ISSN :

JOURNAL OF GREEN SCIENCE AND TECHNOLOGY

THE PERFORMANCE ANALYSIS OF IRRIGATION AREA OF CIBENDUNG WEIR OF BREBES REGENCY

Nur Azis Zain*, Ohan Farhan**

*) Student of Civil Engineering Department Faculty of Engineering Universitas Swadaya Gunung Jati Cirebon
**) Lecturer at Civil Engineering Department Faculty of Engineering Universitas Swadaya Gunung Jati Cirebon

ABSTRACT

Cibendung Weir comprised in the district of Banjarharjo Brebes Center Java, the located approximately less than 50 km from Cirebon and 40 km from Brebes Center Java, and exist some villages such as, Cikakak, Karang Maja, Tiwulandu Village in East and Tonjong, Singkup, Gandol in West.

Cibendung Weir have duct the name is Induk Cibendung Weir or named D.I Jangkelok Hilir. At first, the water able to dilute more less 6677ha but in this time only more less 6349ha, the trouble is diversion of the use of land. This Cibendung Weir was built in the years 1901 – 1904. The irrigation areas of Cibendung Weir supply six kemantren such as Kemantren Cibendung, Kemantren Bantarsari, Kemantren Losari Hulu, Kemantren Losari Hilir, Kemantren Kubangjero, and Kemantren Rungkang.

The purpose of this research is become reference from evaluation performance of the irrigation area in Cibendung Weir by analyzing the physical condition of building although duct in the irrigation area of Cibendung Weir, analyzing of human resource in the irrigation area of Cibendung Weir, analyzing of rain Hydrology in the irrigation area of Cibendung Weir, analyzing of income from Bendung Cibendong, analyzing of the patterns plants in the irrigation area of Cibendung Weir, and analyzing planning plant and the realization of planting in the irrigation area of Cibendung Weir.

The method of this research is qualitative method, in which the fission of the problem is explained that subject or the object research based on the facts which used during doing the research in performance of irrigation system and try to make a good relation in deep from the aspects particularly.

Based on the build condition in this irrigation area is classified as satisfactory with percentage of damage reached 11,30%. Meanwhile, the duct condition in this irrigation area Cibendung Weir is good classified with percentage of damage reached 8,21%. The condition of organizer in DI Jangkelok Cibendung Weir only available 51 people, while in needed is 67 people with less percentage reached 17,94% so that service toward the duct condition is less completed and have the impact to net condition which less wake or always damaged, this situation should be increased.From the results of the analysis of the ratio of demand discharge with available discharge added effective rainfall in Irrigation Area Jengkelok,Cibendung Weir fulfilled,but many unused discharge it is necessary to modify cropping pattern in orde to maximize the potential of available discharge. The planting realization in 7 years ago in the irrigation area Jangkelok Cibendung Weir it is less from the planning plant, but in the period of 2011/2012 occurs increased 7,34% and the realization of intensity planting is average 243,77% while the average of planning plan is 268,91% thus the lower plant in productivity in this case since it can't be done to planting in this wide area.

Keywords: Performance Analysis , Irrigation Area

I. INTRODUCTION

A. BACKGROUND

Indonesia is a country with a tropical climate that has two seasons namely dry and rainy season. In the dry season the amount of water there is certainly not as much as in the rainy season. In the rainy season is the abundant water flow so that floods can occur.

Cibendung Weir comprised in the district of Banjarharjo Brebes Central Java, the located approximately less than 50 km from Cirebon and 40 km from Brebes Center Java, and exist some villages such as, Cikakak, Karang Maja, Tiwulandu Village in East and Tonjong, Singkup, Gandol in West.

Cibendung Weir have duct the name is Induk Cibendung Weir or named D.I Jangkelok Hilir. At first, the water able to dilute more less 6677ha but in this time only more less 6349ha, the trouble is diversion of the use of land. This Cibendung Weir was built in the years 1901 – 1904. The irrigation areas of Cibendung Weir supply six kemantren such as Kemantren Cibendung, Kemantren Bantarsari, Kemantren Losari Hulu, Kemantren Losari Hilir, Kemantren Kubangjero, and Kemantren Rungkang.

Not maximal result of agricultural productivity in Cibendung Weir Irrigation Area is the effect of not maximal intensity of planting in irrigation area, the problem of likelihood caused by decreasing of irrigation network performance in irrigation system. It may also be due to a lack of balance between the available discharge, with the required discharge. Besides the decrease of irrigation network performance also decrease of water quality, damage of facilities and infrastructures consequently irrigation water management is ineffective and efficient, in other words there can be excessive use and use of water in a plot, whereas in other plots experiencing water shortage, On planting productivity..

B. PROBLEM FORMULATION

The effectiveness and efficiency of Irrigation Area of Cibendung Weir System Irrigation System Performance Indicates that the implementation of the principles of irrigation network performance is not yet optimal. Then it can be identified the problem as follows:

1. How is the performance of Cibendung Weir Irrigation System?
2. Is the available discharge sufficient for the discharge requirement?
3. How is the physical condition and network of Irrigation Area Cibendung Weir?
4. How is The Cropping pattern of Cibendung Weir?
5. How is the institution in Cibendung Weir Irrigation Area?

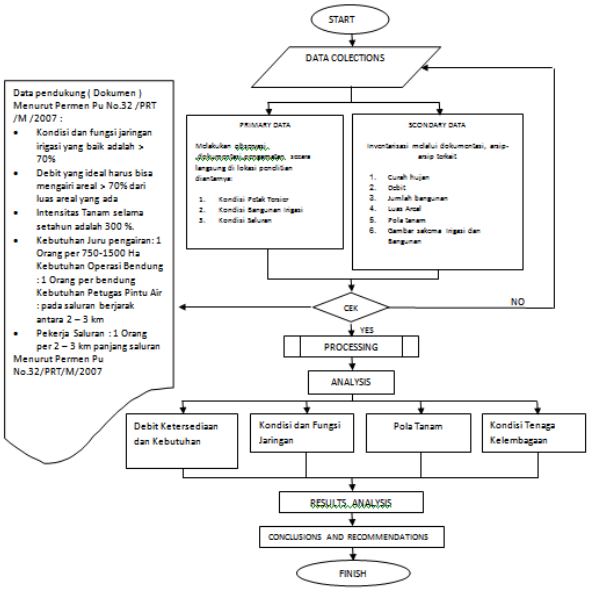
C. OBJECTIVES OF RESEARCH

The objectives of irrigation system analysis in Cibendung Weir Irrigation Area are:

1. Analyzing the performance of irrigation area systems.
2. Analyze the discharge (availability, reliability, needs).
3. Analyzing the physical condition of buildings and irrigation channels.
4. Analyzing the cropping pattern.
5. Analyzing the institutions in the management of irrigation networks.

D. FRAME THINKING

Figure 1.1
Research Flow Chart



II. REVIEW OF LITERATURE AND BASIC THEORY

A. PREVIOUSLY RESEARCH

1. *Evaluasi Kinerja OP Jaringan Irigasi dan Upaya Perbaikannya* (Sumaryanto, Masdjidin Siregar, Deri Hidayat, M. Suryadi Pusat Analisis Sosial Ekonomi Dan Kebijakan Pertanian Badan Penelitian Dan Pengembangan Pertanian Departemen Pertanian (2006))
2. *Evaluasi Operasi Dan Pemeliharaan Bendung Cangkuang Kecamatan Babakan Kabupaten Cirebon*(Ade Joni Alfian, 2013 Thesis Universitas Swadaya Gunung Jati Cirebon)
3. *Kajian Sistem Jaringan Irigasi Rentang Pada Saluran Induk Utara Kabupaten Indramayu* (Budhiono,2011 Thesis Universitas Swadaya Gunung Jati Cirebon)

B. BASIC THEORY

1. DESCRIPTION OF AREAS

Cibendung Weir is located in the district of Banjarharjo Brebes Java Tegah District, located approximately 50 km from the direction of West Java Cirebon and 40 km from Brebes Central Java, and surrounded by several villages, to the east by the village of Cikakak, Karang Maja, Tiwulandu and West by Tonjong, Singkup, Gandol.

2. ANALYSIS

Analysis is an activity that contains a number of activities such as parsing, differentiating, sorting something to be classified and regrouped according to certain criteria then searched its relation and interpreted its meaning. In another sense, analysis is the attitude or attention to something (things, facts, phenomena) to be able to decompose into parts, and recognize the relationship between these parts in the whole. Analysis can also be interpreted as the ability to solve or deciphering a matter or information into smaller components so that more easily understood..

According to Wiradi argued that : *Analisis adalah aktivitas yang memuat sejumlah kegiatan seperti mengurai, membedakan, memilah sesuatu untuk digolongkan dan dikelompokkan kembali menurut kriteria tertentu kemudian dicari kaitannya dan ditaksir maknanya*.

Thus, from the definition of analyzed analysis, it can be concluded that the analysis is a set of activities and processes. One form of analysis is to summarize large amounts of raw data into information that can be interpreted. All forms of analysis attempt to describe patterns consistently in the data so that the results can be learned and translated in a brief and meaningful way .

3. PERFORMANCE

It is an implementation of the functions that are demanded of a person or a deed done. Performance is a condition that must be known and informed to certain parties to determine the level of achievement of results of an official and in connection with the vision of an organization and to find out positive and negative impact of an operational policy: (Jhon Witmore, Coaching for Performance.1997).

4. IRRIGATION

Irrigation is derived from the term irrigatie in Dutch or irrigation in English. Irrigation can be defined as an effort made to bring water from its source for agricultural purposes, to drain and to share water regularly.

Broadly speaking, the purpose of irrigation can be classified into two (2) categories, namely :

1. Direct objective, ie irrigation has a purpose to soil the soil associated with the capacity of water and air content in the soil so as to achieve a condition in accordance with the needs for the growth of plants in the soil.
2. Indirect Objectives, ie irrigation has objectives which include: regulating the temperature of the soil, washing the soil containing toxins, transporting the fertilizer through the existing water flow, raising the ground water level, increasing the elevation of an area by draining the water and settling the mud Water-borne, and so forth.

Table 2.1.
Assessment Criteria Condition of Channel and Building Function Irrigation

No.	Criteria Conditions	Conditions (%)	Handling recommendations
1	Good (G)	70-100	UpGrading dan optimalitation
2	Medium	55 - 70	Medium Rehabilitation
3	Not Good	<55	Heavy Rehabilitation

Permen PU. No. 32/PRT/M/2007

5. IRRIGATION WATER REQUIREMENT

Irrigation water demand is the amount of water required to fulfill evapotranspiration needs, water loss, water requirement for plants with respect to the amount of water provided by nature and the contribution of ground water.

Table 2.2.
Coefficient of Rice Plant

No	Type	Time (Months)	Water Needs (L/Det/Ha)
1	Land Processing	0,5	1,20
2	Cultivation	0,5	1,00
3	Growth	2	0,80
4	Concoction	1	0,20
Amount		**4**	**3,20**

Table 2.3.
Coefficient of *Palawija* Plant

No	Type	Time (months)	The Water Needs (L/det/Ha)
1	Land processing	0,5	0,8
2	Cultivation	1,5	0,2
3	Growth	0,5	0,2
Amount		**2,5**	**1,20**

6. CROPPING PATTERNS AND SYSTEMS GROUP

To meet water needs for plants, the determination of cropping patterns is a matter to consider. The table below is an example of a usable cropping pattern. The table below is an example of the planting pattern used:

Table 2.4.
Cropping patterns

Availability of Water For Irrigation	Planting Pattern In One Year
There are quite a lot of water	rice - rice - crops
Available water in sufficient quantities	rice - crops - sugarcane
Areas that tend to lack of water	rice - crops - fallow

7. DISCHARGE

Is a coefficient denoting the amount of water flowing from a time union source, usually measured in units of liters per second, to meet the water requirement of water, the water discharge must be sufficient to be channeled into the prepared channel (Dumiary in a book entitled *Ekonomika Sumber Daya Air*).

Water discharge is a measure of the volume of water that can pass in a place or that can be accommodated in a place every single time unit (Suyono in a book entitled *Hidrologi Untuk Pengairan*)

8. IRRIGATION EFFICIENCY

Water taken from water sources or rivers flowed into irrigated areas is not all utilized by plants. In irrigation practices there is water loss. The water loss can be evaporation in the irrigation canal, seepage from the channel or other necessities (household).

9. INSTITUTIONAL P3A ON IRRIGATION NETWORKS

Internal factor affecting irrigation network performance is P3A performance. In general, P3A performance is in low to moderate category; There are even a considerable number of tertiary patches where irrigation is not managed systematically in P3A containers (P3A is just a name). This can be seen from the existence of the board, the clarity of the division of tasks between the

board, the ability to encourage farmer participation in the maintenance of tertiary and quarter networks, the ability to collect and openness in the use of irrigation fees, and skills to prevent / resolve internal conflicts P3A organizations or with other parties.

III. RESEARCH METHOD

A. RESEARCH METHOD

Research methodology is the most important thing in doing a research because it is used to find, develop and test facts / data studied to test the truth.

The methodology itself is a systematic and standard procedure necessary to obtain data and analyze data. Data collection can not be separated from a primary data procurement process, as a very important first step, because in general the data collected is used as a reference in an analysis.(Purwanto,*Metodologi Penelitian Kuantitatif*, 2006)

The method used in this research is qualitative method is descriptive - inductive. The descriptive nature of this research is intended to provide a description and explanation of data and information obtained during the research, while the inductive approach based on the process of thinking / observation in the field / empirical facts.

Qualitative method with descriptive-inductive approach, where in solving the problem describes the subject and or object of research based on facts obtained during the research in the performance of irrigation systems and efforts to express the deep relationship of the aspects studied.

B. ANALYSIS METHOD

The method used is as follows :

1. Discharge analysis

Discharge analysis consists of :

a. Water availability

The calculation of water availability using Rational Method as an approach method is a way to determine the relationship of river flow with the intensity of rainfall which is the function and physical parameters. The equations used in the Rational Method are as follows:

$$Q = \frac{1}{3,6} . f. r. A$$

Information:

Q = Water availability (m3/det)
F = Flow coefficient
R = R_{80} = Monthly effective rainfall (mm/month)

b. Mainstay Discharge

Mainstay Discharge is the minimum river discharge for a prescribed predetermined probability that can be used for irrigation. Monthly river flow data is arranged in descending order for each watering period. Then the rank (rank) 80% mainstay discharge is determined in the following way:

$n = \frac{80}{100}$ x many years of recording

2. Physical Condition Analysis

The analysis in question is an analysis of the physical condition of buildings and channels on an irrigation network. Assessment of physical condition is crucial, because the physical of the water building becomes the main condition of the assessment, if in terms of physical is feasible then the performance of other aspects such as water management management analysis can be done. There are also formulas used in calculating the percentage of physical conditions in irrigation networks are as follows ((*Petunjuk Penilaian Kondisi Jaringan Irigasi, 1991:6)*):

Permen PU No. 32/PRT/M/2007 stated that the performance criteria of irrigation networks are divided into 3 classifications as follows::

- Good classification with indicator of irrigation network service function level> 70% - 100%
- Medium classification with indicator of irrigation network service function level 55% -70%
- Damaged (critical) classification with indicator of irrigation network service function level <55%

3. Irrigation Water Requirement Analysis

Irrigation water demand is the amount of water volume needed to meet evapontranspiration needs, water loss, water requirements for crops by taking into account the amount of water provided by nature through the rain and the contribution of groundwater..

1) Factors Affecting the Needs of Crop Water:

a. Land preparation

b. Consumptive use
c. Percolation and seepage
d. Change of water layer
e. Effective rainfall.

2) Needs of Water in Fields
Based on planting plan, crop water requirement, and water loss in channel. Water Requirement in Field formulated::

KAS = Plant Area x Coefficient

The water demand coefficient on the channel is as follows:
Tertiary Water Demand Coefficient : 1.25
Secondary Water Demand Coefficient: 1.10
Tertiary Water Demand Coefficient: 1.05

While the Water Loss Factor in the channel is as follows:
Water loss in tertiary : 5%
Water loss in secondary :10%
Water loss in primary : 25%

3) Cropping Patterns And Systems Group
a) Cropping Patterns

To meet the water needs of the plants, the determination of cropping patterns are things that need to be considered.

The table below is an example of a usable cropping pattern.

Table 3.1.
Cropping Patterns

Availability of Water For Irrigation	Planting Pattern In One Year
There are quite a lot of water	Rice - Rice - Crops
Available water in sufficient quantities	rice - crops - sugarcane
Areas that tend to lack of water	Rice - Crops - Bera

b) Systems Group

To obtain a plant with optimal growth in order to achieve high productivity, the planting should pay attention evenly to the distribution of water to all tertiary plots in irrigation networks. Water sources can not always provide the required irrigation water, so a good water distribution plan should be established. Available water can be used evenly and fairly. At times when water is not sufficient to meet the needs of water plants with continuous drainage, the water supply is done in rotation. In the dry season where the water situation is critical, the water supply will be given / prioritized to the planned plants. In this rotational watering system, the start of cultivation is not simultaneous, but take turns according to the prescribed schedule, with the intention of using water more efficiently. The rice fields are divided into groups and when the start of the field work takes turns according to each groups.

4. Institutional Analysis and Human Resources

Referring to the *Peraturan Menteri Pekerjaan Umum Nomor : 32 / PRT / M / 2007 Kebutuhan Tenaga Pelaksana Operasi & Pemeliharaan* are as follows:

- Head of branch / observer / *UPTD* / branch office / *korwil*: 1 person + 5 staff per 5.000 - 7,500 Ha
- *Mantri / Juru pengairan* : 1 person per 750 - 1,500 Ha
- Weir Operations Officer: 1 person per weir, plus some workers for large weir
- Water Supply Officers: 1 person per 3 - 5 tapping buildings and building for channels spaced between 2 - 3 km or service area 150 to 500 ha
- *Pekerja/pekarya Saluran (PS)* : 1 person per 2 - 3 km channel length.

C. RESEARCH LOCATION

The location of the analysis of irrigation systems in the Jangkelok Cibendung Weir Irrigation Area is included in Banjarharjo sub-district, Brebes District, Central Java, located between (S 6058'35.8032 " and E 108045'39.8736 ") approximately 50 km from the direction of Cirebon west Java and 40 km From Brebes

Central Java, and surrounded by several villages, to the east by the villages of Cikakak, Karang Maja, Tiwulandu and west by Tonjong, Singkup, Gandol.

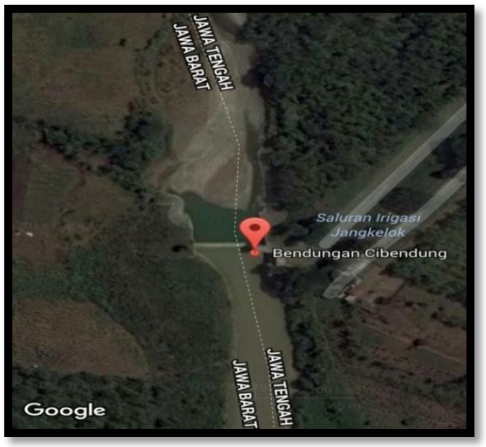


Figure 3.1.
Research Sites

IV. ANALYSIS & DISCUSSION

A. GENERAL DESCRIPTIONS

This Cibendung Weir belongs to Banjarharjo sub-district, Brebes regency of Central Java, located approximately 50 km from Cirebon Jawa Barat and 40 km from Brebes Central Java, and surrounded by several villages, in the east by Cikakak, Karang Maja, Tiwulandu and West by Tonjong, Singkup, Gandol.

Cibendung Weir has the main channel called Bendung Cibendung or in the name of D.I Jangkelok. In early water can irrigate ± 6677 ha but currently only able to irrigate ± 6349 ha, due to the diversion of land use.

B. CONDITION AND FUNCTION OF IRRIGATION NETWORKS

1. Condition and Function of Irrigation Building of Cibendung Weir

Table 4.1.
Condition and Function Building Irrigation Cibendung Weir

No	Commentary	Volume	Denonitation	Conditionn			good	Demage	Exp.
				Good	Minor Demage	Sevelery Demage	%	%	
	Areal Fungsional								
1	Bendung								
	Banguan pengambi	1	bh	1	0	0	100	0	Baik
	Bangunan penguras	1	bh	1	0	0	100	0	Baik
	Tubuh bendung	1	bh	1	0	0	100	0	Baik
2	Bangunan Bagi								
	Bagi	2	bh	1	1	0	50	50	Kurang
	Bagi Sadap	7	bh	5	1	1	71.43	28.57	Baik
	Sadap	48	bh	43	2	3	89.58	10.42	Baik
3	Bangunan Pelengkap								
	Talang	3	bh	3	0	0	100	0	Baik
	Sypon	4	bh	3	1	0	75	25	Baik
	Gorong-gorong	13	bh	13	3	0	100	0	Baik
	Jembatan	68	bh	61	6	1	89.71	10.29	Baik
	Terjun	20	bh	20	0	0	100	0	Baik
Jumlah		168	bh	152	14	5			
Rata-Rata							88.70	11.30	Baik

2. Condition and Function of Irrigation Channel of Cibendung Weir

Table 4.2.
Condition and Function of Irrigation Channel of Cibendung Weir

No.	Chanel Name		Long	Conditon			Fungcition		Exp.
	Primer	Scondary	(Km)	G (Km)	Md (Km)	Sd (Km)	Good (%)	Demage (%)	
1	Saluran Induk Jangkelok	-	4.25	3.12	1.00	0.13	73.51	26.49	Good
2	-	Saluran Sekunder Losari	15.75	12.55	-	3.20	79.66	20.34	Good
3	-	Saluran Sekunder Karang Tegah	1.51	1.41	0.10	-	93.38	6.62	Good
4	-	Saluran Sekunder Bantarsari	4.13	4.01	-	0.13	96.97	3.03	Good
5	-	Saluran Sekunder Jati Sawit	2.38	2.24	-	0.14	94.32	5.68	Good
6	-	Saluran Sekunder Luwungbata	1.88	1.78	-	0.10	94.68	5.32	Good
7	-	Saluran Sekunder Kubang Jero	1.80	1.60	0.20	-	88.89	11.11	Good
8	-	Saluran Sekunder Limbangan	3.20	2.70	-	0.50	84.38	15.63	Good
9	-	Saluran Sekunder Rungkang	11.74	11.11	-	0.63	94.63	5.37	Good
Amount			46.63	40.51	1.30	4.82			Good
Average							91.79	8.21	

Sumber : Dinas UPTd Pemali Malahayu Kabupaten Brebes

From the results of the above analysis, it can be seen that the condition of buildings and conduits in Irrigation Areas Cibendung Weir slightly damaged, damage to the condition of the building reached an average of 11.30%. And for condition of irrigation channel reaching average 8,21%. Which affects the decreasing function of irrigation networks so that water services in Cibendung Irrigation Area become less optimal. There needs to be repair or replacement of damaged equipment, while for irrigation channel condition need regular maintenance and periodical.

C. ANALYSIS OF HUMAN RESOURCES

Table 4.3.
Personnel Data Cibendung Weir

No	Channel Name		Long	PERSONIL																	Exp
				Juru Pengairan			POB			PPA			PPS			Amount			Available	Minus	
	Primer	Scondary	(Km)	Need	Available	Minus	Need	Available	Minus	Need	Available	Minus	Need	Available	Minus	Need	Available	Minus	%	%	
1	Channel Primer		4.25	6	6	0	1	1	0	2	2	0	2	1	1	11	10	1	90.91	9.09	
		Channel Scondary	42.38	-	-	-	-	-	-	42	33	9	14	8	6	56	41	15	73.21	26.79	
Amount			46.63	6	6	0	1	2	0	44	35	9	16	9	7	67	51	16			
Average																			82.06	17.94	

From the results of the above analysis it is known that the number of managerial personnel in Cibendung Weir Irrigation Area is only available 51 people, while the required is 67 people with the percentage of shortfall reaches 17.94% so that the service to channel condition is less fulfilled and impact on the condition of less well maintained network or often Damaged, it is necessary to increase the manpower of the relevant agencies.

D. HYDROLOGY ANALYSIS

1. RAINFALL DATA

Table 4.4.
Rainfall Data of Cibendung Weir

No	Year	Mounth												Mounth											
		Januari		Februari		Maret		April		Mei		Juni		Juli		Agustus		September		Oktober		Nopember		Desember	
		I	II	I	II	I	II	I	II	I	II	I	II	I	II	I	II	I	II	I	II	I	II
1	2002	279	314	21	202	82	138	215	206	97	34	56	0	0	0	0	0	0	0	1	27	150	199	159	
2	2003	115	138	142	219	247	86	25	48	7	1	1	12	0	0	30	3	0	23	23	11	120	90	159	136
3	2004	412	390	183	199	234	100	32	142	5	40	20	0	99	20	0	4	7	4	12	7	47	71	29	110
4	2005	210	269	192	79	205	120	170	57	39	10	7	127	77	54	87	3	0	88	2	137	52	53	107	220
5	2006	192	117	256	130	95	193	226	44	57	96	44	0	0	0	0	0	0	0	0	24	155	152		144
6	2007	139	179	151	120	112	200	155	154	114	93	95	24	2	14	0	0	0	0	16	12	154	29	140	273
7	2008	133	161	149	167	138	157	118	90	14	1	0	39	0	0	40	40	0	0	60	45	176	230	185	327
8	2009	148	132	178	205	162	17	60	155	67	166	68	16	0	30	0	0	0	25	41	32	58	85	89	188
9	2010	257	300	299	106	139	162	195	180	292	99	97	76	90	59	30	90	160	80	90	51	164	64	139	152
10	2011	192	126	133	145	231	146	236	11	155	111	19	24	4	10	0	0	0	0	0	99	69	80	32	323
11	2012	112	194	296	188	146	155	71	20	20	36	15	0	0	0	0	32	0	0	12	68	52	63	192	140
12	2013	192	269	96	196	269	130	265	407	23	182	90	116	191	22	0	0	0	0	0	188	48	179	117	147
13	2014	241	133	129	208	229	199	168	27	7	110	0	183	35	0	18	38	0	0	0	28	82	27	173	257
14	2015	112	160	224	97	214	120	52	129	98	23	4	0	3	0	0	0	0	0	0	15	127	54	163	114
15	2016	148	150	181	190	97	127	40	175	65	143	21	50	69	24	27	23	74	149	181	198	215	177	139	158
Average 1/2 Mounth		181.87	198.33	175.00	166.80	174.53	146.47	122.60	127.00	70.67	76.27	34.13	40.13	38.53	15.53	16.00	15.40	16.60	31.27	26.67	54.13	92.40	97.67	133.00	187.00

a. Rainfall Calculation

Table 4.5.
Effective Rainfall coefficient

2 Weekly Rainfall	% Efectif
0 - 15	0
15 - 50	70
50 - 75	60
75 - 100	45
100 - 250	40
> 250	-

Table 4.6.

Effective Rainfall Biweekly Cibendung Weir

Mounth	Periode	2 Weekly Average 2 (mm)	% Efektif	Effektif Rainfall 2 Weekly (mm)
1	2	3	4	5= 3 x 4/100
Januari	I	181.87	40	72.75
	II	198.33	40	79.33
Februari	I	175.00	40	70.00
	II	166.80	40	66.72
Maret	I	174.53	40	69.81
	II	146.47	40	58.59
April	I	132.60	40	53.04
	II	127.00	40	50.80
Mei	I	70.67	60	42.40
	II	76.27	45	34.32
Juni	I	34.33	70	24.03
	II	40.13	70	28.09
Juli	I	38.53	70	26.97
	II	15.53	70	10.87
Agustus	I	16.00	70	11.20
	II	15.40	70	10.78
September	I	16.60	70	11.62
	II	31.27	70	21.89
Oktober	I	26.67	70	18.67
	II	54.13	60	32.48
Nopember	I	92.40	45	41.58
	II	97.67	45	43.95
Desember	I	133.00	40	53.20
	II	187.00	40	74.80

Tabel 4.7.
Effective Rainfall Volume biweekly Cibendung Weir

Mounth	Rain (m)	Volume (m^3)	Debit (m^3/d)	Debit (l/d)
Januari-1	0.073	4618685.87	3.564	3563.80
Januari-2	0.079	5036873.33	3.886	3886.48
Februari-1	0.070	4444300.00	3.429	3429.24
Februari-2	0.067	4236052.80	3.269	3268.56
Maret-1	0.070	4432448.53	3.420	3420.10
Maret-2	0.059	3719667.47	2.870	2870.11
April-1	0.053	3367509.60	2.598	2598.39
April-2	0.051	3225292.00	2.489	2488.65
Mei-1	0.042	2691976.00	2.077	2077.14
Mei-2	0.034	2178976.80	1.681	1681.31
Juni-1	0.024	1525876.33	1.177	1177.37
Juni-2	0.028	1783645.73	1.376	1376.27
Juli-1	0.027	1712536.93	1.321	1321.40
Juli-2	0.011	690347.93	0.533	532.68
Agustus-1	0.011	711088.00	0.549	548.68
Agustus-2	0.011	684422.20	0.528	528.10
September-1	0.012	737753.80	0.569	569.25
September-2	0.022	1389584.47	1.072	1072.21
Oktober-1	0.019	1185146.67	0.914	914.47
Oktober-2	0.032	2062155.20	1.591	1591.17
November-1	0.042	2639914.20	2.037	2036.97
November-2	0.044	2790385.50	2.153	2153.08
Desember-1	0.053	3377668.00	2.606	2606.23
Desember-2	0.075	4749052.00	3.664	3664.39
Average		**2,666,306.640**	**2.057**	**2,057.335**

E. ANALYSIS OF DISCHARGE

Table 4.8.
Available Discharge Data Cibendung Weir

YEAR	Mounth (M3/Det)																							
	JANUARI		PEBRUARI		MARET		APRIL		MEI		JUNI		JULI		AGUSTUS		SEPTEMBER		OKTOBER		NOPEMBER		DESEMBER	
	I	II	I	II	I	II	I	II	I	II	I	II	I	II	I	II	I	II	I	II	I	II	I	II
2002	4.261	4.181	4.233	4.185	3.859	3.569	3.737	3.573	3.160	1.168	0.957	0.400	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2003	3.000	4.298	3.860	3.425	3.617	3.000	3.045	3.172	3.042	2.985	2.478	0.788	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.895	2.737
2004	5.007	4.776	4.702	4.153	4.346	3.330	4.457	4.717	3.877	4.458	1.307	0.779	1.854	1.745	0.000	0.000	0.000	0.000	0.458	0.000	0.000	2.945	3.854	3.277
2005	4.877	5.021	5.543	10.703	5.007	4.864	4.853	3.999	3.177	3.109	1.383	4.283	3.518	2.276	1.972	0.675	0.000	0.000	0.000	0.000	0.417	0.379	0.667	3.173
2006	4.264	4.881	6.158	5.556	4.257	4.327	3.811	3.454	2.783	2.242	1.823	0.367	0.000	1.023	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.537	2.767
2007	4.448	4.593	5.469	3.593	5.977	4.762	5.346	5.000	4.261	3.665	2.923	2.575	1.210	1.497	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	3.769	4.219
2008	4.602	5.002	3.913	2.825	5.420	6.915	4.565	4.146	3.220	2.209	1.975	0.860	0.975	0.000	0.000	0.000	0.950	0.000	1.350	0.273	2.995	2.000	3.975	4.415
2009	5.476	4.935	4.571	4.435	3.915	4.595	5.000	3.712	3.816	2.030	0.948	1.200	0.822	0.000	0.000	0.000	0.000	0.000	0.000	0.975	2.595	1.916	2.787	4.375
2010	5.270	4.321	4.931	4.319	4.286	4.267	3.459	3.979	3.971	3.534	3.009	1.980	1.948	2.036	1.650	1.898	2.495	2.210	2.732	2.462	2.842	2.513	3.166	4.106
2011	4.263	4.302	4.508	4.084	4.854	4.400	3.154	4.033	3.313	4.778	3.000	2.020	2.173	1.562	0.166	0.975	0.000	0.000	0.000	1.677	3.345	3.429	3.981	4.000
2012	4.595	5.109	4.458	4.505	4.739	4.362	4.595	4.337	3.775	3.922	3.000	3.556	1.350	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.958	1.100	2.542	3.581
2013	4.021	4.850	4.563	7.726	4.000	4.260	4.200	4.016	4.000	2.941	3.326	3.875	2.403	2.503	0.475	0.000	0.000	0.000	0.000	0.000	1.897	3.042	3.230	4.040
2014	4.000	3.320	3.950	4.500	10.209	10.018	4.425	4.834	5.344	4.445	3.122	2.000	2.010	1.500	1.000	0.395	0.000	0.000	0.000	0.000	1.523	3.995	0.000	3.720	4.000
2015	4.507	4.313	4.850	4.664	4.856	4.805	4.887	4.000	4.720	3.131	2.320	2.200	0.700	0.877	0.000	0.000	0.000	0.000	0.000	0.000	2.314	0.000	3.133	4.746
2016	4.746	4.753	4.402	4.746	4.700	4.764	4.884	4.807	4.573	4.815	4.527	3.866	4.223	3.020	2.293	2.081	3.254	4.288	3.393	3.571	4.000	4.211	3.023	4.918
Average	4.572	4.577	4.704	4.883	5.022	4.750	4.255	4.203	3.887	3.379	2.345	1.666	1.691	1.288	0.595	0.373	0.417	0.471	0.488	0.373	1.857	1.945	2.889	4.241

Tabel 4.9.
Effective Discharge Data Cibendung Weir

Mount	Rain (m)	Volume (m^3)	Debit (m^3/d)	Debit (l/d)
Januari-1	0.070	9313134.05	7.186	7186.06
Januari-2	0.069	9209432.19	7.106	7106.04
Februari-1	0.065	8606075.91	6.640	6640.49
Februari-2	0.060	7985043.19	6.161	6161.30
Maret-1	0.071	9468686.84	7.306	7306.09
Maret-2	0.053	6973950.06	5.381	5381.13
April-1	0.054	7208457.67	5.562	5562.08
April-2	0.043	5674141.52	4.378	4378.20
Mei-1	0.038	5024531.86	3.877	3876.95
Mei-2	0.036	4795179.88	3.700	3699.98
Juni-1	0.038	5096121.50	3.932	3932.19
Juni-2	0.028	3681121.41	2.840	2840.37
Juli-1	0.030	3940965.27	3.041	3040.87
Juli-2	0.023	3091317.08	2.385	2385.28
Agustus-1	0.022	2911901.08	2.247	2246.84
Agustus-2	0.028	3685245.91	2.844	2843.55
September-1	0.021	2796414.92	2.158	2157.73
September-2	0.035	4600886.20	3.550	3550.07
Oktober-1	0.030	3953338.79	3.050	3050.42
Oktober-2	0.035	4617089.61	3.563	3562.57
November-1	0.040	5305587.47	4.094	4093.82
November-2	0.040	5352598.42	4.130	4130.09
Desember-1	0.050	6583889.65	5.080	5080.16
Desember-2	0.070	9308420.33	7.182	7182.42
Average		**5,799,313.782**	**4.475**	**4,474.779**

Table 4.10.
Discharge demands of Cibendung weir.

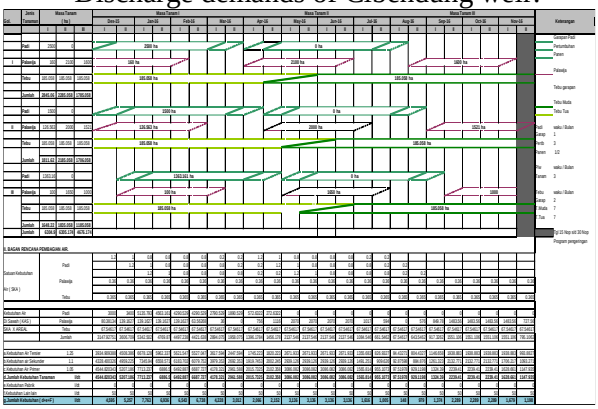
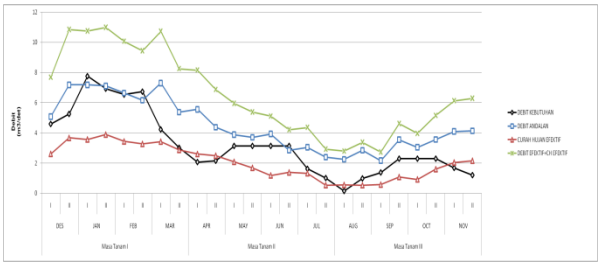


Table 4.11.
Resume of Effective Discharge , Effective Rainfall, Half Monthly Discharge Needs D.I. Jengkelok Cibendung Weir.

DATA		DEBIT NEED (m^3/det)	DEBIT EFEKTIF (m^3/det)	EFEKTIF RAINFALL (m^3/det)	DEBIT EFEKTIF + RF EFEKTIF (m^3/det)
DES	I	4.59	5.080	2.606	7.69
	II	5.26	7.182	3.664	10.85
JAN	I	7.76	7.186	3.564	10.75
	II	6.94	7.106	3.886	10.99
PEB	I	6.54	6.640	3.429	10.07
	II	6.74	6.161	3.269	9.43
MARET	I	4.23	7.306	3.420	10.73
	II	3.01	5.381	2.870	8.25
APRIL	I	2.07	5.562	2.598	8.16
	II	2.15	4.378	2.489	6.87
MEI	I	3.14	3.877	2.077	5.95
	II	3.14	3.700	1.681	5.38
JUNI	I	3.14	3.932	1.177	5.11
	II	3.14	2.840	1.376	4.22
JULI	I	1.62	3.041	1.321	4.36
	II	1.01	2.385	0.533	2.92
AGUST	I	0.15	2.247	0.549	2.80
	II	0.98	2.844	0.528	3.37
SEPT	I	1.37	2.158	0.569	2.73
	II	2.29	3.550	1.072	4.62
OKT	I	2.29	3.050	0.914	3.96
	II	2.29	3.563	1.591	5.15
NOP	I	1.68	4.094	2.037	6.13
	II	1.20	4.130	2.153	6.28

Figure 4.1.
Comparison Chart of Effective Discharge , Effective Rainfall, Half Monthly Discharge Needs D.I. Jengkelok Cibendung Weir.



From the results of the analysis of the ratio of demand discharge with available discharge plus effective rainfall in Irrigation Area Jengkelok Cibendung Weir fulfilled, but many unused discharge it is necessary to modify cropping pattern in order to maximize the potential of available discharge.

Table 4.12.
Modified Discharge demands of Cibendung Weir Cropping Pattern.

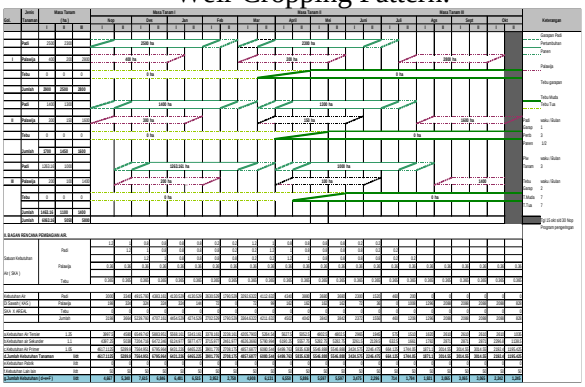
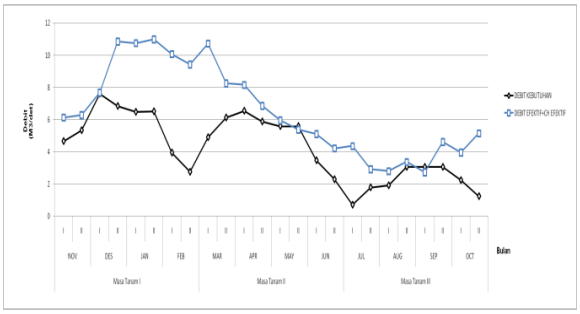


Table 4.13.
Modified Cropping Patterns Resume Between Effective Discharge, Effective Rainfall, Half Monthly Discharge demands D.I. Jengkelok Cibendung Weir.

DATA		DEBIT NEED (m^3/det)	DEBIT EFEKTIF + RF EFEKTIF (m^3/det)	GARDENING PRIOD
NOP	I	4.67	6.131	GARDENING PRIOD 1
	II	5.34	6.283	
DES	I	7.61	7.686	
	II	6.85	10.847	
JAN	I	6.48	10.750	
	II	6.52	10.993	
PEB	I	3.95	10.070	
	II	2.76	9.430	
MAR	I	4.91	10.726	GARDENING PRIOD 2
	II	6.13	8.251	
APRIL	I	6.55	8.160	
	II	5.89	6.867	
MEI	I	5.60	5.954	
	II	5.60	5.381	
JUNI	I	3.47	5.110	
	II	2.30	4.217	
JULI	I	0.71	4.362	GARDENING PRIOD 3
	II	1.79	2.918	
AGUST	I	1.92	2.796	
	II	3.06	3.372	
SEPT	I	3.06	2.727	
	II	3.06	4.622	
OKT	I	2.24	3.965	
	II	1.25	5.154	

Figure 4.2.
Chart of Additional Cropping Patterns Between Effective Discharge, Effective Rainfall, Half Monthly Discharge demands D.I. Jengkelok Cibendung Weir.



From the analysis result using Planting pattern Modification to the comparison of debit requirement with Effective discharge added effective rainfall in Irrigation Area of Jengkelok Cibendung Weir fulfilled, and the use of available discharge is more maximal by using cropping pattern using Padi-Padi-Palawija and the future of planting one on November.

F. ANALYSIS PLANTING PLAN AND REALIZATION OF PLANTING

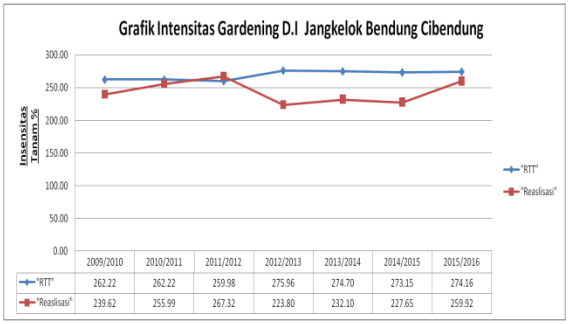
Table 4.14.
Planting Plans in Irrigation Area of Cibendung Weir

Season Gardening	Wide Areal	plan (Ha)																Averaged
	(Ha)	MT.I				MT.II				MT.III				sum			sum	Intensitas
		Padi	Tebu	Plw	jml	Padi	Tebu	Plw	jml	Padi	Tebu	Plw	jml	Padi	Tebu	Plw	Gardening	Gardening(%)
2009/2010	6328.75	5610.29	604.46	114.00	6328.75	0.00	604.46	5039.69	5644.15	0.00	604.46	4018.00	4622.46	5610.29	1813.38	9171.69	16595.36	262.22
2010/2011	6328.75	5610.29	604.46	114.00	6328.75	0.00	604.46	5039.69	5644.15	0.00	604.46	4018.00	4622.46	5610.29	1813.38	9171.69	16595.36	262.22
2011/2012	6328.75	5433.85	522.96	391.41	6348.22	0.00	522.96	5040.45	5563.41	0.00	522.96	4018.65	4541.61	5433.85	1568.88	9450.51	16453.24	259.98
2012/2013	6328.75	5433.85	522.96	391.41	6348.22	0.00	522.96	5806.61	6329.57	0.00	522.96	4263.91	4786.87	5433.85	1568.88	10461.93	17464.66	275.96
2013/2014	6328.75	5420.80	550.56	387.87	6359.23	0.00	550.56	5768.43	6318.99	0.00	550.56	4156.54	4707.10	5420.80	1651.68	10312.84	17385.32	274.70
2014/2015	6279.77	5348.83	539.48	391.46	6279.77	0.00	539.48	5680.29	6219.77	0.00	539.48	4114.00	4653.48	5348.83	1618.44	10185.75	17153.01	273.15
2015/2016	6305.35	5363.62	555.17	386.59	6305.38	0.00	555.17	5750.18	6305.35	0.00	555.17	4121.08	4676.26	5363.62	1665.52	10257.86	17286.99	274.16
Sum Averaged	6318.41	5460.22	557.15	310.96	6328.33	0.00	557.15	5446.48	6003.63	0.00	557.15	4101.45	4658.60	5460.22	1671.45	9858.90	16890.56	268.91

Table 4.15.
Realization of Planting in Cijangkelok Irrigation Area Cibendung Weir

Season Gardening	wide Areal	Realisasi (Ha)																Averaged
	(Ha)	MT.I				MT.II				MT.III				sum			sum	Intensitas
		Padi	Tebu	Plw	jml	Padi	Tebu	Plw	jml	Padi	Tebu	Plw	jml	Padi	Tebu	Plw	Gardening	Gardening(%)
2009/2010	6328.75	5022.00	598.00	472.00	6092.00	1073.00	598.00	3565.00	5236.00	0.00	600.00	3237.00	3837.00	6095.00	1796.00	7274.00	15165.00	239.62
2010/2011	6328.75	4800.00	523.00	379.00	5702.00	1690.00	523.00	3207.00	5420.00	0.00	523.00	4556.00	5079.00	6490.00	1569.00	8142.00	16201.00	255.99
2011/2012	6328.75	5372.00	512.00	406.00	6290.00	1688.00	512.00	3380.00	5580.00	0.00	512.00	4536.00	5048.00	7060.00	1536.00	8322.00	16918.00	267.32
2012/2013	6328.75	5271.00	570.00	449.00	6290.00	523.00	570.00	2164.00	3257.00	0.00	570.00	4047.00	4617.00	5794.00	1710.00	6660.00	14164.00	223.80
2013/2014	6328.75	5177.00	514.00	470.00	6161.00	1200.00	514.00	2155.00	3869.00	0.00	514.00	4145.00	4659.00	6377.00	1542.00	6770.00	14688.00	232.10
2014/2015	6279.77	5150.00	549.00	508.00	6207.00	1779.00	514.00	2098.00	4391.00	0.00	514.00	3184.00	3698.00	6929.00	1577.00	5790.00	14296.00	227.85
2015/2016	6305.35	5200.00	514.00	655.00	6369.00	2520.00	514.00	2168.00	5202.00	0.00	514.00	4304.00	4818.00	7720.00	1542.00	7127.00	16389.00	259.92
Sum Averaged	6318.41	5141.71	540.00	477.00	6158.71	1496.14	535.00	2676.71	4707.86	0.00	535.29	4001.29	4536.57	6637.86	1610.29	7155.00	15403.14	243.77

Figure 4.3.
Comparison Chart of Planting Plan With Planting Realization D.I. Jengkelok Cibendung Weir



From the above data it can be seen that the realization of planting last 7 (seven) years in Jengkelok Cibendung Weir Irrigation Area is less than the cropping patterns plan, but in the period of 2011/2012 there was an increase of the plan of 7.34% and the intensity of the realization of planting an average of 243 , 77% while planting plan average 268,91% thereby decreasing the productivity of this plant because planting can not be done as wide as existing area.

V. CONCLUSION AND RECOMMENDATION

A. CONCLUSION

Based on the results of the analysis and discussion, obtained some conclusions as follows:

1. The condition and function of buildings in Irrigation Area Jangkelok Cibendung weir is in good classification, with average percentage of good reaching 88.70% While the classification of broken with an average of 11.30%.
2. Conditions and functions of the channel in the Irrigation Area Jangkelok Cibendung weir is in good classification, with average percentage of both reached 91.79% While the classification of broken with an average of 8.21%.
3. Manpower in Irrigation Area Cibendung Weir only available 51 people, while the required is 67 people with the percentage of shortfall reaches 17.94% so that the service to channel condition is less fulfilled and impact on the condition of network less well-maintained or often damaged, it is

necessary The addition of manpower if the relevant agencies.

4. Cropping pattern in use in Irrigation Area Jangkelok Cibendung weir is Padi - Palawija - palawija.
5. From the results of the analysis of the ratio of demand discharge with available debit added effective rainfall in Irrigation Area Jengkelok Cibendung weir met, but many unused discharge this is necessary to modify the cropping pattern in order to maximize the potential of available discharge.
6. From the results of the analysis using Modified Cropping pattern of the ratio of debit demand to the debit Effective added effective rainfall in the Irrigation Area Jengkelok Bendung Cibendung fulfilled, and use of available debit more leverage by using the cropping pattern using Padi-Padi-Palawija and start the planting period One in November.
7. Seen from the potential of available discharge and rainfall in Cibendung Weir, cropping pattern can use Padi-Padi-Padi / Palawija but the use of land area will decrease.
8. The last 7 (seven) years irrigation arean Jengkelok Cibendung Weir Planting realization is less than Planting plan, but in the period of 2011/2012 there was an increase of 7.34% plan and the realization intensity of planting an average of 243,77% while the planting plan Averaging 268.91% thus reducing the productivity of this plant because planting can not be done as wide as the existing area.

B. RECOMMENDATION

Based on the results of the analysis and discussion, it is recommended that the following :

1. To collect data on the relevant Official either the debit data, rainfall, planting plan, the realization of planting, the condition of the building and the channel and the number of human resources should be stored in softcopy form in order to facilitate the search if it will need, also minimize the loss and destruction.
2. For irrigation water services at Jangkelok irrigation area Cibendung weir optimal (effectiveness and efficiency), should be strived for normalization (Improvement, Rehabilitation, Maintenance and Care) of irrigation networks (Channels and irrigation buildings) this should be done routinely to minimize the damage Which will occur both on buildings and irrigation channels.
3. For the implementation of Operation and Maintenance in Jangkelok Irrigation Area Cibendung dam in accordance with the guidance of operation and maintenance and governance of irrigation and irrigation water network arrangement effective and efficient (timely, appropriate space, precise guarantee and quality) then the quantity of Human Resources need In accordance with the needs and quality of Human Resources needs to be improved through strengthening institutions, education and technical training fields to irrigation.
4. It is necessary to socialize from related parties to the farmers about the planting system that will be applied every year so that the plant intensity reaches the maximum (300%), and the farmers know what pattern will be used.

BIBLIOGRAPHY

Anonym. 1991. *Petunjuk Penilaian Kondisi Jaringan Irigasi*. Direktorat Jendral Pengairan Departemen Pekerjaan Umum.

Anwar. 2011. "*Operasi & Pemeliharaan Irigasi*". PT Alfabeta.

Budhiono, R.M. 2011. "*Kajian Sistem Jaringan Irigasi Rentang pada Saluran Induk Utara Kabupaten Indramayu*". (Thesis) Universitas Swadaya Gunung Jati Cirebon.

Faridah, Ghita. 2016. *Analisis Kinerja Sistem Daerah Bendung Nambo Kabupaten*

Brebes. (Thesis) Universitas Swadaya Gunung Jati Cirebon.

Joni Alfian, Ade. 2010. *Evaluasi Operasidan Pemeliharaan Bendung Cangkuang Kecamatan Babakan Kabupaten Cirebon*. (Thesis) Universitas Swadaya Gunung Jati Cirebon.

Mangku negara, ap. 2000. *Evaluasi Kinerja SDM*. Jakarta.

Mawardi, E dan Memed M. 2002. *Desain Hidraulik Bendung Tetap*. Bandung: Alfabeta.

Murtiningrum. 2007. *Analisis Keseragaman Pemberian Air*.

Pedoman Penulisan Skripsi. Universitas Swadaya Gunung Jati. Cirebon. 2016.

Peraturan Menteri Pekerjaan Umum Nomor 32 /M/PRT/ Tahun 2007 tentang Operasi dan Pemeliharaan Jaringan Irigasi

Peraturan Menteri PU Permen PU.No.32 /PRT/M/2007, tentang Pedoman Operasi dan Pemeliharaan Jaringan Irigasi.

Purwanto. 2006. *Metodologi Penelitian Kuantitatif*. Jakarta: Gaung Persada Press.

Pusposutardji. 1985. *Dampak Lingkungan Terhadap Irigasi*.

Sidharta. 1997. *Irigasi dan Bangunan Air*.

Sudjarwadi. 1979. *Pengantar Teknik Irigasi*. Jakarta.

Sumaryanto cs. 2006. *Evaluas iOperasi dan Pemeliharaan Jaringan Irigasidan Upaya Perbaikannya*. Pusat Analisis Sosial Ekonomi dan Kebijakan Pertanian Badan Penelitian dan Pengembangan Pertanian Departemen Pertanian.

Suyono, Kensaku Takeda. 1976. *Hidrologi untuk Pengairan*. PT. Pradnya Paramita. Jakarta.

Syarif. 2002. *Analisis Dampak O & P pasa Objek Irigasi*. Jakarta.

Wahyudi. 1987. *Definisi Irigasi*. Institut Pertanian Bogor.

Witmore, John. 1997. Coaching for Performance. University of California.

Zalfa Khaerunissa, Darin. 2014. *Analisis Kinerja Sistem Daerah Bendung Ambit Kabupaten Cirebon*. (Thesis) Universitas Swadaya Gunung Jati Cirebon.

http://www.sarjanaku.com/2012pengertian-sistem-menurut_paraahli.html (Accessed on 1-03-2017)

http://pengertianbahasa.blogspot.com/2013/02/pengertian-analisis.html (Accessed on 1-03-2017)

http://www.anneahira.com/pengertian-analisis.html (Accessed on 4-03-2017)

https://id.wikipedia.org (Accessed on 5-03-2017)