THE WATER ILLEGAL ABSTRACTION ON THE IRRIGATION SCHEME AND ITS INFLUENCE TO CROPPING INTENSITY IN SOUTH SULAWESI, INDONESIA

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Abstract

Indonesia already self supporting rice in 1984 and 2009. For defending of food security government policy to construct weir, dam for supporting irrigation infrastructures. South Sulawesi as one of the rice producer province in outside of Java island. South Sulawesi province government is very intent to develop and rehabilitate of the irrigation infrastructures for supporting National Rice Food Security. One of the reason of the reducing efficiency of irrigation is the existence of illegal abstraction on the Irrigation canal, because the water which taken illegally by the farmer from the main/secondary canal can't be measured and the remains is directly discarded to the drainage canal or to the river, so this irrigation area on the downstream side will have water shortage.

The study which is conducted in four (4) Irrigation Areas in South Sulawesi Province, such as Kelara Karalloe Irrigation Area , Tabo-Tabo Irrigation Area , Sadang Irrigation Area and Lamasi Kiri Irrigation Area, which had been operated for more than 20 years showed that the cropping intensity which achieved in the average of the last 3-5 years for each irrigation area is ranged between 115% - 160%.

Problem Formulation; 1) what reason occurring of the illegal water abstraction, 2 what is the effort for preventing of the illegal water abstraction, 3) what is the impact to the cropping intensity. Objective of Study; 1) to kow the causes of the water illegal abstraction, 2) to know how to prevent the water illegal abstraction, 3) to know how far the influence of the illegal water abstraction to cropping intensity.

In this study, data collecting of illegal water abstraction, irrigation efficiency and cropping intensity in Kelara Karaloe Irrigation Area (I/A), Tabo-Tabo Irrigation Area, Sadang Irrigation Area and Lamasi Kiri Irrigation Area. The method which is used to determine the existence of illegal abstraction and the prevention efforts is by conduct the field observation and meetings and also discussions with the site officer of O&M , the farmers (WUA) and also the related parties in the location of illegal abstraction. This method is used to determine the amount of cropping intensity in the last few years before the rehabilitation by collecting the secondary data from the related departments such as the Department of Agriculture and Department of Public Works/Irrigation and after the rehabilitation by collecting data fromWUA.

The water illegal abstraction occurred due to lack of accuracy of design, the awareness of farmers and social problem. To prevent of illegal water abstraction are by increasing *awareness of farmers; redesign improperly site of structure trough the farmer participation,* decreasing of the cropping intensity indicated the differences before and after closing the water illegal abstraction the cropping intensity for Kelara Karalloe I/A is about 30%, Tabo-Tabo I/A is about 33%, Sadang I/A 40%, and Lamasi Kiri I/A 43%.

Key word : The Water Illegal Abstraction and Cropping Intensity

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1. Introduction

Background

Indonesia already self supporting rice in 2004 and 2009 . For defending of food security government policy to construct weir, dam for supporting irrigation infrastructures. South Sulawesi as one of the rice producer province in outside of Java Island.

South Sulawesi province government is very intend to develop and rehabilitate of the irrigation infrastructures for supporting National Rice Food Security. For achievement operation of irrigation should be provided are human resources, condition of irrigation schemes (physic), budget, manual of operation and maintenance, adherence of farmer as user of water irrigation (water User Association/WUA) to operation manual, organization.

The implementation on irrigation operation had been occurred of weak law enforcement, farmer abstracts the water not through the irrigation scheme, but by other infrastructure like as plastic hose, making hole across to the dike of canal. This case has influenced to the down irrigation scheme harvesting, its means in upper of irrigation scheme more water but in the down of irrigation scheme is scarce of water. Next, impact to the cropping intensity and will be decrease. This case will have impact to the rice production.

In accordance with the study of water management which is conducted in four (4) Irrigation Areas in South Sulawesi Province (appendix. 1 and 2), such as Kelara Karalloe Irrigation Area (7004 ha), Tabo-Tabo Irrigation Area (6,810 ha), Sadang Irrigation Area (55,000 ha) and Lamasi Kiri Irrigation Area (4,332 ha), which had been operated for more than 20 years showed that the cropping intensity which achieved in the average of the last 3-5 years for each irrigation area is ranged between 115% - 160%.

The illegal abstraction or the illegal offtake on the farmers language (local terms) in some irrigation areas is known as *"balombong"* is very difficult to be solved by the officer O & ML in the field. Why the illegal abstraction become one of the reasons of the decreasing on cropping intensity or the lack of water condition in the downstream site, it is because water which taken from the illegal abstraction can't be controlled and tend to be exaggerated.

Problem Formulation

1. What reason occurring of the illegal water abstraction;
2. What efforts for preventing of illegal water abstraction;
3. What is the impact to the cropping intensity

Objective of Study

1. To know the causes of the water illegal abstraction
2. To know how to prevent the water illegal abstraction
3. To know how far the influence of the illegal water abstraction to cropping intensity

2. Material and Methodology

Material

In this study, data collecting of illegal water abstraction, irrigation efficiency and cropping intensity in Kelara Karaloe Irrigation Area, Tabo-Tabo Irrigation Area, Sadang Irrigation Area and Lamasi Kiri Irrigation Area.

Methodology

The method which is used to determine the existence of illegal abstraction and the prevention efforts is by conduct *the field observation and meetings* and also *discussions*

with the site officer O & M (Irrigation skill worker), the farmers and P3A and also the related parties in the location of illegal abstraction.

The Implementation of Activity

The Implementation of activity which is conducted in the four irrigation areas (I/A) is done in the different times such as below:

	Kelara Karalloe I/A	DI Tabo Tabo I/A	DI Sadang	DI Lamasi Kiri
Collecting data and discussion	Sep 98 – Mar 99	Oct 00 – Agt 01	Jul 00 – Oct 00	Agt 03 – Des 03
The Implementation of rehabilitation	Agt 99 – Agt 01	May 05 – Mei 07	Mei 05 – Mei 07	Dec 05 – Des 07
Monitoring of post construction	2001 - 2005	Not yet	Not yet	Not yet

To determine the location and condition of illegal abstraction in each canal and structure, it is needed to carry out the investigation to the entire of irrigation canal. Data which obtained were confirmed and discussed with the officer of O&M and WUA. Collecting data of extensive plants/harvest is obtained from the related parties while as the plants data/harvest after construction/rehabilitation can be obtained from FWUA/Consultant.

3. Results and Discussion

The Cause of Illegal Abstraction and The Prevention Efforts

In accordance with the inventory result and the investigation of canal and structure on the several irrigation areas which study are conducted, has been identified for example, are as follows:

a). **The Location of Offtake Structure which is inappropriate**

On the planning stage, the location of offtake structure is inappropriate with the site conditions and the lack of discussion between the local government and the farmers. When the canal is operated the farmers did not get water from its structure and the structure in the upstream side causing the water illegal abstraction on the main/secondary canal. Examples of these cases can be seen on the offtake structure *BB.3 of Secondary Canal Bulo-Bulo, Kelara Karalloe Irrigation Area*. For the prevention efforts is conducted the site investigation and discussion among the farmers and the entire related parties by considering the technical aspect so the offtake structure BB.3 was *moved upward ± 200 m.*

b). **Base Elevation of Offtake Structure is too high**

This is usually occur on the offtake structure which taken water from the main canal and irrigation areas which irrigated and located on the lower elevation from the base of main canal. The examples of this case is that on the some offtake structure on the Main Canal Kelara, Kelara Karalloe I/A. Base elevation of offtake gate are designed accordance with the water level in the discharge condition 70% so that when the discharge which available during the dry season is lower (± 25% Q_n), water can not irrigated through the offtake gate. That is why, the farmers destroy the part of the structure under the offtake structure in order that the water can flows into their areas, such can be seen on figure.1.

The prevention efforts are by rehabilitated this structure and the elevation of the base gate is placed at 0.10 m above the floor of the base canal, such on figure.2 .

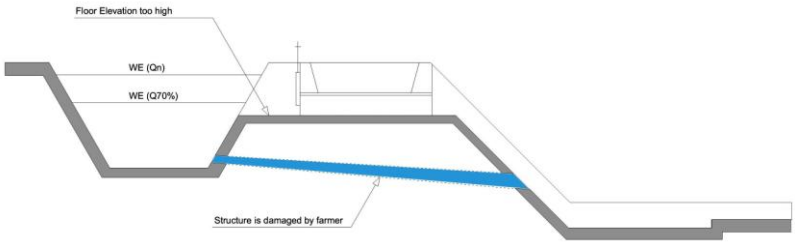

Fig. 1 Base floor of off take structure to high so when occurred small discharge, the water can't Enter, will Affect to Illegal Abstraction by Farmer with Damage of Structure

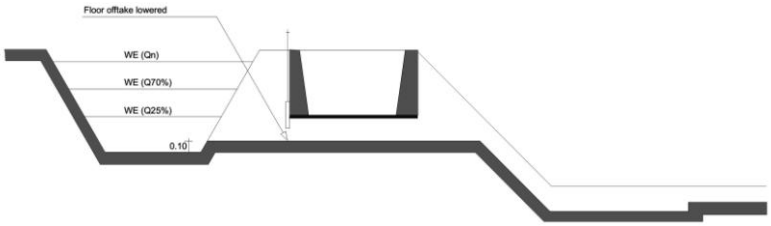

Fig. 2 Base floor of off take structure is lowered when to be 0.10 m above base floor of main canal, so when occurred small discharge, water still enter to offtake structure, so farmer not anymore illegal abstract water

c). **Tertiary Block which is Too Large Area**

In several irrigation areas, there is always a tertiary block which has an area >100 ha. According with the result of study in 4 irrigation areas so the irrigation areas which is served by the tertiary block which area >100 ha are such follows:

- Kelara Karalloe I/A, there are 12 tertiary blocks with area 1,206 ha
- Tabo-Tabo I/A, there are 14 tertiary blocks with area 1,786 ha
- Sadang I/A, there is no tertiary blocks with area >100 ha
- Lamasi Kiri I/A, there are 23 tertiary blocks with area 2,618 ha

In accordance with the site inventory, all tertiary block with area >100 ha and located beside/parallel with the main or secondary canal, so the areas in the downstream side get water from some illegal abstraction, such on figure.3. This occurs because more amount of water losses at the long tertiary/quartery canal.

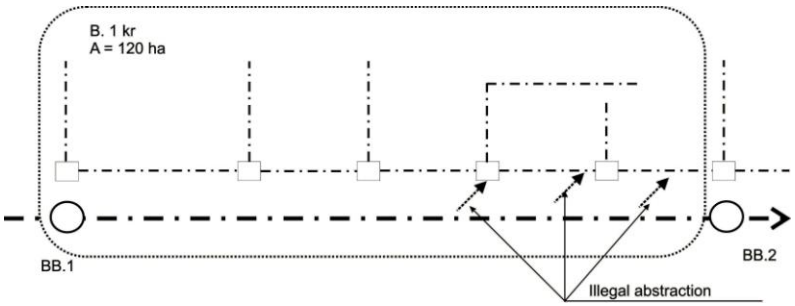

Fig. 3 Tertiary block B.1kr too large and tertiary canal parallel with secondary canal which too long, so water can't achieve down portion and farmer take illegal abstract water

The effort to prevent this problem is through the discussion to determine the water illegal abstraction which should be closed. Beside that, it also to determined the water illegal abstraction which authorized become the offtake structure, so the existing tertiary portion is divided into several tertiary portion according to the agreement by considering the technical aspect, such on figure. 4 .

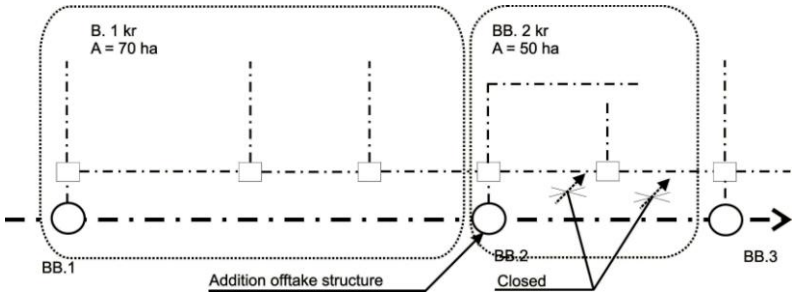

Fig. 4 Tertiary block B.1kr is fragmented to be two tertiary blocks and add new offtake structure which its location already have discussed with farmer and interrelated parties

d). **Lay-out which is not appropriate with the Topography Condition**

This usually occurs on the large irrigation areas with a flat site condition. If the topography measurement are not accurate, it will be occurs the failure in the location of canal and structure which planned only according to the contour whereas the site condition are different. The examples of this case is happen on *Sadang irrigation area* are the areas based on the layout map which should get water from the New Secondary Canal, but because *the areas is higher than water in the New secondary canal*, so the farmers do the water illegal abstraction from the *Secondary Canal of Carawali* which resulted that the irrigation areas in the downstream side of illegal abstraction had experienced the lack of water and always cause a strife in several years, such on figure. 5.

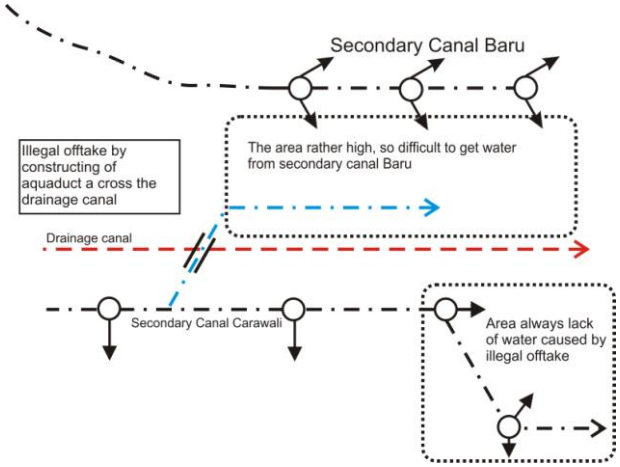

Fig. 5 By existing the water illegal abstraction to area of secondary canal Baru, area down portion of secondary canal Cakrawali is shortage of water and the farmer can't plant

The prevention efforts are by conducted the identification and discussion with farmers and the entire related parties. This is resulted that the illegal abstraction is legitimated become the offtake strcture and to anticipate the water shortage on Carawali, then it is
built the small weir on the dump canal irrigated to the secondary canal of Carawali in the downstream side of this illegal abstraction area, such on figure. 6.

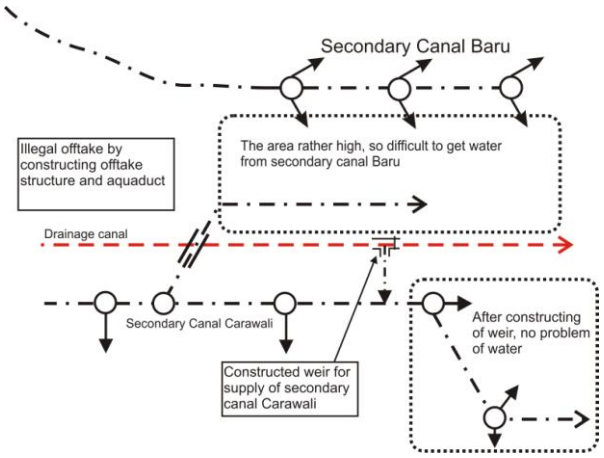

Fig. 6 Through the discussion with farmer/WUA and interrelated parties, the water abstraction is formal ceremonied and area down portion of secondary canal Cakrawali is constructed a new weir on drainage canal

e). Main Canal on the Embankment Areas

Ideally, the main/secondary canal is not located on the high embankment areas because this will cause the high of water looses, the lowering of canal body because of settlement and also it is prone to the existence of illegal abstraction. However, there are still main/secondary canal which built on the high embankment areas with several reasons and considerations. For example, in this case is in main canal of Tabo-Tabo, although the offtake structures are existing but due to the quarterly canal is not treated as well, and the farmers want immediately get a much of water so they do the illegal abstraction by using the plastic hose with induction siphon system, such can be seen on the sketch of figure. 7 and photographs in figure-8.

The prevention efforts in by conducted a discussion with farmers and related parties in order to discharge the hose of illegal abstraction and to add in the offtake structure according to the agreement, such on Figure.7.

Fig. 7 Water illegal abstraction by plastic hose

Illegal abstraction by plastic hose is demolished and constructed new offtake based on the discussion result with farmer/WUA

Fig. 8 Photos of water illegal abstraction by using plastic hose on main canal Tabo-Tabo

f). The Tertiary Canal is not function optimally

In accordance with the inventory result in 4 Irrigation Areas (I/A) where the study are conducted, had been identified that one of the reason of the existence of illegal abstraction is that because the tertiary canal can't be function optimally because many problems, among

them is the location of tertiary/tertiary canal and box tertiary/quartery which is not appropriate with the farmers' requirements (on the design/construction, farmers are less involved in). In addition, it because the condition of tertiary canal which had been long operated and began to damaged whereas the farmers are not be able to fixed it. As a result, the farmers in the downstream side of tertiary block can directly take the water from the main/secondary canal (illegal).
In order to prevent this problem is conducted the formation and utilization of WUA/FWUA and also socialization about Law No. 7 about Water Resources with the emphasis that operation and maintenance of tertiary canal become the responsibility of farmers/WUA.

g). **The Implementation of Water Distribution is Unclearly**

Based on the survey result at the study, there are only 2 from 4 of Irrigation Areas that have a Manual Book O & M that is *Sadang I/A and Lamasi Kiri I/A*, whereas the other areas does not have this Manual Book. This is bring a difficulties in water distribution when the availability of water is limited, for example is Kelara Karalloe (I/A), it does not have the Manual Book of O & M so that the distribution of water during the dry season is being unclearly, and the worst condition is that because the policy of water distribution are very influenced by some leaders in these areas, so there is no good rotation system. This is cause other farmers trying to take the water by illegal abstraction. The effort in order to prevent this problem is that by preparing the Manual Book of O & M and the utilization of WUA/FWUA.

h). **The Farmers is Not Discipline and Have No Attention to the Requirements of other Farmers**

One of the reason of the existence of illegal abstraction is that because farmers have no discipline in obey the crop pattern which had been determined by the Committee of Irrigation. In the Kelara Karalloe I/A and Tabo-Tabo I/A, the availability of water during the dry season is very limited so in the Regulation of the Committee of Irrigation decided that the main crop is palawija. But in the reality, there are some farmers in the upstream side still plant rice. In order to get enough water, the farmers directly taken the water from the main/secondary canal such as on figure. 9. The efforts to prevent this problem is by utilization of WUA/FWUA and doing the comparative study to other developed areas, such as on figure. 10.

Fig. 9 Photo of water illegal abstraction from secondary canal Bulo-Bulo, Kelara Karalloe I/A

Fig. 10 Photo of comparative study by FWUA/WUA Kelara Karalloe I/A in Banaran village, Nganjuk Regency, East Java

i). **The Implementation of Sanctions is not Distinct**

Although there have been many water illegal abstractions in several irrigation areas but it seems that it left by the Officer of O&M or by other farmers, but there are no a distinction sanction to prevent the water illegal abstraction. According with the inventory result during the studies in 4 Irrigation Areas, have not found yet some actions/sanctions which can be applied to prevent the illegal abstraction, although in several Irrigation Areas had been established such WUA and FWUA such as in Sadang I/A and DI Lamasi Kiri I/A. To prevent this problem, it is needed to apply a distinction sanctions according to the local cultures.

3.2 **The Influences of Illegal Abstraction to the Cropping Intensity**

Based on the result of studies in the four Irrigation Areas showed that the amount average of cropping intensity during the last few years before the rehabilitation work is such as follows:

Name of Irrigation Areas (I/A)	Area (ha)	Design based on the studies		Realization (period 3-5 years)		Remarks
		Cropping pattern	Cropping Intensity (%)	Crop pattern	Cropping Intensity(%)	
Kelara Karalloe	7,004	Paddy - Paddy/Plwj	200	Paddy - Paddy/Plwj	115	The 2nd crop less water
Tabo-Tabo	6,810	Paddy - Paddy/Plwj	200	Paddy - Paddy/Plwj	127	The 2nd crop less water
Sadang	54,674	Paddy - Paddy	200	Paddy – Paddy	160	Enough water
Lamasi Kiri	4,205	Paddy - Paddy	200	Paddy - Paddy	157	Enough water

From the above data showed that the realization of cropping intensity on the four Irrigation Areas where is studies are conducted is smaller than the design of cropping intensity about 200% at the design stage (total irrigation efficiency 65% for the rice and 55% for palawija) The simple analysis about the influence of illegal abstraction to the amount of cropping intensity can be explained such below:

a). **Kelara Karalloe Irrigation Area**

The cropping intensity during the last five years (1995 - 2000) at the Kelara Karalloe I/A with a large area 7004 ha and the average about 115% is very far different if it is compared with the design cropping intensity about 200%. If the cropping pattern is paddy-paddy/palawija, it can be reached about 160%. From the above analysis, it showed that there is an influence of illegal abstraction to the *decreasing of cropping intensity 30% in Kelara Karalloe I/A.*

After the rehabilitation is done with the activity such an excavation of sediment in the main canal and the prevention of illegal abstraction so the cropping intensity which can be reached is range about 145% (2000-2005). There is an increasing in the cropping intensity (1^{st} + 2^{nd}) about 30%, whereas the increasing of cropping intensity during the dry season (2^{nd} crop) is amount 18%, can be shown on appendix. 3.

From the above analysis, it showed that there is an influence of illegal abstraction to the decreasing of cropping intensity in the Kelara Karalloe. I/A

b). **Tabo-Tabo Irrigation area**

According to the last five years data (1996 – 2001), the amount of cropping intensity in the Tabo-Tabo I/A with area 6,810 ha is 127%, is very far if it compared with the amount of cropping intensity which is designed about 200%. This is because the farmers in the upstream side during the dry season still cropping rice by directly taken water from the main canal of Tabo-Tabo through the plastic hopes. If the cropping pattern is paddy-paddy/plwj, it can be reached about 150%. From the above analysis, it showed that there is an influence of illegal abstraction to the *decreasing of cropping intensity 33% in the Tabo-Tabo I/A.*

c). **Sadang Irrigation area**

Sadang I/A with a total area of rice fields is 54,674 ha have an average of cropping intensity about 160%, with a details: in the upstream side about 19,318 ha with cropping intensity 200%, in the middle area about 23,380 ha with cropping intensity 150%, in the downstream side is about 8,130 ha with cropping intensity 100% and in the Belawa Wajo area about 2,147 ha with cropping intensity 150%, whereas in the downstream side which experienced the water shortage because there is an excessive illegal abstraction in the upstream side is just reached the cropping intensity 100%. In addition, there is an area in the downstream side with area ± 5,000 ha which have a switch functions into a fishpond because it never get irrigation during the last few years. From the above analysis, it showed that there is an influence of illegal abstraction to the *decreasing of cropping intensity in the Sadang irrigation area about 40%.*

d). **Lamasi Kiri Irrigation Area**

DI Lamasi Kiri with area 4,205 ha have an average of cropping intensity in three years (2000 – 2003) is amount 157%, with the details on 1st crop is amount 90% and 2nd is amount 67%. The cropping intensity in the areas of the upstream side can be reached until 200 %, in the middle area can be reached until 170% and in the downstream side is less than 100%. This is happen because during the rainy season, there are several areas which is *flooded* by the waters because of the *collapse of the embankments*, so that the cropping intensity is <100%, and during the dry season, the downstream side did not get the irrigation water so that the cropping intensity is only 67%. . From the above analysis, it shown that *there is an influence of illegal abstraction* to the decreasing of cropping intensity in Lamasi Kiri I/A *during the dry season about 33%*.

3.3 The Influences of Illegal Abstraction to the Social Problem

In accordance with an inventory result and analysis in the four Irrigation Areas where the studies are conducted, it can be known that some social problems are occurred because the existence of illegal abstraction such as follows:

- The water conflict which causes a physical struggle.
- The social tendencies because the farmers in the upstream side has a higher income than the farmers in the downstream side.
- The Institutional of farmers (WUA) in the downstream side is not active because there is no water which should be managed. According to the monitoring result in the Kelara Karalloe I/Aafter the rehabilitation with the prevention of illegal abstraction so that this problem above will not happen again and the institutional of the farmers will be actively.

4. Conclusion

- *The water illegal abstraction is caused by*: a) the location of offtake structure which is inappropriate, b) base elevation of offtake structure is too high, c) main canal on embankment area, d) the teriary canal isn't function optimally, e) the implementation of water distribution is unclearly, f) the farmer not discipline and not attention to requirement of other farmer.
- *To prevent of the water illegal abstraction* : a) offtake structure BB.3 move upward 200m on secondary canal Kelara Karaloe, b) to rehabilitate structure and elevation on base gate above the floor of base canal on main canal Kelara Karalloe, c) the existing tertiary block divided into several tertiary blocks in 3 (three) irrigation areas, d) to add off take structure based on the agreement in main canal Tabo-Tabo irrigation area, e) establishment of WUA and socialization about Law No.7, 2004 regarding on Water Resources, f) to prepare)&M manual and utilization of WUA/FWUA in Tabo-Tabo and Kelara Karaloe irrigation area, g) utilization of WUA and comparative study for Tabo-Tabo and Kelara Karaloe, g) to apply a distinction sanction according to the local cultures in Sadang and Lamasi Kiri irrigation Area.
- The *influence of illegal abstraction to the cropping intensity*: for Kelara Karalloe I/A 30%, Tabo-Tabo I/A 33%, Sadang I/A 40% and Lamasi Kiri I/A 43%.

5. Summary

The water illegal abstraction in irrigation canal is caused by of lack accuracy of design and the awareness of farmers and social problem . To improve lack of accuracy of design by farmer participatory and low awareness of farmer by socialization and comparative study to other area which more developed. The water illegal abstraction to influence the decreasing of the cropping intensity to design for Kelara Karalloe I/A 30%, Tabo-Tabo I/A 33%, Sadang I/A 40% and Lamasi Kiri I/A 43%.

6. Acknowledgements

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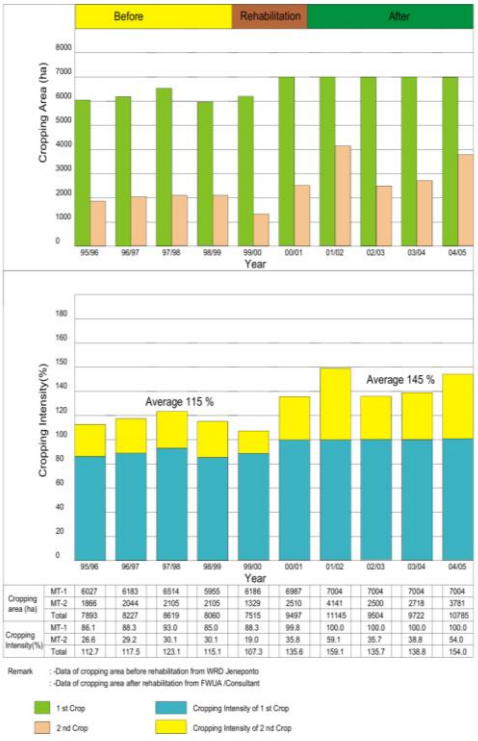
Appendix

Appendix. 1 Map of Indonesia State

Appendix. 2 Map of Study Location



Appendix. 3 Graphic of cropping area and cropping intensity in Kelara Karalloe I/A (7,004 ha)