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Analysis Performance of the Kamun Weir Irrigation Area in the Lutung Barat Canal, Majalengka Regency

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Abstract. Irrigation system management aims to realize water utilization in agriculture, which is participatory, integrated, and environmentally friendly. Kamun weir is located in Liangjulang village, Kadipaten sub-district, Majalengka District, and belongs to the Kamun irrigation area. The research entitled Analysis Performance of the Kamun Weir Irrigation Area in the Lutung Barat Canal, Majalengka Regency, aims to provide an overview and problems solving that occur at the irrigation network level, restoring and optimizing its original function. The method analyzes rainfall data for water requirements, cropping patterns, and irrigation physical conditions. The results of the analysis show that the water needs of the Kamun Lutung Barat irrigation area have been met with the existing mainstay discharge. However, there was still a shortage in May period II, where the existing mainstay discharge of 3046 liters/second was still needed to meet the demand discharge of 3423 liters/second. However, after modifying the cropping pattern with padi-palawija-tebu, the water requirement in the second period of May became 2848 liters/s, so the required water discharge has been met with the existing mainstay discharge. Irrigation channel conditions are in the medium classification with a percentage of 67.58%, and the condition of the irrigation building is in the medium classification with a percentage of 66.88%.

Keywords: Irrigation, Water Need, Cropping Pattern, Discharge, Condition Irrigation

INTRODUCTION

Implementation of irrigation network management is basically influenced by several factors including technical and non-technical factors. Therefore it is necessary to increase among these factors in order to support the implementation of good irrigation network management. Irrigation system management aims to realize water utilization in agriculture, which is carried out in a participatory, integrated, environmentally friendly, transparent, accountable and just manner. Management of irrigation systems in a transparant and accountable manner implies that irrigation system management is carried out openly and can be accounted for, while equitable irrigation system management implies that irrigation system management is carried out proportionally according to the needs of the community using irrigation water from upstream, middle to part downstream.

Kamun dam is located in Liangjulang village, Kadipaten sub-district, Majalengka district and belongs to the Kamun irrigation area. Built in 1913 the first rehab (1988), the last rehabilitation (2018). The area of the Kamun weir is 4,056 Ha, the Kamun irrigation area serves 4 districts, namely the Kadipaten sub-district, Kertajati sub-district, Jatitujuh sub-district. The Kamun dam is included in the river category of the Cimanuk-Cisanggarung province which crosses Majalengka regency.

Government policy regarding water resources management and management in the agricultural sector, namely the irrigation sector, is contained in Law Number 7 of 2004 concerning Water Resources, Government Regulation Number 20 of 2006 concerning Irrigation, Government Regulation Number 42 of 2008 concerning Management of Water Resources , Regulation of the Minister of Public Works Number 32/PRT/M/2007 concerning Operation and Maintenance of Irrigation Networks, Regulation of the Minister of Public Works Number 33/PRT/M/2007 concerning Guidelines for Empowerment of P3A/GP3A/IP3A.

As for that which affects the irrigation system in the Kamun irrigation area, among others, increased sedimentation on the Cimanuk River, damage to facilities and infrastructure which results in effective and efficient irrigation water regulation and a lack of balance between the available discharge and the required discharge. Thus there is a decrease in planting intensity so that agricultural productivity is not maximized in the region.

LITERATURE

One type of utilization of water sources is for irrigation. Considering that Indonesia is an agricultural country with crops and the main food of its population is rice, the role of irrigation as the main producer of rice occupies an important position. Irrigation requires a large investment for the construction of facilities and infrastructure, operation and maintenance. Therefore it is necessary to carry out good, correct, and precise management so that the use of water for irrigation can be done optimally.

Irrigation is all or all activities related to the business of obtaining water for agricultural purposes. These efforts include planning, constructing, managing and maintaining facilities to extract water from water sources and divide the water regularly and if there is excess water by dumping it through drainage channels. Broadly speaking, the objectives of irrigation can be classified into 2 (two) groups, namely:

a. Direct Purpose, namely irrigation has the aim of wetting the soil in relation to the capacity of water and air content in the soil so that a condition can be achieved in accordance with the needs for the growth of existing plants. on the land.
b. Indirect Purpose, namely irrigation has objectives which include: regulating the temperature of the soil, washing soil that contains toxins, transporting fertilizer material through the existing water flow, raising the ground water level, increasing the elevation of an area by flowing water and depositing the carried sludge water, and so on.

The amount of water required for irrigation is greatly influenced by various natural factors, also depending on the type of plant and its growing period. For this reason, a good regulatory system is needed so that water needs for plants can be met and efficient in water utilization. Given that the water available in nature is often not in accordance with the needs of both the location and the time, a channel (irrigation and drainage channel) and complementary structures are needed (for example: dams, weirs, water pumps, siphons, culverts, gutters and so on) to carry water from its source to the location to be flowed and at the same time to regulate the size of the water taken or what is needed.

METHOD

In this research, the methods used are quantitative methods and qualitative methods. The quantitative method is a method used by collecting and studying literature related to the analysis, while the qualitative method is a method used by collecting field data that will be used as data in the object.

The methodology used in writing this thesis is as follows:

1. Looking for primary data and secondary data (in related agencies and offices) which are needed to complete the data required in the preparation of the thesis.
2. Literature study as a literature review from books and other media (internet).
3. Processing and analyzing the data obtained. Drawing conclusions and suggestions from the results of the thesis study.

DISCUSSION

According to the Government Regulation of the Republic of Indonesia Number 20 of 2006 concerning Irrigation, it is stated that irrigation networks are canals, buildings and their complementary structures which are an integral part of the supply, distribution, administration, use and disposal of irrigation water. The irrigation network is divided into several types, namely:

1. Primary irrigation network is part of the irrigation network consisting of the main building, main/primary canal, drainage channel, share building, tapping building, tapping building and complementary buildings.
2. Secondary irrigation network is part of the irrigation network which consists of secondary canals, drain channels, share buildings, share- tapping buildings, tapping buildings and their complementary buildings.
3. Tertiary irrigation network is an irrigation network that functions as an irrigation water service infrastructure in a tertiary plot consisting of tertiary channels, quaternary canals and drains, tertiary boxes, quarter boxes and their complementary buildings.

Table 1

Conditions and Functions

No	Nama Bangunan	Volume	Satuan	Kondisi			Baik (%)	Rusak (%)	Ket
				Baik	RR	RB			
1	Bendung Tetap	1	bh	1	-	-	100	-	Baik
2	Pintu Bendung Tetap	2	bh	2	-	-	100	-	Baik
3	Pintu Pembilas Bendung	1	bh	1	-	-	100	-	Baik
4	Bangunan Penguras	7	bh	2	4	1	28,57	71,43	Rusak
5	Pintu Bangunan Penguras	11	bh	8	3	-	72,73	27,27	Baik
6	Bangunan Skot Balok Penguras	2	bh	-	-	2	-	100	Rusak
7	Pintu Bangunan Skot Balok (Intake)	1	bh	1	-	-	100	-	Baik
8	Bangunan Bagi	2	bh	2	-	-	100	-	Baik
9	Pintu Bangunan Bagi	5	bh	5	-	-	100	-	Baik
10	Bangunan Sadap	41	bh	30	5	6	73,17	26,83	Baik
11	Pintu Bangunan Sadap	42	bh	37	2	3	88,10	11,90	Baik
12	Bangunan Pelengkap	42	bh	16	7	19	38,10	61,90	Rusak
Jumlah		**157**	**bh**	**105**	**21**	**31**			**Sedang**
Rata - Rata							**66,88**	**33,12**	

Sumber : Dinas UPT SDA Jatitujuh Kab. Majalengka

Catatan :

Menurut Permen Pu No. 32/PRT/M/2007

Berfungsi Baik	> 70% - 100%
Berfungsi Sedang	> 55% - 70 %
Kurang Berfungsi	< 55%

Table 2

Mainstay Discharge of West Kamun Lutung Irrigation Area 2000 to 2020

Daerah Irigasi : Kamun (dalam liter per detik)
Bendung : Kamun
Sungai : Cilutung Debit Rata - Rata Setengah Bulanan

Nomor Urut	OKT		NOV		DES		JAN		FEB		MAR		APR		MEI		JUN		JUL		AGS		SEP	
	I	II	I	II	I	II	I	II	I	II	I	II	I	II	I	II	I	II	I	II	I	II	I	II
1	3073	8446	18284	31340	26883	35526	30896	25263	26313	21110	29868	23596	20894	12973	13832	11621	9723	11544	6636	7220	2133	1615	1454	O
2	2268	8311	18284	29941	26327	35526	23275	20449	17564	19297	26149	21972	16267	11045	13718	11555	9059	3805	4462	3671	1833	1265	1454	O
3	2187	8311	17690	29941	26327	25388	22160	17825	17384	16725	24714	16021	15792	10910	12470	10607	5600	3512	3027	3160	1454	1252	1288	O
4	2136	5723	8708	24396	13025	23448	12684	16775	15536	12737	20405	14862	12054	10843	10586	10461	4948	3458	2881	2317	1449	1202	1280	2616
5	2096	4177	8135	23813	12118	16747	12513	15200	15370	8785	14702	7455	11995	8620	9998	8643	4799	3016	2239	2317	1360	1184	1177	2095
6	2096	3154	6910	16498	10987	16257	11593	8511	8467	5315	11193	7349	9643	7876	6326	8007	3458	2616	1949	2080	1280	1163	1177	1454
7	2048	2754	6632	7865	10106	15325	9994	8299	6244	4567	7662	6524	4556	5886	5695	5796	3811	2360	1867	1984	1270	1161	1158	1230
8	1965	2674	5443	6343	8910	12121	6125	6477	4889	4286	5933	5514	4553	3899	4307	5061	3307	2268	1818	1654	1269	899	1154	1192
9	1962	2604	3866	6190	7974	5740	4932	6164	4391	4263	5765	4780	3952	3498	4290	4676	3228	2226	1788	1624	1266	775	983	1190
10	1487	2560	3843	5851	5975	5538	4861	4811	4118	3714	5525	3692	3821	3379	4015	4235	3039	2109	1783	1612	1185	699	686	1162
11	1427	2514	3757	5716	5824	5454	4731	4401	4029	3435	4628	3630	3458	3370	3890	3830	2796	2108	1755	1568	1086	660	655	1159
12	1319	2315	3630	5321	5556	5410	4687	4325	3857	3963	4358	3409	3458	3329	3752	3689	2776	2106	1737	1490	1034	653	646	1008
13	1254	2232	3565	5132	5230	5366	4439	4321	3800	3112	4295	3270	3445	3220	3469	3570	2757	2085	1612	1468	634	631	605	877
14	1248	2187	3506	5088	5013	5141	4372	3879	3259	3032	3535	3254	3342	3216	3469	3557	2655	1963	1531	1237	623	612	563	820
15	1230	2132	3318	5002	4806	5026	4241	3796	3243	2952	3217	3137	3146	3117	3348	3494	2650	1646	1360	1003	618	599	508	757
16	1217	1820	2976	4983	4605	4946	4070	3585	3238	2848	3046	3021	2874	2830	3208	3012	2379	1613	1215	890	615	588	365	718
17	1154	1556	2632	4185	3964	4583	3675	3146	3163	2916	1739	2263	2171	2412	2288	2328	2057	1408	1096	815	602	582	352	629
18	1121	1326	2400	4008	3943	4540	3461	2944	2870	1976	1723	1865	2166	2299	2091	1760	1759	774	855	767	599	575	325	362
19	996	854	2071	3931	3754	4352	3074	2803	2594	1875	1686	1723	1880	2209	1591	1005	1692	699	662	650	585	422	0	273
20	897	838	1442	3613	3632	2940	2380	999	2074	1322	1686	970	1091	1899	1073	960	1208	686	605	566	553	360	0	267

Sumber : Hasil Analisis Perhitungan

Demand Water demand is the amount of water needed crops such as rice or crops in the fields that must be provided and tailored to the current needs such as rice plants at the time of land preparation, plant growth and when the rice is harvested need water with different intensities, namely:

Land Management	0.5 months	1.25 l/sec/ha
Growth	3.0 months	0.75 l/sec/ha
Harvest	0.5 months	0.30 l/sec/ha

Water demand at the intake gate is calculated by ca. ra multiplies the amount of water demand in the paddy fields by the demand factor at the
tertiary, secondary and primary gates, namely:

Coefficient of tertiary water demand	:	1.25
Coefficient of secondary water demand	:	1.10
Coefficient of primary water demand	:	1.05

Water needs must also take into account the amount of water loss. water in each channel. Water losses in tertiary, secondary and primary canals are as follows:

Water losses in tertiary canals : 5 %

Water losses in secondary canals : 10 %

Water losses in primary canals : 25 %

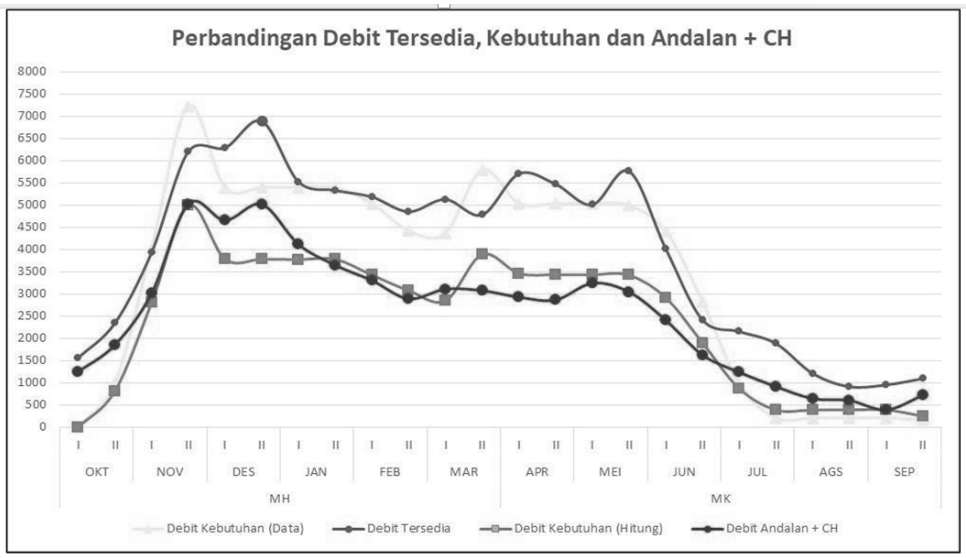

Figure 1

Graph of Comparison of Water Demand

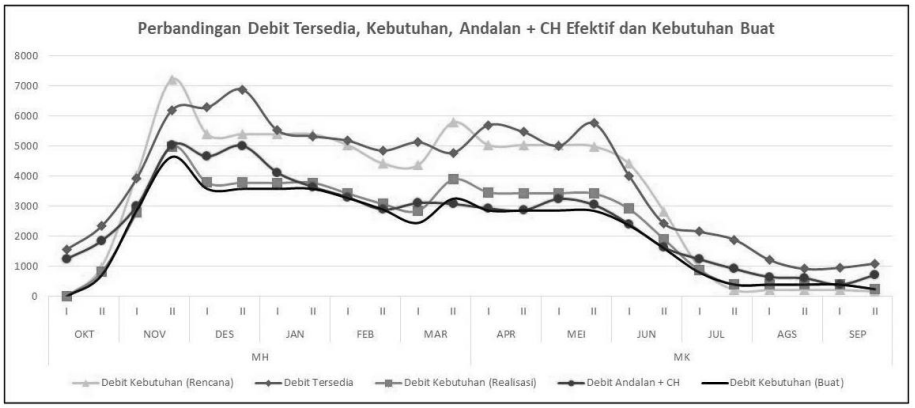

Figure 2

Graph of Comparison of Water Discharge Requirements with Modifications Cropping Pattern

CONCLUSION

Based on the results of the analysis and discussion, it can be concluded as follows:

1. Irrigation channel conditions are in the Medium classification with a percentage of 67.58%. While the condition of the irrigation building is in the Medium classification with a percentage of 66.88%. So the average percentage of the physical condition of irrigation canals and buildings in the Kamun Lutung Barat Irrigation Area is 67.23%.
2. The existing management staff in the Kamun Lutung Barat Irrigation Area are not in accordance with the needs where the available power is only 30 people, while what is needed is as many as 37 people which has an impact on the operation and maintenance activities being not optimal so that the service and water regulation is not optimal.
3. The maximum planting intensity is 300%, while the results of the analysis for the last 10 years in the West Kamun Lutung Irrigation Area obtained an average planting realization of 159.97%.
4. The water needs of the Kamun Lutung Barat irrigation area have been met with the existing mainstay discharge, but there was still a shortage in May period II where the existing mainstay discharge of 3046 liters/second did not meet the demand discharge of 3423.

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