

# Economic Value of Irrigated Water in Gunung Mas Regency of Central Kalimantan

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## ABSTRACT

Currently farmers in Gunung Mas regency, Central Kalimantan, have not paid irrigation fees. This condition makes farmers less appreciative of the existence of water resources. This begins with the farmer's mindset that water is a public good with abundant availability. Farmers will feel the importance of water resources in the dry season because the supply of irrigation water is decreasing. The scarcity of water for the agricultural sector makes it important to assess the value of irrigation water in the economic sector. Water scarcity can significantly reduce farmers' income due to decreased rice production. Therefore, the role of irrigation to increase rice production in the area needs to be supported by irrigation water management that seeks to maximize its economic value.

**KEYWORDS:** economic value, irrigated water, rice production, management

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## 1. INTRODUCTION

Water is the source of life for living things that have social, economic and environmental functions. Law Number 7 of 2004 concerning Water Resources [1] in article 1 point 7 states that water resources management is an effort to plan, implement, monitor and evaluate the administration of water resources, the utilization of water resources and control of damaged resources. The largest use of water is in the agricultural sector among other sectors in Indonesia. More than 80% of water utilization in Indonesia is used to support agricultural cultivation. Therefore, irrigation as one of the supporting components for the success of agricultural development has a very important role, so it can be said that the role of the agricultural sector is very strategic in the national economy so that agricultural activities cannot be separated from water [2]. Based on the law, article 29 paragraph 2 explains that water resources are determined to meet basic needs, environmental sanitation, agriculture, energy, industry, mining, transportation, forestry, and biodiversity, sports, recreation and tourism, ecosystems, aesthetics, and needs. other stipulated in accordance with statutory regulations. It is also explained in Article 29 paragraph 3 that the provision of water to meet basic daily needs and irrigation for smallholder agriculture in the existing irrigation system is the main priority for the provision of water resources above all needs [3]. Law No.7 of 2004 concerning Water Resources provides an explanation regarding financing in article 78 paragraph (1) that the financing and implementation of construction, operation, maintenance of primary and secondary irrigation systems are the responsibility of the government and local governments in accordance with their authority and can involve participation Public. Law No. 7 of 2004 Article 78 Paragraph (3) provides an explanation that the financing of operation and maintenance of the tertiary irrigation system is the responsibility of farmers and can be assisted by the government and / or local governments. Based on this regulation, farmers should have played a role in repairing damaged tertiary irrigation channels. In fact, the damaged irrigation network has not been repaired by farmers, causing sedimentation and in the long run, the tertiary irrigation network becomes permanently damaged [3].

Government Regulation (PP) Number 20 of 2006 concerning Irrigation [4] Article 74 paragraph 1 states that financing the development of primary and secondary irrigation networks is the responsibility of the government, provincial governments, or district / city governments in accordance with their respective authorities. The law is continued in the same article, paragraph 2, which states that financing the development of tertiary irrigation networks is the responsibility of the Water User Farmers Association (P3A) (Kristina Situmorang, 2014). Based on the Regulation of the Minister of Public Works and Public Housing (PUPR) No.30 of 2015 [5], Article 1 paragraph 3 states that irrigation is an effort to provide, regulate and discharge irrigation water to support agriculture, which types include surface irrigation, swamp irrigation, underground water irrigation. , pump

irrigation, and pond irrigation. Irrigation has several main functions, namely improving water supply for rice fields and regulating the wetting of rice fields. Land unity that gets water from an irrigation network is called an irrigation area [6].

The primary and secondary canals in the Sekata Juri Irrigation Area are the responsibility of the district government to finance its development and maintenance in accordance with Law No. 7 of 2004 [1] and Government Regulation (PP) No. 20 of 2006 [5], while financing the operation and maintenance of tertiary channels is the responsibility of the farmers. In addition, the limited funds provided by the government for the management and maintenance of irrigation networks, it is necessary to transfer the division of authority and responsibility in the management of irrigation networks.

The economic value of irrigation water is reflected in the role of irrigation water in supporting increased rice production. The economic value of irrigation water in Gunung Mas Regency is estimated with the aim of knowing the contribution of irrigation water in lowland rice farming, so that water resources will be more respected and water utilization can be carried out efficiently. The economic value of irrigation water can be used as a basis for determining irrigation water fees. Determination of fees for irrigation water is needed in determining effective policies to increase the efficiency of irrigation water use as well as to repair damaged tertiary irrigation networks. This study also estimates the value of farmers' Willingness to Pay (WTP) to pay for tertiary irrigation networks. The amount of farmers' WTP on improving the tertiary irrigation network is certainly influenced by several important factors [7]. This research also examines the factors that influence the willingness or unwillingness of the farming community to participate in paying irrigation management fees. The economic value of irrigation water and the amount of WTP of farmer respondents can be used as a basis for determining irrigation water fees. Determination of fees for irrigation water is needed in determining effective policies to increase the efficiency of irrigation water use, especially for repairing tertiary irrigation networks which are currently experiencing damage.

## 2. IRRIGATED WATER

### Definition

Definition According to the 1945 Constitution of the Republic of Indonesia, article 5 paragraph 2 Irrigation has an important role for the nation and the State of the Republic of Indonesia, according to the internal mandate. Strengthened by the Law of the Republic of Indonesia Number 7 of 2004 concerning Water Resources. Furthermore, Government Regulation number 20 of 2006 [8] clarifies irrigation, among others [9]:

1. Water is all water found on, above, or below the ground surface, including in this definition surface water, ground water, rainwater, and sea water on land.
2. Water source is a place or container of natural water and artificial tau found above or below the ground surface
3. Irrigation is the business of providing, regulating and discharging irrigation water to support agriculture, the types of which are surface irrigation, swamps, underground water, pumps and ponds.

Based on Law No.7 / 2004 concerning Water Resources [1] Article 41 paragraph (1) contains the definition of irrigation is the business of providing, regulating and disposing of water to support agriculture, which types include surface irrigation, swamp irrigation, underground water irrigation, pump irrigation, and irrigation. pond. Irrigation network is a single unit of channels and structures required for the regulation of irrigation water, starting from the provision, extraction, distribution, distribution and use of it [10].

### System

Irrigation systems in Indonesia generally depend on the way river water is taken and intended to irrigate rice fields can be divided into rural and government irrigation based on their management. The village irrigation system is communal and does not receive assistance from the government, and its construction and management are carried out by the community. Meanwhile, government irrigation development and management requires assistance from the government which is divided into three categories:

1. Technical Irrigation, irrigation networks that receive separate water supply from the discharge network, and their water supply can be measured, regulated, and controlled at certain points, and all buildings are permanent in nature.
2. Semi-technical irrigation, the flow to the rice fields can be arranged, but the amount of flow cannot be measured, and has few permanent structures.
3. Simple Irrigation, usually receiving assistance from the government for construction or improvement. However, it is managed and operated by the village community. Has a semi-permanent building, and does not have measuring and flow control devices, so that the flow cannot be regulated and measured [11].

The irrigation network is divided into main network and tertiary network. The main network includes buildings, primary channels and secondary channels. While the tertiary network consists of buildings and channels that are in a tertiary plot. An area unit that gets water from an irrigation network is called an irrigation area.

### 3. ECONOMIC VALUE

#### Understanding

Water resources, which are often considered a common property, mean that any extraction of water that is carried out will not affect the stock of water resources, so that the depletion of water resources is assessed without a price (zero price). The use of unregulated water resources causes the extraction to be even greater, so that water availability decreases and causes higher costs [12].

According to Fauzi [12], natural resources such as water, air, land, oil, fish, forests, etc. are essential resources for human survival. Good natural resource management will improve the welfare of mankind and conversely, bad natural resource management will have a bad impact on mankind, so that resources can be defined as something that is considered to have economic value. Another definition also states that resources are also related to two aspects, namely the technical aspects that allow how the resources are used and the institutional aspects that determine who controls the resources and how the technology is used.

In general, economic value is defined as the measurement of the maximum amount a person wants to sacrifice for goods and services to obtain other goods and services. Formally, this concept is called Willingness to Pay, which is the willingness to pay someone for goods and services produced by natural resources and the environment [12].

#### Willingness to Pay Concept

Willingness to Pay (WTP) or willingness to pay is an individual's willingness to pay for an environmental condition or an assessment of natural resources and natural services in order to improve environmental quality. WTP calculates the ability of each individual or society in the aggregate to pay or spend money in order to improve environmental conditions to suit the desired conditions. WTP is the potential use value of natural resources and environmental services [13].

Water for irrigation must be collected and transported from the point of source of natural water flow to the user, namely farmers [14]. Water used for irrigation purposes has a non-market value. The non-market value of water can measure the net profit (change in welfare) related to some changes that occur in the presence of water resources, in this case related to the contribution of water in the agricultural sector. There are several concepts in determining the value of irrigation water and to choose the right concept, it is necessary to clarify the attributes and decisions in the questions posed. As with any commodity economy, users' willingness to pay for water depends on place, shape and time of day. A value at the location refers to the value at the receiving point. The value at the source water refers to the value in the natural hydrology of the system, at the source point.

#### Management Fee

Limited funds provided by the government for irrigation network management encourage farmer participation in irrigation management, so it is necessary to transfer the division of authority and responsibility in irrigation management [10].

Irrigation water management fee is an effort to solve a problem related to operation and maintenance that is submitted to farmers using water for services and services received. Farmers are trained to be able to finance the operation and maintenance (O&M) of irrigation in tertiary plots independently through the Water User Farmer Association. Therefore, for irrigation areas that are developed by the government and have good irrigation performance, Irrigation Water Management Fees are imposed [15].

With the existence of well-managed irrigation fees, the burden on Regional Government in O&M activities of irrigation networks is reduced and a good condition of the irrigation network will be realized so that it can provide high performance. Therefore, in the end irrigation management fees became the main source of funds for financing the O&M of irrigation networks.

#### Water User Farmer Association

According to Government Regulation Number 77 of 2001 [16], a water user farmer association is an irrigation management institution that becomes a forum for farmers using water in an irrigation service that is democratically established by farmers, including local institutions managing irrigation water. In Permentan number 79 of 2012 concerning Guidelines for Guidance and Empowerment of Water User Farmer Associations [17], it is explained that the Water User Farmer Association (P3A) is an institution grown by farmers who benefit directly

from water management in irrigation networks, reservoirs or trench dams, and ground water. The members of P3A are farmers who use water as a means of irrigating rice fields.

Ministerial Regulation No.30 of 2015 [18], Article 4 paragraph (2) states that the development and management of irrigation systems carried out in irrigation areas is carried out in a participatory, integrated, environmental-friendly, transparent, accountable and just manner by prioritizing the interests and participation of the farming community. In paragraph (4) it is further explained that community participation is carried out to increase a sense of belonging, a sense of responsibility, and increase the community's capacity in the context of realizing efficiency, effectiveness and sustainability of the irrigation system. Water user farmer association (P3A) is an irrigation management institution that becomes a forum for farmers using water in a service area or tertiary or village plot, which is democratically formed by water user farmers, including local irrigation management institutions [6]. As a consideration for water resources management, several results of previous studies were also reviewed, which have an important influence in the research area [19-22].

The active role of P3A is one of the key factors in the successful use of irrigation water. Because this active role will increase the effectiveness and efficiency of optimum water use, so as to produce optimal production. The existence of P3A can better guarantee the distribution, provision and utilization of irrigation water to its members [23].

The P3A was formed with the aim of optimizing the use of water management and irrigation networks in tertiary plots, pump irrigation or rural irrigation, the area of which is equal to tertiary plots for the purpose of improving the welfare of farmers using water as members of P3A. P3A's duties are [23]:

(1) Managing water and irrigation networks in a tertiary plot or irrigation area so that irrigation water can be exploited by its members in an effective and effective manner in meeting water needs for agriculture by taking into account the elements of equal distribution among farmers,

(2) Establishing and maintaining a tertiary network or irrigation network so that its function can be maintained,

(3) Determine and regulate contributions from its members to finance the operation and maintenance of the tertiary network and efforts to develop the association as an organization.

(4) Guiding and supervising its members to comply with all regulations relating to the distribution of water issued by the Central and Regional Governments,

(5) Receiving assets from the Government in the form of small irrigation networks or pump irrigation networks to be managed responsibly.

P3A has functions, namely (1) Involvement in water allocation as part of determining services and willingness to pay for management fee, (2) Maintenance of irrigation systems through donations of money in the framework of management fee and through donations of labor at the level of tertiary irrigation networks, (3) Resolving conflicts at the main irrigation system level and prevent improper intervention by farmers, (4) Financial management including deliberations on operating and maintenance costs, as well as collection of fees and bookkeeping [10].

#### 4. CONCLUSION

The main problems faced in the implementation of the O&M sector of the irrigation network consisted of (1) infrastructure and O&M activities of the irrigation network are very much determined by its good physical condition, the O&M costs are cheaper; (2) human resources and O&M officer problems are serious matters faced at this time, the number and quality of staff that are below standard will be difficult to achieve maximum irrigation network performance; (3) O&M funds, the problem of this fund is still very concerning because the number and availability are always far from being available; (4) farmers have not been able to manage tertiary networks in an efficient, efficient and effective manner so that many still use water excessively, neglect the maintenance of irrigation channels and structures, and so on; (5) related agencies (stakeholders), lack of coordination and cooperation good relations between the government and the farmers using water, resulting in a strong sectoral ego and non-integrated programming.

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