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Self-Financing Strategy for Water Conservation Through Payment of Environmental Services for Domestic Water Users in the Upper Areas of Renggung Watershed

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ABSTRACT

The objectives of this research are: (1) identify the community's willingness to pay (WTP) for domestic water environmental services and their WTP value; (2) analyze the factors that influence the domestic water WTP value; (3) analyze the potential for self-financing for water conservation; and (4) formulate mechanisms and strategies for the management of conservation self-help funds. This research was conducted in the upstream area of the Renggung Watershed with 30 sample households. Data were analyzed using a mathematical approach to calculate the WTP value and multiple regression analysis was used to determine the factors influencing WTP. The research results are as follows: (1) the majority (83.33%) of the community is willing to pay for domestic water environmental services with an average WTP value for each household of IDR 6,633 per month; (2) there are three factors that have a significant influence ($p<0.10$) on the WTP value, namely: age of the head of the family, household expenditure, and education of the head of the family; (3) the potential for self-help conservation funds sourced from domestic water WTP is IDR 744,001,115 per year; and (4) mechanisms and strategies for managing conservation self-help funds are carried out by empowering BUMDES as managers and local non-governmental organizations as supervisors.

1. INTRODUCTION

Water has an important role as a basic need that must be met for human survival [1, 2]. The need for water to meet population activities is increasing, apart from the increase in population, also because activities that require water increase, such as industrial areas, trade, education, tourism, and so on [3, 4].

In response to the global water crisis the United Nations (UN) declared 2005–2015 as the "water for life" decade, to increase awareness of the world community so that they jointly try to prevent water crises from occurring in the future [5-9].

Currently, the crisis of water resources occurs in various regions as indicated by the drying up of several springs. The condition of water resources is strongly influenced by human activities [10-12]. Efforts to maintain the sustainability of water availability can be done through water resource conservation activities [13-15].

Water resources conservation activities consist of 3 (three) main activities, namely: (1) protection and preservation of water resources, (2) water preservation, and (3) quality management and water pollution control [16]. Furthermore, it is emphasized that the support and role of participation from various parties, both the government, the business world, higher education institutions and community groups are needed in maintaining the sustainability of water resources through conservation activities.

Conservation efforts ranging from mass community service and field schools to technical assistance and pilot projects have culminated in the development of a more holistic concept, the establishment of a Model Conservation Village (MDK). The establishment of MDK is considered as the right effort, because it can unite various interests by prioritizing conservation as an important part of all activities in one area [12, 17-19].

The forest in the Renggung Watershed's upstream area serves as a catchment and a water source for Central Lombok Regency's residents, primarily for domestic use [20, 21]. To maintain the sustainability of water resource conservation areas, a system of incentives for these conditions is needed. The intended incentive system is to save water by applying the correct water price and supporting the appropriate institutional system [22, 23]. Therefore, the efforts that can be developed include the implementation of fees for environmental services. The application of the concept of compensation for environmental services is very possible to develop to maintain the sustainability of water resources conservation areas [24-26].

In this sense, this research must be carried out with the objectives of: (1) identify the community's willingness to pay (WTP) for domestic water environmental services and their WTP value; (2) analyze the factors that influence the WTP value for domestic water; (3) analyze the potential for self-financing for water conservation; and (4) formulate

mechanisms and strategies for managing conservation self-help funds.

2. METHOD

This research was conducted in the upstream area of the Renggung Watershed, located in the Kopang Subdistrict and North Batukliang Subdistrict, Central Lombok Regency (Figure 1). Furthermore, data and information were collected through in-depth interview techniques, document searches, and observation. A quota sampling method was used to determine the sample size, which consisted of 30 households.

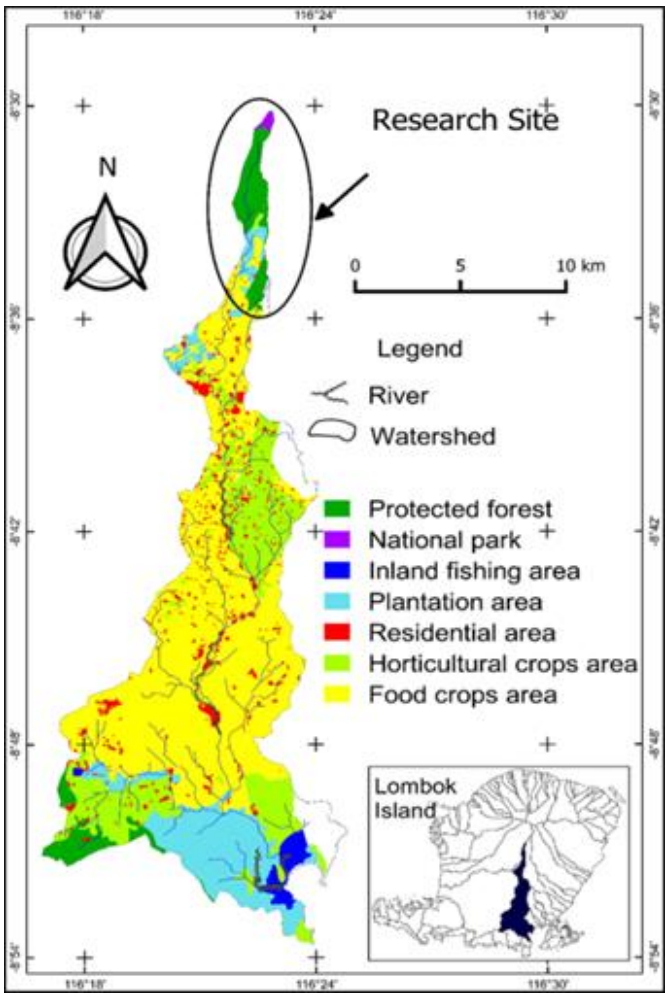

Figure 1. Research locations in the Upstrean Region of the Renggung Watershed

In addition, depending on the research objectives and the type of data collected, the following analysis was performed [27-31].

2.1 Household water demand

To calculate the economic value of household water use, the formula is used.

$$NART = RTPA \times JA \times KP \times HAS \quad (1)$$

Information:

NART=Economic value of domestic water users (Rp/m^3/household/month)
RTPA=Number of households that use water
JA=Average number of family members (person/head of household)
KP=Average household water consumption (m^3/household/month)
HAS = price of water in the community (equivalent to the price of regional drinking water companies) (Rp/m^3)

2.2 Willingness to pay for domestic water users

The estimation of the average willingness-to-pay (WTP) value for water can be calculated using the following formula, based on the average amount that the responding households are willing to pay.

$$EWTP = \frac{\sum_{i=1}^{n} W_i}{n} \quad (2)$$

Information:

EWTP=mean value of WTP(Rp/month)
Wi=Amount of WTP that you are willing to pay(Rp/month)
n=number of respondents(people)
i=respondent willing to pay(person)

2.3 Calulation of the total value of the willingness to pay (WTP) of the water

The estimate of the total value of the WTP of the respondents is calculated using the formula:

$$TWTP = EWTP(\frac{n_i}{N})P \quad (3)$$

Information:

TWTP=Total WTP
EWTPi=WTP individual sample i (Rp/household/month)
ni=the number of sample i that is willing to pay WTP (household)
i=respondent who is willing to pay (i=1, 2…, n)
N=Amound samples (household)
P=Average population for the last 3 years (household)

2.4 Analysis of the factors that affect the value of the WTP

A WTP function analysis was performed to determine the factors that influence the magnitude of the respondent's WTP value. The model used for this analysis is a multiple linear regression model with equation as follows:

$$WTP = \beta 0 + \beta 1X1 + \cdots + \beta nXn + \varepsilon$$

where,

WTP: respondent's WTP value (Rp)
β0: constant
β1…βn: regression coefficient
X1…Xn: influence variable
ε: mistake or mistake

3. RESULTS AND DISCUSSION

3.1 Domestic water needs

Water is a crucial element for meeting the daily needs of residents. The total demand for water in an area is calculated based on the number of residents in the area multiplied by the average demand. The total water needs of the population have different standards depending on the category of the area of residence of the residents (Table 1).

Table 1. Standard of water needs of the population

Category	Population Street (Person)	Water Requirement Standard (ltr/person/day)
Metropolis	1,000,000	150–200
Big City	500,000-1,000,000	120–150
Medium City	100,000-500,000	90–120
Small Town	20,000-100,000	60–90
Village	<20,000	40–60

Source: DPU Cipta Karya [32]

Domestic water use is for the needs of various household activities, such as cooking, drinking, bathing, washing, toileting, and cleaning kitchen equipment [4, 24, 27]. The results showed that the average need for water for domestic use was 134.47 liters per household per day, which includes 5.13 liters (3.82%) for drinking water and 129.30 liters (96.18%) for Bathing, Washing and Latrines (BWL) needs.

When related to the average number of family members per household of 3.83 people, the average domestic water demand for the community in the Upper Renggung Watershed is 35.11 liters per person per day, or 1.34 liters for drinking and 33.77 liters for BWL needs. Therefore, the average per capita water requirement for people in the upstream area of the Renggung Watershed is still below the standard water requirement as shown in Table 1. Furthermore, if the average per capita domestic water demand capita is (35.11 liters/person/day) multiplied by the number of residents in the area upstream of Renggung Watershed (Stiling Village, Aik Bukak Village, Bual Village, Wajageseng Village and Jenggik Utara Village) of 35,831 people, then the total volume of water needed for domestic needs. In the Upper Renggung Watershed area, it is 1,258,026 m^3 per day.

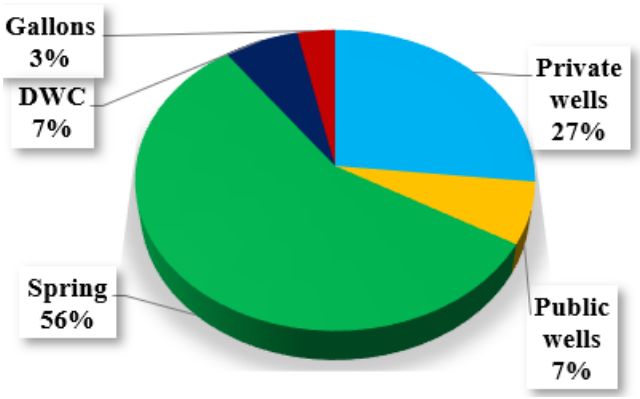

Figure 2. Sources of water for drinking and cooking needs communities in the upstream area of the Renggung Watershed

Judging by the source, most of the water used for drinking and cooking (57%) comes from springs. The other main sources come from private wells (27%) and the rest from public wells 7%, Drinking Water Company (DWC) 7%, and gallons of bottled water 3%. The same is true of the water sources for Bathing, Washing and Latrines (BWL) needs, most of which (57%) come from springs, 30% from private wells, and 7% from public wells and DWC (Figure 2 and Figure 3). In addition, water for domestic use from local springs, private wells, and public wells is obtained at no cost.

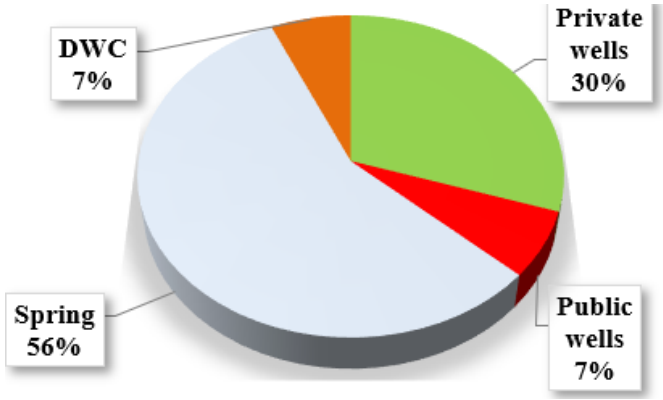

Figure 3. Sources of water for bathing, washing, toilet needs communities in the upstream area of the Renggung Watershed

3.2 Economic value of domestic water

Community use of water is generally inefficient because many people still allow water to continuously flow into available storage tanks. Therefore, it is necessary to assign an economic value to water to encourage people to appreciate the existing environmental services [32]. The level of dependency on potable water correlates with the community's willingness or awareness to pay for environmental services, which of course is influenced by the socioeconomic conditions of the surrounding community [33].

Regarding the economic value of water for domestic needs in the area upstream of the Renggung Basin, it is estimated by: the total volume of water for domestic needs multiplied by the price of water per liter. In this case, the reference water price is the Central Lombok Drinking Water Company (DWC) single household water price. According to the Decree of the Board of directors of DWC Tirta Ardhia Rinjani, Lombok Central Regency No. 12 of 2022 , the rate for Household I (code 2B) is: (1) IDR 2946 for a use of 0 to 10 m^3, (2) IDR 3,830 for a use of 11 to 20 m^3, and (3) IDR 4,419 for a use of > 21 m^3.

As explained above, the average water use for household needs (domestic needs) of the community in the area upstream of the Renggung Basin is 35.11 liters/person/day or equivalent to 1,053 liters/person/month . Because the volume of use is in the range of 0 to 10 m^3, the standard price used is IDR 2,946/m^3. Thus, the estimated economic value of water for domestic needs in the area upstream of the Renggung Watershed for each person is IDR 37,236/year. Furthermore, if this economic value is multiplied by the number of residents in the Renggung Watershed upstream area of 35,831 people, then the total economic value of water for household needs in the Renggung Watershed upstream area is IDR per year 1,334,203,116.

3.3 Willingness to pay (WTP) for domestic water

Willingness to pay (WTP) is the willingness of an individual to pay for an environmental condition or an assessment of natural resources and natural services in order to improve environmental quality. The WTP measures the extent to which individuals or communities are able and willing to pay or spend money to improve environmental conditions to meet desired standards. WTP is the potential use value of natural resources and environmental services [32, 34]. The public's willingness to pay (WTP) for domestic water in the area upstream of the Renggung Watershed is presented in Table 2.

The proportion of people who have the ability to pay for environmental quality (DAP), especially water for domestic needs, is quite high, it exceeds 80%. This reflects the high level of public concern and awareness about the importance of preserving water conservation areas. The value of the payment capacity (DAP) of each household that uses domestic water varies from 1,000 to 25,000 IDR per month, with an average of 6,633 IDR per month.

3.4 Factors affecting domestic water WTP value

Willingness to pay or not to pay is influenced by several factors. To find out the factors that influence the value of the WTP, a multiple linear regression analysis is carried out. In this study, 6 variables thought to influence WTP for domestic water were used, namely: age of household head, household income, household expenses, number of family members, volume of water use and educational level of the household head. The results of the analysis are presented in Table 3.

Table 2. Community willingness to pay (WTP) for the domestic use of water

No	Description	Amount (Person)	Percent (%)
	Willingness to pay (WTP) domestic water environmental services		
1	a. Willing	25	83.33
	b. Not willing	5	16.67
	Amount of WTP value (Rp/household/month)		
2	a. Average	6,633	
	b. Range	1,000-25,000	

Table 3. Results of analysis of factors affecting willingness to pay (WTP) society for domestic water use

	Coefficients	Standard Error	t Stats	P-values	Lower 95%	Upper 95%
intercepts	-1734,6675	7809,0853	-0.2221	0.8267	-18140,9469	14671,6118
age of household head	245.8301	122.2044	2.0116	0.0595	-10.9119	502.5721
household income	0.0006	0.0010	0.5957	0.5588	-0.0015	0.0027
household expenses	-0.0064	0.0026	-2.4343	0.0256	-0.0119	-0.0009
number of family members	988.5158	1790,5881	0.5521	0.5877	-2773,3702	4750,4019
volume of water use	30.1297	38.9403	0.7737	0.4491	-51.6809	111.9403
educational level of the family	5002,3950	2743,6476	1.8233	0.0849	-761,7947	10766,5847

Ket. Multiple R = 0.5650; R Square = 0.3193; Adjusted R Square = 0.0924

The results of the analysis presented in Table 3 show that there are 3 (three) factors/variables that can explain or significantly influence (α = 10%) the WTP of the community that uses domestic water for environmental water services in the upstream area. of the Renggung Watershed. The three variables are the age of the household head, household spending, and the education level of the household head.

Age has a significant positive effect on the willingness to pay for environmental services (WTP) for water. That is, the older a person is, the higher their level of concern for the preservation and conservation of water resources. This is in line with the results of a study [24] which concluded that age has a very significant effect on the willingness to pay for environmental water services in the village of Fatumnasi, south-central of Timor. Afifah [35] further confirmed that the older a person is, the greater their desire for clean and easy water.

Apart from age, household spending also has a significant negative effect on the WTP of domestic water. In this case, the higher the household spending, the lower the level of ability to pay for environmental services in water resources. However, this does not automatically indicate a lack of concern for water conservation and sustainability; instead, spending on other needs remains quite high. Another factor that has a significantly positive effect on the WTP value of domestic water is the education of the householder. Heads of household who have a secondary level of education or higher, have an understanding and awareness of the importance of conserving water resources, the higher the value of the WTP will be, and vice versa.

Meanwhile, three other factors, namely: household income, number of family members, and volume of water used for household (domestic) needs, have a positive effect on the WTP value, but not significant. This is in line with the results of research from the WWF Nusa Tenggara Program [36], which confirms that the size of the WTP value is positively correlated with the amount of community income and the level of community reliance on water resources from the DAS Upstream Renggung. area.

3.5 Potential of self-help funding for water conservation

The potential for self-help funding for water conservation comes from payments for domestic water environmental services by all communities in the upstream area of the Renggung Watershed. As previously explained, the average WTP value for water is IDR 6,633 per month, while the total number of households in the upstream area of the Renggung Watershed is 9,347 households. Thus, it can be estimated that the total potential for self-financing for water conservation in

the upstream area of the Renggung Watershed is IDR 744,001,115 per year.

3.6 Mechanisms and strategies for managing environmental services for financing water conservation self-help

Management of domestic water environmental services can be carried out by empowering village-owned enterprises (in Indonesia "BUMDES") and local non-governmental organizations in the upstream area of the Renggung Watershed, with the following mechanisms and strategies:

1. An environmental services management institution can be established to manage the receipt and distribution of funds from payments and remuneration for environmental services. These institutions, BUMDES and non-governmental organizations, would have duties and responsibilities for managing these funds.
2. The mechanism for withdrawing and using funds from payments and rewards for environmental services can be carried out through environmental service management institutions. The funds collected can be used to finance water conservation activities such as building water management infrastructure, procuring water management equipment and educational and outreach activities.
3. BUMDES can play a role in managing water resources by managing clean water resources and selling them to local communities. BUMDES can also manage water resources for agriculture, fisheries and livestock purposes.
4. Community participation in water resources management can be encouraged via community self-help groups that monitor and maintain water resources.

By involving BUMDES and community self-help groups in water resources management, it is hoped that community participation in managing and maintaining the sustainability of water resources can be increased. Apart from that, this strategy can also help the government in developing sustainable water resource management plans. The mechanism for withdrawing and using funds from payments and compensation for environmental services through environmental service management institutions can also ensure the sustainability of independent water resources management.

4. CONCLUSION AND SUGGESTIONS

Based on the results of the study and data analysis it can be concluded the following matters: (1) The majority (83.33%) of the community is willing to pay for domestic water environmental services with an average WTP value for each household of IDR 6,633, (range IDR 1,000, IDR 25,000) per month; (2) there are three factors that have a significant effect (α=10%) on the value of WTP, namely: age, household expenditure, and education level of the family head; (3) The potential for conservation self-help funds sourced from domestic water WTP is IDR 744,001,115 per year; and (4) mechanisms and strategies for managing conservation self-help funds are carried out with empowering BUMDES as managers and local non-governmental organizations as supervisors.

It is suggested that: (1) the dissemination of payments for water environmental services as well as conservation action programs in the upstream area of the Renggung DAS should be encouraged; (2) it is necessary to establish an environmental service management institution at the village level as well as a village regulation regarding water conservation; (3) it is necessary to carry out further comprehensive studies with wider coverage of areas and target groups as well as testing models and mechanisms for self-funding water conservation.

REFERENCES

[1] Akeju, T.J., Gbenga, J., Abubakar, O.K. (2018). An analysis of willingness to pay (WTP) for improved water supply in Owo Local Government, Ondo State, Nigeria. Asian Research Journal of Arts & Social Sciences, 5(3): 1-15. https://doi.org/10.9734/ARJASS/2018/39282

[2] Tapia, L.R., Daniel, A., Fernández, R., Novelo, J.M. (2017). Household's perception of water quality and willingness to pay for clean water in Mexico City. Journal economies, 5(12): 2-14. https://doi.org/10.3390/economies5020012

[3] Sukardi, L., Dipokusumo, B., Idris, M.H. (2019). Local community participation in protection area of water resources conservation in the Rinjani Forest Management Unit (FMU) of Rinjani Barat, Lombok Island. Sumatra Journal of Disaster, Geography and Geography Education, 3(2): 62-69. https://doi.org/10.24036/sjdgge.v3i2.244

[4] Sukardi, L., Ichsan, A.C., Febryano, I.G., Idris, M.H., Dipokusumo. (2021). Analysis of community self assistance level in water resources conservation in the upper areas of Renggung Watershed Lombok Island. International Journal of Design & Nature and Ecodynamics, 16(4): 387-392. https://doi.org/10.18280/ijdne.160405

[5] Sudiyono, S. (2012). Pengelolaan sumberdaya air di Kabupaten lombok barat: Sebuah potret implementasi Kebijakan Ekonomi Hijau. Jurnal Masyarakat dan Budaya, 14(3), 571-598.

[6] Pristianto, H. (2018). Pengelolaan sumber daya air yang berkelanjutan di Kota Sorong. urnal Median, 11(1): 25-31. https://doi.org/10.31227/osf.io/s4f2v

[7] Sihotang, I.V., Sudarmadji, I.L.S. Purnama, Baiquni, M. (2016). Model Konservasi Sumberdaya air sebagai upaya mempertahankan Keberlanjutan air di sub DAS aek silang. Spasial Wahana Komunikasi dan Informasi Geografi, 15(1): 1-11. https://doi.org/10.21009/spatial.151.01

[8] Akhmaddhian, S. (2017). Pengaruh kebijakan pemerintah daerah dalam konservasi sumber daya air terhadap kesadaran lingkungan masyarakat Kabupaten Kuningan. Jurnal Unifikasi, 4(1). https://doi.org/10.25134/unifikasi.v4i1.477

[9] Pratama, A., Latifahb, S., Afifuddinb, Y. (2014). Analisis pendugaan konsumsi air dan nilai ekonomi air sungai Parsariran untuk kebutuhan sektor rumah tangga (studi kasus di Desa Hapesong Baru, Kecamatan Batang Toru, Kabupaten Tapanuli Selatan). PenoremaForestry Science Journal, (2): 1-8.

[10] Irawan, D.E., Silaen, H., Sumintadireja, P., Lubis, R.F., Brahmantyo, B., Puradimaja, D.J. (2015). Groundwater–Surface water interactions of Ciliwung River streams, segment Bogor–Jakarta, Indonesia. Environmental Earth Sciences, 73: 1295-1302. https://doi.org/10.1007/s12665-014-3482-4

[11] Liu, Y., Chen, Y. (2006). Impact of population growth and land-use change on water resources and ecosystems of the arid Tarim River Basin in Western China. The International Journal of Sustainable Development & World Ecology, 13(4): 295-305. https://doi.org/10.1080/13504500609469681
[12] Sukardi, L., Sa'diyah, H., Husni, S. (2015). Alternatif peningkatan partisipasi ibu rumah tangga masyarakat lokal dalam perlindungan mata air di kawasan hutan Rinjani Lombok Tengah, Angrimansion, 16(1): 32-46. https://doi.org/10.29303/agri.v16i1.11
[13] Arsyad, S. (2006). Konservasi Tanah Dan Air, IPB Press, Indonesia.
[14] Setyowati, D.L., Juhadi, J., Kiptida'iyah, U. (2017). Konservasi Mata Air Senjoyo Melalui Peran Serta Masyarakat Dalam Melestarikan Nilai Kearifan Lokal. Indonesian Journal of Conservation, 6(1): 36-43. https://doi.org/10.15294/ijc.v6i1.12529
[15] Sudarmadji, S., Suprayogi, S., Widyastuti, M., Harini, R. (2012). Konservasi mata air berbasis masyarakat di Kabupaten Gunungkidul. Sekolah Pascasarjana, Universitas Gadjah Mada. https://doi.org/10.22146/teknosains.3990
[16] Kodoatie, R.J. (2010). dan Roestam, Pengelolaan Sumberdaya Air Terpadu. Penerbit Andi, Yogyakarta, Indonesia
[17] Kustamar, K. (2016). Konservasi Sumber Daya Air Di Hulu DAS. Prosiding Temu Ilmiah IPLBI 2016. Institiut Teenoiogi Nasional Mlalang, Malang, Indonesia.
[18] Ichsan, A.C., Aji, I.M.L., Webliana, K., Sari, D.P. (2019). The analysis of institutional performance of the village conservation model in Gunung Rinjani National Park. IOP Conference Series: Earth and Environmental Science, 270(1): 012019. http://dx.doi.org/10.1088/1755-1315/270/1/012019
[19] Ichsan, C. (2020). The implementation of conservation village model program in mount Rinjani National Park (A Regulation Perspective). Ecology, Environment and Conservation, 26(3): 144-153. http://eprints.unram.ac.id/id/eprint/16542.
[20] Sukardi L. (2009). Desain model pemberdayaan masyarakat lokal dalam pengelolaan hutan berkelanjutan (kasus masyarakat sekitar kawasan hutan taman nasional gunung rinjani pulau lombok) [Disertasi]. Sekolah Pascasarjana, Institut Pertanian Bogor.
[21] Sukardi, L. (2014). Persepsi dan Partisipasi Ibu Rumahtangga Masyarakat Lokal Dalam Perlindungan Mata Air Di Kawasan Hutan Rinjani Lombok Tengah. In Konferensi dan Seminar Nasional BKPSL ke-22 Tahun 2014, 18-21 November 2014.
[22] Sukardi, L. (2012). Willingness to pay (WTP) Masyarakat terhadap Konservasi Sumberdaya Air Hutan Rinjani, Konferensi dan Seminar Nasional BKPSL XXI, PPLH Universitas Mataram.
[23] Dasrizal, M.P. (2015). Model sistem pembayaran jasa lingkungan dalam kaitannya dengan konservasi sumberdaya air dan lahan: Studi kasus pada batang anai sumatera barat. Economica: Journal of Economic and Economic Education, 1(1): 16-31. https://doi.org/10.22202/economica.2012.v1.i1.102
[24] Lodan, F.I., Demak E.R.D, dan Kristina M.N. (2021). Analisis willingness to pay jasa lingkungan air di desa fatumnasi kabupaten timor tengah selatan.
[25] Jurnal Sadjati, E., Insusanty, E. (2014). Nilai Ekonomi Air Rumah Tangga Masyarakat Sekitar Hutan Ulayat Buluhcina. Fakultas Pertanian, Universitas Lancang Kuning, 11(2): 12-22. https://doi.org/10.31849/jip.v11i2.1245
[26] Ulya, N.A., Warsito, S.P., Andayani, W., Gunawan, T. (2014). Nilai Ekonomi Air Untuk Rumah Tangga Dan Transportasi–Studi Kasus Di Desa–desa Sekitar Hutan Rawa Gambut Merang Kepayang, Provinsi Sumatera Selatan (Economic Value of Water for Domestric and Transportation-Case Study in Villages Around Merang Kepayang. Jurnal Manusia dan Lingkungan, 21(2): 232-238. https://doi.org/10.22146/jml.18548
[27] Sutopo, M.F., Sanim, B., Saukat, Y., Mawardi, M.I. (2011). Analisis kesediaan membayar jasa lingkungan dalam pengelolaan sumberdaya air minum terpadu di indonesia (studi kasus DAS cisadane hulu). Jurnal Teknologi Lingkungan, 12(1): 17-23. https://doi.org/10.29122/jtl.v12i1.1258
[28] Tang, Z., Nan, Z., Liu, J. (2013). The willingness to pay for irrigation water: A case study in Northwest China. Global Nest Journal, 15(1): 76-84. https://doi.org/10.30955/gnj.000903
[29] Sabri, F., Amelia, R. (2016). Analisis willingness to pay (WTP) dan kebutuhan air di Kecamatan Merawang. INFO-TEKNIK, 17(2): 235-252. http://doi.org/10.20527/infotek.v17i2.2499
[30] Sandhyavitri, A., Putri, R.N., Fauzi, M. dan Sitikno, S. (2016). Analisis Kesediaan Masyarakat Untuk Membayar (willingness to pay). Biaya Pengadaan Air Bersih (PDAM) Di Kota Pekanbaru. Jurnal Teknik Sipil Perencanaan. 2(18): 75-86. https://doi.org/10.15294/jtsp.v18i2.7475
[31] Saptutyningsih, E. (2007). Faktor-faktor yang berpengaruh terhadap willingness to pay untuk perbaikan kualitas air sungai Code di Kota Yogyakarta. Jurnal Ekonomi & Studi Pembangunan, 8(2): 171-182.
[32] Zulkipli, Z., Soetopo, W., Prasetijo, H. (2012). Analisa neraca air permukaan DAS Renggung untuk memenuhi kebutuhan air irigasi dan domestik penduduk Kabupaten Lombok Tengah. Jurnal Teknik Pengairan, 3(2): 87-96.
[33] Midi, L., Kasim, S., Saldin, S. (2016). Analisis kesediaan membayar (willingness to pay) jasa lingkungan hidrologi kawasan hutan produksi gunung loi-loiyo (Studi kasus desa laroonaha kecamatan oheo kabupaten konawe utara). Jurnal Ecogreen, 2(1): 57-62.
[34] Hanley, N., Spash, C.L. (1993). Cost-Benefit Analysis, Edward Elgar Publishers, Cheltenham, UK.
[35] Afifah, K.N. (2013). Analisis willingnes to pay jasa lingkungan air untuk konservasi di taman wisata alam kerandangan kabupaten lombok barat provinsi nusa tenggara barat. Doctoral dissertation, Program Magister Ilmu Lingkungan.
[36] WWF Program Nusa Tenggara. (2012). Studi model dan mekanisme pengelolaan jasa lingkungan di kabupaten lombok tengah. WWF, Mataram, Indonesia.