 91 | 93.5 | 992.6 | 177.1 |
| 2014 | 59.4 | 248.8 | 48 | 190.5 | 20.4 | 67.6 | 21.4 | 101.9 | 37.3 | 72.1 | 57.1 | 50 | 974.5 | 248.8 |
| 2015 | 90.7 | 126.7 | 115.3 | 58.4 | 42.7 | 65.3 | 24 | 70.3 | 68 | 46.5 | 35.7 | 71.1 | 814.7 | 126.7 |
| 2016 | 174.2 | 101 | 53.8 | 38.3 | 80.8 | 60.8 | 63 | 71.7 | 133.7 | 46.8 | 39.9 | 73.2 | 937.2 | 174.2 |
| 2017 | 79.9 | 65.8 | 16.8 | 65.3 | 50.1 | 82.7 | 62.1 | 85.1 | 50.4 | 83.8 | 61.7 | 32.2 | 735.9 | 85.1 |
| 2018 | 85.8 | 108.8 | 138.2 | 42.1 | 59 | 100.1 | 60.9 | 27.2 | 107.3 | 29.4 | 48 | 138.5 | 945.3 | 138.5 |
| 2019 | 155.2 | 91.1 | 169.1 | 48.2 | 29.2 | 35.8 | 61.4 | 19 | 83.1 | 71.2 | 16.2 | 84 | 863.5 | 169.1 |
| 2020 | 45.3 | 111.3 | 19.8 | 86.1 | 24.5 | 29.6 | 43.4 | 41.3 | 41.5 | 67.6 | 89.7 | 33.9 | 634 | 111.3 |
| 2021 | 36.5 | 51.5 | 22.3 | 81.4 | 116.6 | 42.3 | 70 | 22.3 | 28.6 | 161.7 | 50.9 | 97.2 | 781.3 | 161.7 |
| 2022 | 135.4 | 162.4 | 62.6 | 41.8 | 31.7 | 16.5 | 51.1 | 53.4 | 32 | 26.3 | 28 | 53.2 | 694.4 | 162.4 |
| 2023 | 28 | 61.1 | 36.5 | 56.6 | 59.1 | 28.7 | 95.6 | 81 | 54.7 | 28.3 | 24.5 | 26.2 | 580.3 | 95.6 |
| Rata" | 97.0 | 108.5 | 74.2 | 68.8 | 57.1 | 56.5 | 53.8 | 58.7 | 67.9 | 59.8 | 49.3 | 68.5 | 796.1 | |

Source: BMKG, Jayapura Dock II Meteorological Station (2024)

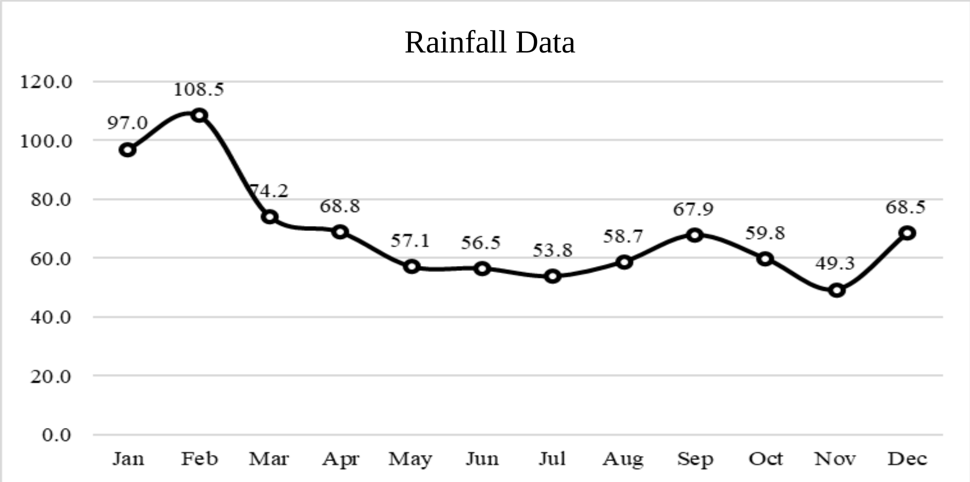



**Figure 2 Average Monthly Rainfall of Dock II Jayapura**
(Source: BMKG, Jayapura Dock II Meteorological Station, 2024)

b. Air Temperature Data,

Monthly average air temperature data based on data from BMKG, Jayapura Dok II Meteorological Station, range from 29.13 to 29.89 $^{o}$C, with an average of 29,421 $^{o}$C.

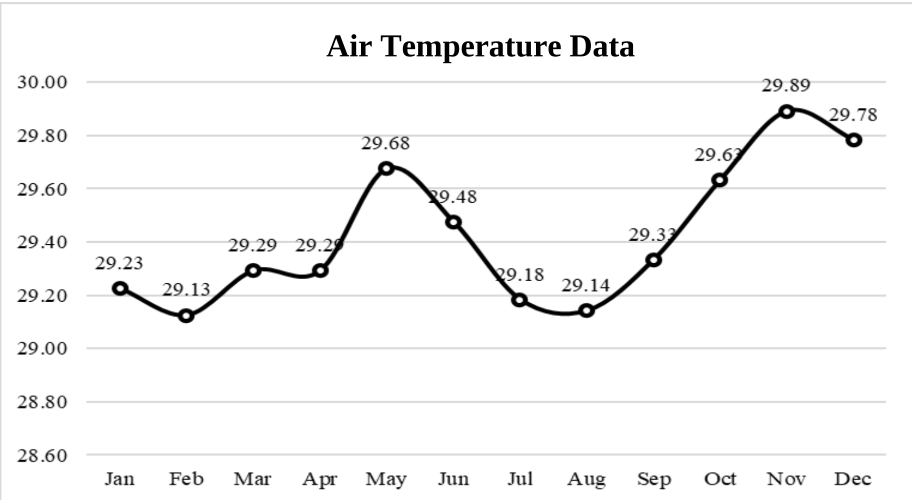



**Figure 3 Monthly Average Air Temperature of Dock II Jayapura**
(Source: BMKG, Jayapura Dock II Meteorological Station, 2024)

c. Air Humidity Data

Monthly average relative humidity data based on data from BMKG, Dok II Jayapura Meteorological Station ranges from 89.83 to 93.50% with an average of 92.21%.

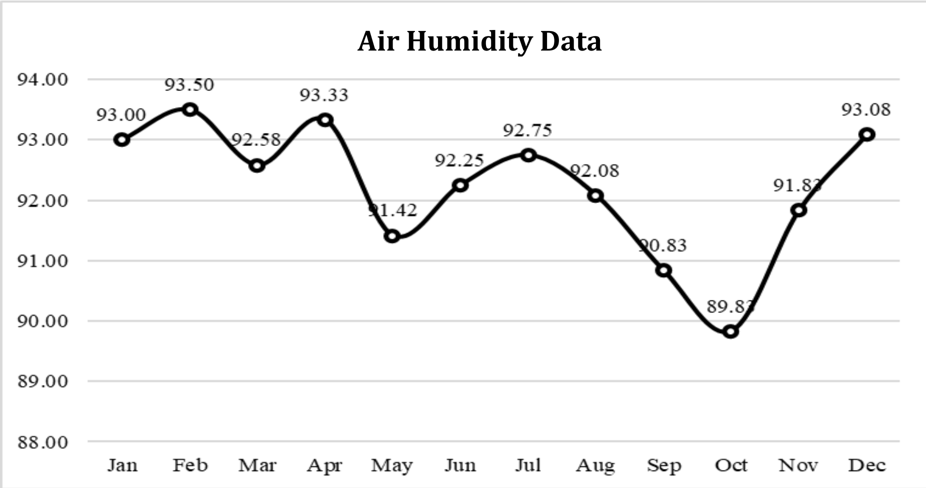
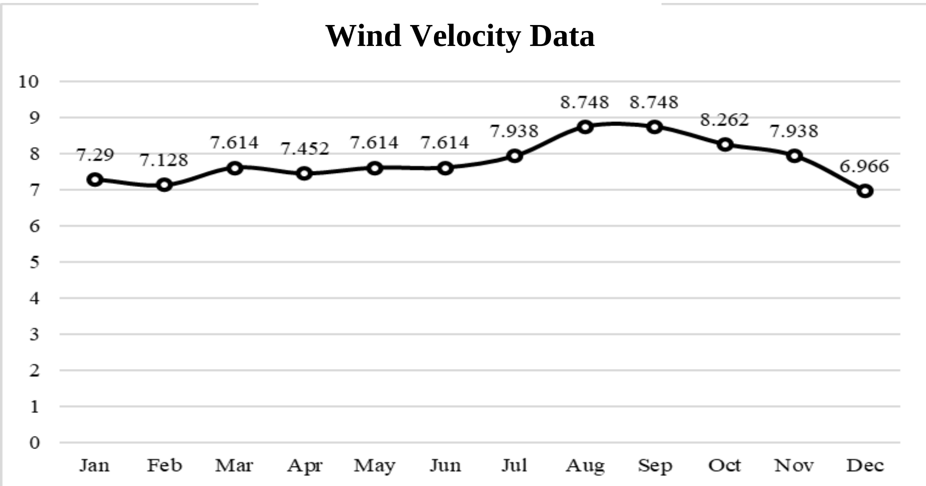



**Figure 4 Monthly Average Air Humidity Doc II Jayapura**
(Source: BMKG, Jayapura Dock II Meteorological Station, 2024)

d. Wind Velocity Data,

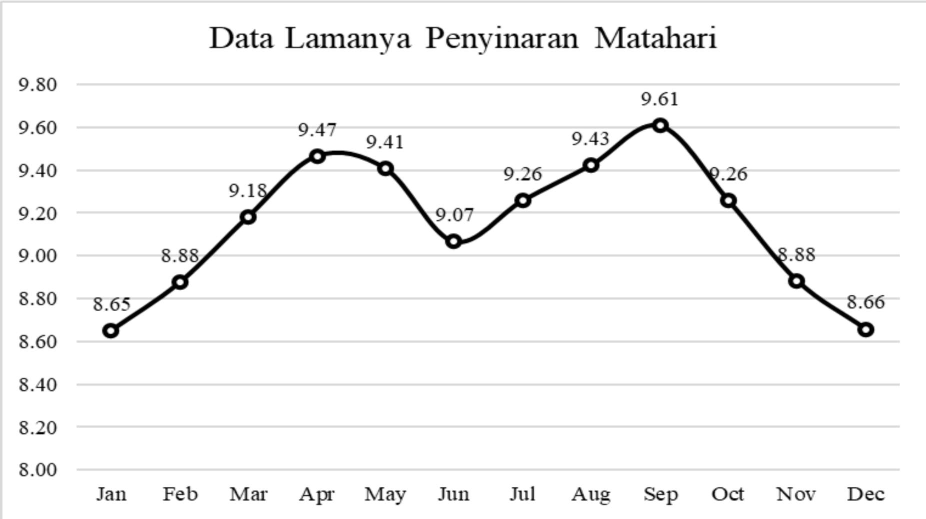
Monthly average wind speed data based on data from BMKG, Dok II Jayapura Meteorological Station ranges from 6,966 to 8,748 knots (3,583 – 4.5 m/s) with an average of 7,776 m/s (4 knots).




**Gambar 5 Kecepatan Angin Rata-Rata Bulanan Dok II Jayapura**
(Sumber: BMKG, Stasiun Meteorologi Dok II Jayapura, 2024)

e. Data Penyinaran Matahari

Data lamanya penyinaran matahari rata-rata bulanan berdasarkan data dari BMKG, Stasiun Meteorologi Dok II Jayapura berkisar antara 8.65 hingga 9.61 jam/hari dengan rata-rata 9.145 jam/hari.




**Gambar 6 Lamanya Penyinaran Matahari Dok II Jayapura**
(Sumber: BMKG, Stasiun Meteorologi Dok II Jayapura, 2024)

2. Analisis Ketersediaan Air

Analisa ketersediaan debit diperoleh dari hasil analisis curah hujan regional mengingat dilokasi DAS Tami belum ada pencatatan debit. Dalam analisa ketersediaan air permukaan akan digunakan sebagai acuan adalah debit andalan (dependable flow). Debit andalan adalah suatu besaran debit pada suatu titik kontrol (titik tinjau) di suatu sungai dimana debit tersebut merupakan gabungan antara limpasan langsung dan aliran dasar (Akbar, 2007).

**Tabel 2**
**Mock Bendung Tami**

| No | Description | Unit | Month | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Jan | Feb | Marc | Apryl | Mei | Jun | Jul | Augt | Sep | Oct | Nov | Des |
| 1 | Rainfall (Rh20%) | P | 195.50 | 85.50 | 115.00 | 91.00 | 106.00 | 44.50 | 42.50 | 41.00 | 51.00 | 65.50 | 128.00 | 130.00 |
| 2 | Rainy Day | n | 19.00 | 15.00 | 15.00 | 18.00 | 18.00 | 20.00 | 18.00 | 17.00 | 22.00 | 11.00 | 26.00 | 16.00 |
| | Limited Evapotranspiration | | | | | | | | | | | | | |
| 3 | Evapotranspiration | Ep | 49.15 | 33.52 | 41.13 | 43.81 | 56.57 | 46.94 | 54.54 | 67.98 | 53.38 | 60.01 | 49.05 | 57.67 |
| 4 | Exposed Surfaced | m% | 45,000 | 50.000 | 55,000 | 50,000 | 55,000 | 55,000 | 65,000 | 75,000 | 80.000 | 70.000 | 45,000 | 45,000 |
| 5 | (m/20)*(18-n) | % | 0.023 | 0.075 | 0.083 | 0.000 | 0.000 | 0.055 | 0.000 | 0.038 | 0.160 | 0.245 | 0.180 | 0.045 |
| 6 | dE = (m/20)*(18-n)*Ep | | 1.106 | 2,514 | 3,394 | 0.000 | 0.000 | 2,582 | 0.000 | 2,549 | 8,541 | 14,702 | 8,828 | 2,595 |
| 7 | Et =Ep-dE | (3 6) | 48.044 | 31,005 | 37,741 | 43.812 | 56,571 | 44,361 | 54,541 | 65,426 | 44,839 | 45,306 | 40.217 | 55,075 |
| | Water Balance | | | | | | | | | | | | | |
| 8 | Runoff Storm (Rs) =P-Et | (1-7) | 147,456 | 54,495 | 77,259 | 47.188 | 49,429 | 0.139 | 0.000 | 0.000 | 6,161 | 20.194 | 87,783 | 74,925 |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 9 | Run Off Storm 5% Rs | | 7,373 | 2,725 | 3,863 | 2,359 | 2,471 | 0.007 | 0.000 | 0.000 | 0.308 | 1,010 | 4,389 | 3,746 |
| 10 | Soil Storage | (8-9) | 140.083 | 51,770 | 73,396 | 44,829 | 46,958 | 0.132 | 0.000 | 0.000 | 5,853 | 19,184 | 83,394 | 71,178 |
| 11 | Soil Moisture(SMC=150) | | 150.000 | 130.433 | 91.303 | 63.912 | 54,432 | 50.403 | 48,691 | 47,963 | 47,654 | 47,522 | 47,466 | 47,422 |
| 12 | Water Surplus | (8-10) | 7,373 | 2,725 | 3.863 | 2.359 | 2,471 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 4,389 | 3,746 |
| Runoff and ground Water Storage. | | | | | | | | | | | | | | |
| 13 | Initial Storage | 50%SMC | 75,000 | 65.217 | 45,652 | 31.956 | 27.216 | 25.202 | 24.346 | 23,982 | 23,827 | 23,761 | 23.733 | 23.711 |
| 14 | Inflitration = I'Ws 0.3 | (11*0.3) | 45,000 | 39,130 | 27.391 | 19.174 | 16.330 | 15.121 | 14,607 | 14,389 | 14,296 | 14,257 | 14,240 | 14,227 |
| 15 | 0,5x (1+k)x (baris13) | | 71,250 | 61,956 | 43.369 | 30.358 | 25.855 | 23.941 | 23.128 | 22.782 | 22.636 | 22.573 | 22,546 | 22.525 |
| 16 | V(n-1) | | 64.125 | 121.838 | 165,414 | 187.905 | 196,437 | 200.063 | 201.604 | 202.259 | 202.537 | 202.655 | 202.705 | 202.727 |
| 17 | Storage Volume (Vn) | (14 + 15) | 135.375 | 183.793 | 208.783 | 218.263 | 222.292 | 224.004 | 224,732 | 225.041 | 225.173 | 225.228 | 225.252 | 225.252 |
| 18 | dVn Vn V(n-1) | | 0.000 | 48.418 | 24.990 | 9,480 | 4.029 | 1.712 | 0.728 | 0.309 | 0.132 | 0.056 | 0.024 | 0.000 |
| 19 | Base Flow | (13 17) | 45.000 | 0.000 | 2,401 | 9.694 | 12.301 | 13,409 | 13.879 | 14.080 | 14,165 | 14,201 | 14,216 | 14.226 |
| 20 | Direct Runoff | (11-14) | 105.000 | 91.303 | 63.912 | 44.739 | 38.102 | 35.282 | 34.084 | 33.574 | 33.358 | 33.265 | 33.226 | 33.195 |
| 21 | Runoff | (18 19) | 150.000 | 91.303 | 66.313 | 54,432 | 50.403 | 48.691 | 47.963 | 47.654 | 47.522 | 47,466 | 47.442 | 47,422 |
| 22 | Catchment Area | m² | 9.00E+08 | 9.00E+08 | 9.00E+08 | 9.00E+08 | 9.00E+08 | 9.00E+08 | 9.00E+08 | 9.00E+08 | 9.00E+08 | 9.00E+08 | 9.00E+08 | 9.00E+08 |
| 23 | Debit (m3/bln) | (20*21) | 1.35E+08 | 8.22E+07 | 5.97E+07 | 4.90E+07 | 4.54E+07 | 4.38E+07 | 4.32E+07 | 4.29E+07 | 4.28E+07 | 4.27E+07 | 4.27E+07 | 4.27E+07 |
| 24 | Debit | (m S/det) | 50.403 | 30.680 | 22.283 | 18.290 | 16.937 | 16.361 | 16.117 | 16.013 | 15.969 | 15.950 | 15.942 | 15.935 |

Source: Data Analytics (2024)

**Table 3**
**Availability of Irrigation Water for the Tami River**

| **No.** | **Month** | **Debit Andal (m3/sec)** |
|---|---|---|
| | | **Tami River** |
| | | **Availability** |
| 1 | Jan | 50.403 |
| 2 | Feb | 30.680 |
| 3 | March | 22.283 |
| 4 | Apr | 18.290 |
| 5 | May | 16.937 |
| 6 | June | 16.361 |

| | | |
|---|---|---|
| 7 | July | 16.117 |
| 8 | Aug | 16.013 |
| 9 | Sept | 15.969 |
| 10 | Oct | 15.950 |
| 11 | Nov | 15.942 |
| 12 | Des | 15.935 |
| **Average** | | **20.907** |

Source: Data Analytics (2024)

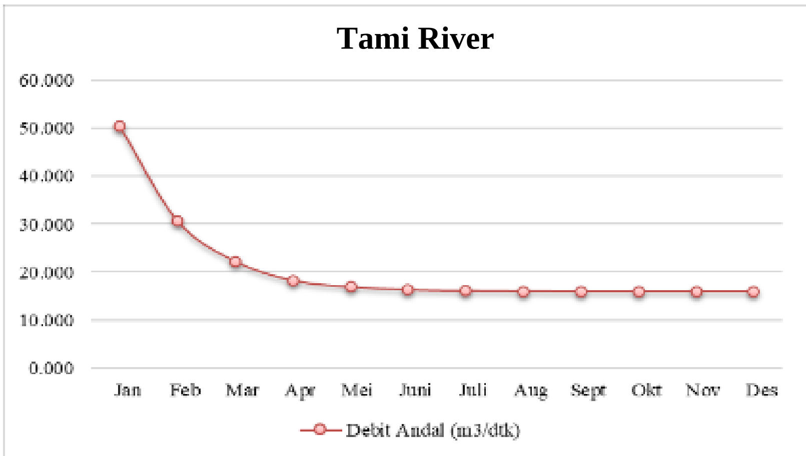



**Figure 7 Reliable Discharge of Tami Dam Water Availability**
(Source: Data Analytics, 2024)

3. Water Demand Analysis

Most of the water demand for irrigation comes from surface water sources. Several variables affect this demand: weather, soil, cropping pattern, water availability, irrigated area, irrigation efficiency, planting method, planting schedule, and crop coefficient. (Gultom, 2021). Several factors are considered when determining DR for irrigation, including evapotranspiration, percolation, effective rainfall contribution, water requirement for tillage, water layer replacement, crop water requirement, and overall irrigation canal efficiency. In planning, the total area of agricultural land can be multiplied by the irrigation water requirement per hectare.

**Table 4**
**Results of Calculation of Irrigation Water Demand**

| Year | DR |
|---|---|
| | Lt/dt/ha |
| 2013 | 0.45 |
| 2014 | 1.31 |
| 2015 | 0.63 |
| 2016 | 1.99 |
| 2017 | 0.95 |
| 2018 | 0.67 |
| 2019 | 0.86 |
| 2020 | 0.80 |
| 2021 | 0.56 |

| | |
|---|---|
| 2022 | 1.18 |

Source: Data Analytics (2024)

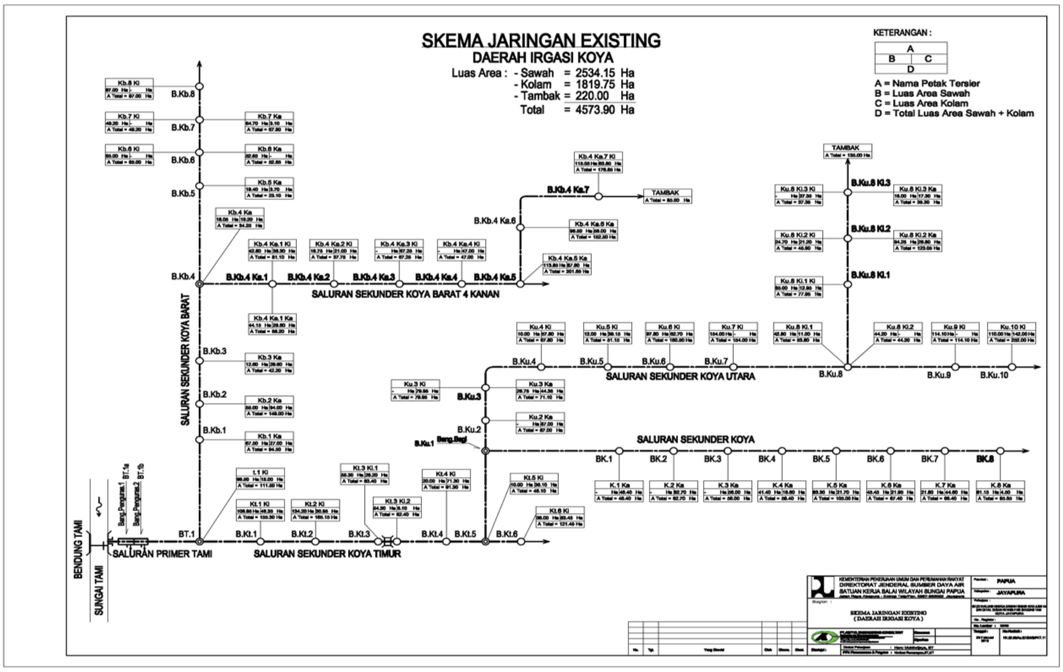



**Figure 8 Schematic of Existing Irrigation Network**
(Source: Secondary Data Analysis, 2024)

Irrigation service area = 4573.90 ha. Then, the irrigation water requirement is:
Water requirement: Service Area x $DR_{max}$
Irrigation Water Requirement: 4573.90 x 1.31
: 5991.81 lt/dt = 5.992 $m^3$/dt

4. Plan Discharger Analysis

Flood discharge analysis can be done using rational, empirical methods (Haspers, Weduwen, and Melchoir) or synthetic unit hydrographs (Nakayasu, Gama I, ITB, SCS, etc.). In this hydrological analysis, the rational method, the empirical method (Haspers, Weduwen, and Melchoir), and the HSS Nakayasu method are used. The following is the calculation results. (Tarigan & Amalia, 2022).

**Table 5**
**Recapitulation of Planned Flood Discharge Calculation**

| Re-Period (Year) | Flood Discharge Plan ($m^3$/dt) | | | | |
|---|---|---|---|---|---|
| | Rational | Der Weduwen | Haspers | Melchoir | HSS Nakayasu |
| 2 | 803,52 | 399,22 | 187,03 | 249,02 | 694,53 |
| 5 | 1.140,11 | 607,70 | 265,37 | 385,59 | 1.220,78 |
| 10 | 1.362,96 | 755,94 | 317,24 | 482,02 | 1.569,20 |
| 25 | 1.644,52 | 954,15 | 382,78 | 609,57 | 2.131,59 |
| 50 | 1.853,41 | 1.108,74 | 431,39 | 707,88 | 2.586,13 |
| 100 | 2.060,75 | 1.268,31 | 479,65 | 808,24 | 3.029,99 |

**Analysis Sedimen**

The observation/tracing of several rivers flowing in the Tami watershed, namely at several observation/sampling points in S. Skanto, are as follows:

1. At the coordinates of 0476679 Northern, 9698807 Eastern, or on the S. Skanto bridge near the Company 571 Dormitory, the river spring is turbid (the sediment load is relatively high), with a concentration of elevated sediment load of 5.0326 gr/ltr.
2. At the coordinates of 0467446 Northern, 9691403 Eastern, or on the S. Skanto bridge between Arso 9 and Arso 7, the level of turbidity is relatively the same as above, with a concentration of 2.6574 gr/ltr of elevated sediment.
3. At the coordinates 0459719 Northern, 9683467 Eastern, or on the S. Skanto bridge in Arso 5, the turbidity level is relatively lower than in the previous two places above, with the concentration of the kite's sediment charge at 0.9653 gr/ltr.
4. The turbidity level is also relatively high in K. Keruh (S. Sangarum W). An example is taken at the coordinates 0458828 Northern, 9694973 Eastern, namely at the K. Muruh bridge in Arso 3, about 100 m upstream from the mouth of K. Jernih (the meeting of K. Jernih with K. Kemur, at the coordinates 0458913 Northern, 9695008 Eastern), with a sediment load concentration of 2.665895 gr/ltr.
5. From observation/sampling at S. Tami (Asoro W) around the PIR 4 bridge, namely at coordinates 0477000 Northern, 9671292 Eastern, it is not too cloudy to the naked eye, with a concentration of sediment load of 0.3728 gr/ltr.
6. In S. Tami's son, who carved near the Arso Kota market, which was observed at the coordinates of 0474947 Northern, 9677785 Eastern, with a concentration of sediment load of 1.8275 gr/ltr.

Then the amount of sediment = 5.0326 + 2.6574 + 0.9653 + 2.665895 + 0.3728 + 1.8275
= 13,521 gr/ltr. In determining the magnitude of the sediment volume, it is necessary to calculate the sediment discharge (Qsm) first with several parameters, namely:

Constant values (K) = 0.0864
Plan debit (Qn) = 5.992 $m^3$/dtk
Sediment concentration value (Cs) = 13,521 gr/lt = 13521.5 mg/lt
Sediment content weight (ɣs) = 1.34 gr/$cm^3$

Then, it is analyzed with the formula:

Qsm = k x Cs x Q
= 0.0864 x 13521.5 x 5.992
= 6.999 ton/hr

The discharge is worth 4.096 tons/day then divided by the weight of the sediment content (ɣs = 1.34 gr/$cm^3$), then it is obtained:

Qsm = 6.999 / 1,34
= 5.224 $m^3$/hr

So, the sediment discharge in the Tami Dam Irrigation Area is 5,224 $m^3$ /hr.

**Analisis Volume Sedimen**

Based on the Irrigation Planning Criteria (KP) – 02, the amount of sediment volume acquisition is recommended to pay attention to the interval between the flushing time

(ΔT) and the flushing time between seven to fourteen days. Thus, the sediment volume (Vs) can be calculated by:

V = Debit sedimen x T

It is planned to flush once every fourteen (14) days, then the volume of sediment is calculated:

Vs = 5.22 $m^3$/hr x 14 days

= 73.134 $m^3$

A sediment volume of 73,134 m3 was obtained with a flushing time of every fourteen (14) days.

## Performance Evaluation of the Tami Dam Mud Bag

At this stage, the researcher identified the problem of the performance of the mud bag at the Tami Dam by conducting direct interviews with informants. The performance of the mud bags at the Tami Dam has decreased, where there are many alluvial sediments. The performance of the mud bag at the Tami Dam can be said to be unable to operate correctly due to the large amount of sediment deposits, which is as high as the drain's threshold, making hydraulic draining impossible. (KURNIAWAN, 2023).

Based on the observations and interviews conducted, the analysis of the performance of mud bags at the Tami Dam can be described as follows:

**Table 6**
**Results of Mud Bag Performance Analysis Interview Results**

| | |
|---|---|
| A *crane* was planned to transport the wood material around the dam, but this has not been implemented. Currently, the OP that is carried out only transports periodically after the flood subsides by manual means. | Sedimentary material is dominated by alluvial sediments sourced from the river's upper reaches. This condition affects the performance of the sandtrap building, which is currently no longer functional.<br>The sludge bag does not function optimally because the sediment downstream of the drain door is as high as the threshold of the drain door, so hydraulic draining cannot be done. The intake door is never operated; it is always open, even during floods, so sediment enters the channel excessively. |
| Making a drainage building two downstream of the central canal, but this effort is also not optimal because the position of the downstream launch channel of the drainage door that is perpendicular to the flow of the Tami River has been covered by sediment from the Tami River. | OP's activities, such as dredging sediment in mud bags and channels (OP costs Rp 2 billion/year), cannot compensate for the incoming sediment. |
| Most of the buildings and canals in the irrigation area system are still good. | Due to the malfunction of the mud bags, sedimentation entered the network, filling irrigation canals and tapped buildings. |

Source: Data Analytics (2024)

## SWOT Analysis of Mud Bag Problems

SWOT analysis is an analysis of an organization's internal and external conditions, which is then used as a basis for designing strategies and work programs (Situmorang et al., 2019). Based on the problems that exist in the Mud Bags at the Tami Dam in Jayapura City, a SWOT analysis can be carried out to obtain an optimization strategy for handling mud bags at the Tami Dam Jayapura City.

**Table 7**
**SWOT Analysis of Sludge Bag Performance**

| Strenght (*Kekuatan*) | Weakness (*Kelemahan*) | Opportunity (*Peluang*) | Threat (*Ancaman*) |
|---|---|---|---|
| • Most of the buildings and canals in the irrigation area system are still good, even though the sludge bags are no longer functioning.<br>• The existence of 2 drainage buildings to help overcome the sedimentation problem. | • Sediment accumulated along the main channel from Mud Bag Building 1 to Mud Bag 2 and First Partition Building.<br>• the existence of the Tami dam during the flood caused an inundation/*backwater* effect and flooding upstream, especially at the confluence of the river.<br>• The existing OP personnel are not optimal and have not yet been incorporated into the P3A farmer group.<br>• Absence of OP manuals in operations and maintenance of both weirs and networks.<br>• The lack of OP Officers compared to the volume of activities is inadequate.<br>• Lack of cost and maintenance in operation and maintenance and the participation of the farming community (P3A) in the involvement of OP activities. | • The existence of PUPR Office of the irrigation section handles explicitly the problem of mud bags and other irrigation networks.<br>• Irrigation channels that are still good so that they can support food security for the community. | • The existence of materials sourced from the upstream of the river that carry materials in the form of alluvial sediment and wood sediment overflowing the landmark and alluvial sediment that enters the main channel due to damage to the intake door.<br>• The change of land (land use change) into a pond affects the distribution of water, the downstream part does not receive water because the upstream part is used for ponds.<br>• The existence of the Tami tributary is indicated to produce alluvial sediment due to the characteristics of the river cliffs and changes in river geometry due to sedimentation |

Source: Data Analytics (2024)

**Strategies for Handling Mud Bag Problems**

From the results of the SWOT analysis above, the resulting strategy to overcome the problems that are obstacles to the mud bags at the Tami Dam, Jayapura City are as follows:

1. Rehabilitation of intake doors at Tami Dam,

2. Rehabilitasi pintu penguras bendung
3. Rehabilitation of drain and sludge bag door 1:
   a. Repair of mud bag doors to the main channel and towards the river,
   b. Extend the door pillar towards the river and extend the tidal pool.
4. Deepen the Main channel with the Settling Pond and make a channel towards the sandtrap one launcher channel (downstream of the Olakan pond)
5. Make a sediment-settling pond with a combination of regulating doors (inlet and outlet) along the main channel next to the main channel.
6. Construct a Siltdam building near the downstream floodway confluence.

## Conclusion

Based on the research conducted, namely, the Evaluation and Strategy of the Tami Dam Mud Bag Capacity and Irrigation Water demands, it can be concluded as follows: 1.) Mud bag capacity of the flushing period is obtained sediment volume of 73,134 m3 with a flushing time for 14 days. 2.) During the deposition in the mud bag, the water velocity will increase, and the deposition process begins to decrease. At that time, the sediment will begin to enter the channel. To overcome this situation, the sludge bag must be drained. 3.) The performance of the mud bags at Tami Weir has decreased, where there is much alluvial sediment. The performance of the mud bag at Tami Dam can already be said to be unable to operate correctly due to the large number of sediment deposits, which are as high as the drain door's threshold, making hydraulic draining impossible. To overcome the problems that become obstacles to mud bags at the Tami Dam in Jayapura City, the following steps are needed: a. Rehabilitation of the intake door at Tami Weir, b. Rehabilitation of the weir's drain door, c. Rehabilitation of the drain and mud bag door 1: 1. Repair the mud bag door to the main channel and towards the river 2. Extend the door pillar towards the river and extend the olak pool, d. Deepen the main channel with the main pool. Deepen the main channel with a settling pond and channel towards the sandtrap launcher channel 1 (downstream of the Olakan pond)., e. Make a sediment-settling pond d. Deepen the main channel with a settling pond and channel towards the sandtrap launcher channel 1 (downstream of the Olakan pool). e. Make a sediment-settling pond with a combination of regulating doors (inlet and outlet) along the main channel next to the main channel. f. Build a Siltdam building near the downstream floodway confluence

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