FARMERS’ PARTICIPATION FOR IRRIGATION WATER RESOURCE SERVICES FEE, KAPAHIANG REGENCY BENGKULUPROVINCE-INDONESIA

by Sriati Sriati

FARMERS' PARTICIPATION FOR IRRIGATION WATER RESOURCE SERVICES FEE, KAPAHIANG REGENCY BENGKULU PROVINCE-INDONESIA

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Abstract

The environmental services fee program is a policy instrument to protect the watershed and increase the quantity, quality, and availability (QQA) of irrigation water. The value of willingness to pay as the environmental service of water resource can state the participation of farmers in the sustainable management of environmental services for water resources in the upstream watershed area of Musi, Kapahiang Regency. Furthermore, this study aims to find out the participation of farmers through the formulation of willingness and ability to pay a fee for irrigation water resource services. The result of binary regression obtained that factors affecting willingness to pay of farmer for irrigation water resource services fee were the basic knowledge of irrigation water resource services fee, the role in irrigation maintenance, the farming income, and the distance rice fields to the river as a water resource. The estimation model of the ability of farmers to pay compensation for the services of the water resources environment with multinomial logit regression showed that the distance rice fields to the river, the status of land ownership, education, and demographic history affect the willingness to pay of farmers for irrigation water resource services fee. The average value of willingness to pay that farmer respondents want is IDR 168,927.37 per land areal and planting season. Meanwhile, the total value of willingness to accept the farmer community in the upstream watershed area of Kepahiang Regency was estimated to be Rp. 640, 310, 526. 30 per planting season.

Keywords: Wilingness and ability of Farmers; irrigation water resource services fee; Wilingness to Pay; quantity, quality and availability (QQA).

INTRODUCTION

Rapid population and economic growth generate the high pressure on the land use which results in a decrease in the ecological function of the watershed area (Sihite, 2001; Muradian and Cardenas, 2015; Valiant, 2014). The management of the ecological watershed functions and soil and water conservation is a means of determining water and Quantity, Quality and Availability (QQA) systems of water for sustainable human life and all organism. Water is one of the essential needs in life, including in the agriculture aspect. With the scarcity of water, conflict, and competition emerge to possess, utilize and manage water

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resources which result as the water management becomes increasingly important in overcoming its limitations on time, space, quantity, and quality (Valiant, 2014).

The environmental services fee program is an increasingly popular policy instrument for watershed protection. Most of the program involve the users for example farmers in downstream as consumers. In addition, the producers are the rice field owners in upstream who carry out activities to protect the watershed's ecological functions. The rice field owners in upstream can be paid to stop deforestation, do reforestation, reduce soil erosion on agricultural land or stop the slash and burn farming system. The potential benefits to water users in downstream include improvements in QQA water, reducing the risk of severe flooding, and reducing inheritance value by conserving natural resources for future generations (Whittington and Pagiola, 2012; Lapeyre *et al.,* 2015; McElwee *et al.,* 2014). An environment service fee is a tool for managing ecosystems related to ecology and its economic services (Mombo *et al.,* 2014; Rodríguez-de-Francisco and Budds, 2014). From an economic standpoint, the environmental service fee of water resources can run effectively if the market mechanism works well (Salim, 2005).

In the implementation of successes and failures of the environmental services fee program relates to the role of local communities, the level of received compensation and the broader dynamics of life (He and Sikor, 2015). The environmental services fee emerged as an incentive-based policy instrument to manage and secure the flow of environmental services for human welfare (Caro *et al.,* 2015). The environmental services fee (IJL) deals with environmental problems as a result of production system failures in internalizing environmental costs and failure to regulate the behavior of institutions to maximize individual utility (Singh, 2015).

Willingness to pay (WTP) for environmental services fee of water resources reflects the perception of water user farmers on the existence and importance of water. Considering the limited development funds and irrigation management from the government, it is necessary to have active participation of water user farmers to take care of them (Yulianti, 2012). In the management context of environmental fee sustainable water resources. The IJL scheme is considered a management tool that can help to change the destructive behavior of environmental economic actors in ecosystems through compensating for their losses and increasing attitudes to conservation (Mombo *et al.,* 2014). IJL is generally arranged on a voluntary, conditional agreement between at least one 'seller' and one 'buyer' as long as environmental services are well defined or resources that use will produce environmental services (Caro *et al.,* 2015). The success of the Environmental services fee that is voluntary depends on changes in the behavior of the people involved. Local heterogeneity as a livelihood strategy plays a strong role in achieving the ultimate goal of the success of the Program of environmental services fee (Newton *et al.,* 2012).

WTP of environmental services fee of water resources is an effort to conserve stable water throughout the year. the existence of upstream forests as a catchment area must always be maintained. In an effort to conserve, the cost is one of the obstacles. The lack of a conservation budget is one of the important factors that make the management of watershed areas ineffective. (Yulianti. 2012; Hayes *et al.,* 2015). Utilizing market mechanisms can protect water sources in the watershed (maintaining availability and meeting water demand). Thus, the development of market mechanisms must consider the assessment of the total economy and ensure that there are stakeholders who have awareness, knowledge, and capability in the process carried out, as well as a clear definition of land rights; the existence of supporting policies and institutionalization (Rozak, 2010).

According to Muradian and Cardenas (2015), the market for environmental resources faces a number of important limitations. It is caused by the character of the community or group of most ecosystem functions, the market faces serious limitations as an instrument in possessing environmental services. The economic value of river water resources is not often defined because there is no market. River water resources that provide benefits and services are intangible and are often misinterpreted as non-market value products and are not traded in real economic markets so that the general public may not be willing to pay if additional funds are needed for environmental management. Therefore, environmental quality is degraded over time due to the absence of prices (money value) (Yeo *et al.,* 2013).

Basically, farmers strongly agree to adopt practices or activities to restore ecological conditions and therefore receive the fee set by the government as their compensation even though they incur additional costs and reduce income (Meyer *et al.,* 2015). It is hoped that the majority of environmental services fee initiatives can help to improve the livelihoods of local communities by reducing poverty, especially for the poor who are involved in selling their environmental services. However, the environmental services fee program with its approach to poverty reduction certainly faces several risks and constraints (Mudaca *et al.,* 2015). This study aims to analyze the willingness and ability of farmers to pay environmental services fee for water resources and identify factors influencing the farmer participation in environmental services fee of irrigation water resources in the upstream Musi watershed in Kepahiang Regency, Bengkulu Province, Indonesia.

Methodology

Method

This research conducted in the upstream watershed area of Musi. Kepahiang Regency, Bengkulu Province, Indonesia. The research was conducted through the survey with the quantitative approach and descriptive analysis with the qualitative method. The population was all farmers who rely on the irrigation water as a source of irrigated rice fields in the upstream Musi watershed in Kepahiang Regency, Bengkulu Province, Indonesia.

This study used a random sampling method. The number of samples in each village was determined by the proportional random sampling. The number of samples used in this study was 100 samples (respondents of irrigated rice farmers) spread in 54 villages in 3 (three) sub-districts which were the location of the study. Gujarati (1995) and Guntoro (2003) stated that the normal curve distribution can be achieved if the number of research samples approaches 100. For qualitative methods using purposive sampling and snowballing sampling. The resource people, informants or participants become the samples of data sources.

Data Analysis

Data obtained in the field were processed and analyzed quantitatively and carried out qualitatively. To analyze the willingness to pay (WTP), a contingent valuation method (CVM) was used. This method was a direct calculation (survey) by asking the willingness to pay (WTP) to the respondent using a questionnaire. This method allows all commodities that were not traded in the market to be estimated for economic value by using the following stages: (1) Forming a Hypothetical Market of environmental services, (2) Obtaining Supply Value (BIDs), (3) Determining Total WTP (TWTP), and (4) Evaluating CVM.

Logistic Regression Analysis

a. Logistic Regression Analysis was used to analyze the influence of socio-economic and institutional factors on the level of farmer participation in environmental services fee for water resources (Dipokusumo, 2011):

$$\text{Logit } [P(Y \leq j)] = \alpha_j + \beta X_i \text{ ; } j = 1, 2, 3, ..., c\text{-}1. \quad \ldots\ldots (1)$$

To measure the level of farmer participation in the form of willingness and ability to pay for environmental services as suggested by Hosmer and Lameshow (1989). with modifications as follows:

(i) Assessment of the willingness to pay for environmental services:

$$\text{Logit Will}_2 \ [P(Y \leq j)] = \alpha_j + \beta X_i \text{ ; } j = 1, 2, 3, ..., c\text{-}1. \quad \ldots\ldots (2)$$

(ii) Assessment of the ability to pay for environmental services:

$$\text{Logit Afford}_4 \ [P(Y \leq j)] = \alpha_j + \beta X_i \text{ ; } j = 1, 2, 3, ..., c\text{-}1. \quad \ldots\ldots (3)$$

Will_2 $[P(Y \leq j)]$ = The binary logistic regression model expressed in 2 (two) possible events in the form of variable categories as follows: 1 = unwilling to pay Environmental Services fee for Irrigation water resources, 2 = willing to pay Environmental Services fee for irrigation water resources. In the analysis of possible event from the category of response variables carried out through logit transformation (Sugiyono, 2009).

b. Participation of farmers can be expressed in the scale of very low, low, medium and high, so that the measurement can be in a statement of the ability to pay fee for irrigation water resource services. For measuring the level of participation. an assessment of the level of repayment ability was stated as follows:

- Afford_4 $[P(Y \leq j)]$ = The multinomial logistic regression model was expressed in 4 (four) categories as follows: Very low participation = 1 if WTP was smallest alternative irrigation fee value (IDR 150,000); Low participation = 2 if WTP was a small alternative irrigation fee value (IDR 180,000); Medium participation = 3 if WTP was moderate alternative irrigation fee value (IDR 210,000); High participation = 4 if WTP was large alternative irrigation fee value (IDR 250,000).
- X_i = Independent variabel consisting X_1= age (year); X_2= education where 1 = not graduating from primary school, 2 = primary school, 3 = secondary school, 4= high school and 5 = higher education; X_3= size of household (person); X_4= land area (Ha); X_5= knowledege about Environmental services fee (1= if know and 0 = otherwise) (Dummy); X_6 = demographic history (1=if a migrant and 0 = otherwise) (Dummy); X_7 = role in irrigation maintannce (1= never in irrigation maintannce, 2 = rarely in irrigation maintenance, 3 = frequently in irrigation maintannce); X_8 = Farming income (IDR/land areal/planting season); X_9 = Status of land ownership (1=sharecropper, 2= tenant farmer, 3= owner); X_{10} = distance river (as water resource) to rice fields (meters); α = intresep; β = slope of regression model.

RESULT AND DISCUSSION

Factors affecting participation of farmer in enviromental services fee (IJL) of irrigation water resources

From 100 respondents, there were 76 people (76%) who were willing to pay for the environmental services fee of irrigation water resource purpose to operational cost and maintaining irrigation networks and 24 people (24%) were unwilling to pay environmental services fee (IJL) of irrigation water resource for several reasons. The main reason of unwillingness to pay was because the assumption that water is a public good so it does not need to pay. The quality, quantity, and availability (QQA) of water received were not good enough, and their distrust of the management of the Water User Farmers Association. The social and economic factors included in the model are age, education level, size of the household, land area, knowledge about environmental services fee, demographic history, the role of respondents in irrigation management, farming income, the status of land ownership and distance rice fields to the river as irrigation resources.

Establishing the Willingness to Pay Model of IJL of irrigation water resources in the Upstream Musi of Kepahiang Regency

The results of the analysis show that out of the ten factors included in the model, only 4 (four) variables have a significant effect on the model of farmer participation in the formulation of willingness to pay IJL of irrigation water resource at α (alpha) 1%, 5%, and 10%. In detail, it can be seen in Table 1.

From the results of the binary logit regression analyst. the analysis of the effect of socio-economic factors on the willingness to pay of farmers in environmental services fee of irrigation water resources obtained a value of -2log likelihood which is 74.52 resulting Chi-square value is 35.687 with a significant 0.000. It means that independent variables simultaneously have a significant effect on the participation of farmer to be willing and unwilling to pay environmental services fee of irrigation water resources. Other interpretation is that the binary logit model obtained can explain or predict the choice of farmers. The test of Hosmer and Lemeshow show that the p-Value (0.768) is greater than alpha 0.2. which means that the empirical data matches the model (Table. 1) (Hosmer and Lemeshow, 1989).

In this model, the value of Nagelkerke R Square is 0.449 which is relatively good. The Nagelkerke R Square value shows about how much effects of the independent variables determine the respondents' possibilities of willingness to pay of farmer to environmental services fee of irrigation water resources. The value of the Nagelkerke R Squares is 0.449. which means that simultaneously all the diversity of WTP variables of respondents is 44.9 percent can be explained by the model. the remaining is 55.1 percent explained by variables outside the model. The value of R Square in economic research on natural resources and the environment is still tolerated up to 15 percent (Garrod and Willis, 1999; Sutopo *et al.,* 2011).

Table 1. Results of Analysis of the affect of Socio-Economic Factors on Willingness to Pay Farmers in IJL of irrigation water resources in the Upstream Musi of Kepahiang Regency.

Variables in the Equation						
Parameter	B	S.E.	Wald	df	Sig.	Exp(B)
Constants	-3.617	3.002	1.451	1	0.228	0.027
Age (X_1)	0.018	0.030	0.352	1	0.553	0.982
Education (X_2)	0.234	0.372	0.394	1	0.530	1.263
Size of Household (X_3)	-0.443	0.311	2.028	1	0.154	0.642
Land area (X_4)	-3.317	4.415	0.564	1	0.452	0.036
Knowledge about IJL of irrigation water resources (X_5)	-1.173	0.688	2.910	1	0.088[c]	0.312
Demographic history (X_6)	-0.521	0.670	0.604	1	0.437	0.594
Role in irragation maintanance (X_7)	1.332	0.630	4.473	1	0.034[b]	3.790
Farming income (X_8)	1.641	0.584	7.900	1	0.005[a]	5.161
Status of land ownership (X_9)	-0.003	0.658	0.000	1	0.996	0.997
Distance rice fields to river (X_{10})	0.003	0.001	8.472	1	0.004[a]	1.003

Model Summary			
Step	-2 Log likelihood	Cox and Snell R Square	Nagelkerke R Square
1	74.529	0.300	0.449

Omnibus Tests of Model Coefficients				
Step		Chi-square	Df	Sig.
1	Model	35.687	10	0.000

Hosmer and Lemeshow Test				
Step		Chi-square	Df	Sig.
1	Model	4.898	8	0.768

Variable(s) entered on step 1: X_1. X_2. X_3. X_4. X_5. X_6. X_7. X_8. X_9. dan X_{10}.
Notes : a = α <1%; b = α < 5%; c = α < 10%

Table 2. Observation Value and Expectations on Possibilities of Willingness to Pay IJL SDAI.

Observe			Expected		
			Wilingness		Corrected (Percent)
			Unwilling	Willing	
Step 1	Wilingness	Unwilling	10	14	41.7
		willing	4	72	94.7
	Overall corrected value (%)				82.0

Based on Table 2, the results show that the value of observations and expectations for possiblity to environmental services fee of irrigation water resource with the difference between the overall corrected value (Overall Percentage) is 82.0 percent of 100, then the resulting regression model is quite feasible. The binary logistic regression equation model is:

$$\mathbf{Y_{WTP} = -3.617 - 1.173X_5 + 1.332X_7 + 1.641\,X_8 + 0.003\,X_{10}}$$

The results of the WTP logistic regression model show that there were out of 10 social and economic factors there are 4 (four) factors affecting the willingness to pay of farmer to environmental services fee of irrigation water resource, namely: knowledge of environmental services fee of irrigation water resource (X_5), role in irrigation maintenance

(X_7), farming income (X_8), and the distance of rice fields to river (X_{10}). The knowledge factor about environmental services fee of irrigation water resource affects the increase or decrease in the willingness to pay of farmer to environmental services fee of the irrigation water resource. Hayes (2015) explained that the success of the environmental services fee depends on the ability of the community to translate its objectives to the conservation of natural resource management and produce collectively regulated environmental additional benefits. Matthies (2015) emphasized that environmental services fee of irrigation water resource is considered for biodiversity conservation and climate change mitigation. The participation in environmental services fee can increase the resilience and survival of small farmers through structural. operational and financial diversification. Furthermore. Matthies (2015) explained that the environmental services fee can act as a strategy to reduce needs and reduce the risk of land use for the community because the diversity of land use by landowners can avoid developing risks.

Leimona (2015) identify that environmental services fee of irrigation water resource payments is in accordance with the capabilities and expectations of the community which are very favored and feasible. This type of payment is well known as the social economic (socioeconomic) investment like mutual cooperation and the role in institutions which is one of the important aspects of the environmental services fee and anti-poverty approach. Furthermore, the farming acceptance factor determines the participation in the willingness to pay of environmental services fee of irrigation water resource payments. The willingness to pay can be increased through several efforts which increase the acceptance of lowland rice farming. The higher level of acceptance of perennial planting rice farming generates the higher level of farmer participation in the willingness to pay of environmental services fee of irrigation water resource payments which is 1.641 times. This approach happens because the farmers who have a high level of farm acceptance tend to have a higher awareness and willingness to pay for environmental services fee of irrigation water resource payments. The other research showed that the number of external parameters responds to environmental service fee payments to the environmental service providers such as household income and opportunities for livelihood diversification, payment rates, and opportunity costs, land area and ownership (Bremer *et al.,* 2014).

The distance between the paddy field to the rivers is the key factor which determines the participation of farmer in the willingness to pay of environmental services fee of irrigation water resource payments. This is because the distance of rice field to river determine the water QQA. The long-distance generate low water QAA which increase the willingness to pay environmental services fee of irrigation water resource payments which hopefully fulfilled to their irrigated rice field. Koehler (2015) reported that the success of Handpumps related to the given opportunity cost in the use of alternative water pumps which provide water service in the countryside. The general users tend to pay higher fees than walking over the longer distances.

Determination of the farmer paying Y_{Aff}TP (Affordability to pay model) ability model (environmental service fee of irrigation water resource payments in Upper Musi River Basin in Kepahiang district

The factor which affects the ability of farmers to pay the environmental services fee of irrigation water resource payments YaffTP (Affordability to pay model) were further analyzed by multinomial logistic regression with four (4) categories. The analysis results showed that only four (4) factors have the ability effects to initiate the environmental services fee of irrigation water resource payments in the upper Musi River Basin in Kepahiang District which are Education (X_2), Demographic history (X_6), Land Ownership status (X_9), and the distance of paddy field (X_{10}). Table 3 detailed showed the Chi-Square values obtained from the results of statistical analysis and the values of probability strength.

Tabel 3. Analysis results of the influence of socioeconomic factors on the ability level of Y_{aff}TP (Affordability to pay model) paying farmers of environmental services fee of irrigation water resource payments in the upper Musi River Basin in Kepahiang District.

Socioeconomic factor	Model Fitting Criteria	Likelihood Ratio Tests		
	-2 Log Likelihood of Reduced Model	Chi-Square	df	Sig.
Constants	0.314[a]	0.000	0	.
Age (X_1)	2.794[b]	2.480	2	0.289
Education (X_2)	38.173	37.859	6	0.000
Size of Household (X_3)	0.091[b]	.	2	.
Land area (X_4)	0.046[b]	.	2	.
Knowledge about environmental services fee of irrigation water resources (X_5)	7.543[b]	7.229	2	0.027
Demographic history (X_6)	34.152	33.838	2	0.000
Role in irragation maintanance (X_7)	0.006[b]	.	4	.
Farming income (X_8)	0.036[b]	.	2	.
Status of land ownership (X_9)	38.777	38.463	4	0.000
Distance rice fields to river (X_{10})	107.622	107.308	2	0.000

Description: (a) Reduce Models (Constants) and (b) Unexpected variables

Tabel 4. Free variable prediction capability of YaffTP (Affordability to pay model) level of farmers paying the environmental services fee of irrigation water resource payments (Rp.) in the upper Musi river basin in Kepahiang district.

	Prediction			
Observation	150,000	180,000	210,000	
150,000	41	1	0	97.6%
180,000	1	19	0	95.0%
210,000	0	0	14	100.0%
Overall Percentage	55.3%	26.3%	18.4%	97.4%

Table 4 showed that the success rate of the total forecasting multinomial logit regression model of 97.4% is able to correctly predict. According to the prediction of willingness to pay, the willingness to pay of Rp. 150,000.-. Rp. 180,000. and Rp. 120,000 can be correctly predicted with the percentages of 97.6%, 95.0%, and 100%, respectively. Thus, the model of farmer's ability to pay the environmental services fee of irrigation water resource payment is statistically set into three (3) categories which shows reliable predictive behavior.

The analysis of farmer's willingness to pay (WTP) to contribute paying the IJL of irrigation water resource payment in the upper Musi river basin, Kepahiang district.

In this study. the contingent valuation method (CVM) approach was used to analyze the farmer's willingness to pay on the participation in paying the IJL of irrigation water resource payment in the upper Musi river basin in Kepahiang district. The results of the implementation of five (5) step in the CVM method are as follows:

1. Hypotetical market formation

All the respondents were given by the scenarios regarding to the statements which describe the current state of the environment and the condition of the irrigation water resource network nowadays and future in which there will be a decline in QQA resulting in the implementation of economic instrument as the form of payment for irrigation water resource services as the implication of those declines. In addition, the respondent obtained an overview of the hypothetical situation which was built in an effort to improve the QQA of irrigation water in the upper Musi river basin area of Kepahiang district.

2. The willingness to pay obtained bid

The technique which was used in this study was dichotomous choice which offers respondent farmers a certain amount of money willing to pay to get the value of irrigation water and asked if they want to pay of not the amount of money to contribute to environmental services fee of irrigation water resource payment in the upper Musi river basin of Kepahiang district.

3. Estimated average value of willingness to pay (EWTP)

The estimation of the willingness to pay the average (EWTP) is calculated based on the data on the distribution of WTP respondent in which obtained by dividing the number of given WTP with the total number of the respondent who is willing to pay.

Tabel 5. The analysis result of environmental services fee of irrigation water resource in the upper Musi river basin of Kepahiang district.

WTP	Respondent (people)	% Respondent	WTP x ∑Respondent	EWTP (WTP x %)	% Population	Total WTP (WTP average x % Population)
150,000	42	0.55	6,300,000	82,894.74	2,094.47	314,171,052.6
180,000	20	0.26	3,600,000	47,368.42	997.37	179,526,315.8
210,000	14	0.18	2,940,000	38,684.21	698.16	146,613,157.9
250,000	0	0	0	0	0	0
Total	**76**	**1.00**	**12,840,000**	**168,947.37**	**3,790.00**	**640,310,526.3**

The result of the calculation of the respondent EWTP value is Rp. 168,947.37 per planting season. The distribution of WTP value of the respondent can be detailed seen in Table 5.

The result showed that the values turn out to be above the value of the irrigation management fee that was once applied in this area which is equal to one (1) can of rice (approximately Rp. 150,000.00). According to one of the respondents (Mr. Zainal Amirsyah) previously, there is the contribution of KP2A which amount to one can of rice per planting season paid to “Ulu ulu”.

The valuation or economic valuation of the natural resource commodities reveals the alleged economic value of the environment or irrigation water resources and it is an estimate of the decline in indirect irrigation water resource QQA (passive use) (Fauzi, 2010). This value is determined by the willingness and the ability of farmers to consider profile and loss and pay water natural resource irrigation prices, as well as the conservation and maintenance efforts. The willingness to pay method can provide the consideration for determining policies and objectives for managing natural and environmental resources in a sustainable manner (Cheung and Jim. 2014; Hizami *et al*., 2014; Kamri, 2013; Kolahi *et al*., 2013; Sekar *et al*., 2013).

4. Total WTP

Willingness to pay is the amount or value of money that farmers are willing to pay for goods and services and measure the willingness of farmers to sacrifice their income (Aswad et al., 2011). The aggregate willingness to pay value or total willingness to pay (TWTP) of respondent farmers in environmental services fee of irrigation water resource payments in the upper Musi river basin of Kepahiang regency which is based on the willingness to pay respondents distribution using formula 3. The result of calculation of the total TWTP value is Rp. 640,310,526. 30.- per planting season.

5. The evaluation of CVM implementation

Based on the results of the multiple regression analysis, it is quite good because the R^2 value is equal to 65.5 percent. This study deals with the natural and environmental resources that can be tolerated up to 15 percent (Masrun *et al*., 2016). CVM is one of the most important concepts in WTP. Aswad (2011) consider that WTP is important to develop a valid and optimal price estimation strategy.

Conclusion

The factors that significantly influence the decision of respondent farmers to be willing to pay for environmental services fee of irrigation water resource are the knowledge of environmental services fee of irrigation water resource, roles in the irrigation maintenance, farming receipts, and the distance of rice field to rivers. The distance between paddy fields to rivers, land ownership status, education, and demographic history influenced the ability of farmers to pay the environmental services fee of the irrigation water resource. The average value of WTP that the respondents wanted was RP. 168,947.33 per planting season, while the total value of the willingness to pay of farming communities in the upper watershed area of Kepahiang district Rp. 640,310,526.30 per planting season.

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