



Optimizing the potential of the river through the “merti kali” program to support the sustainable communities

Endah Saptutyingsih^{a,1,*}, Berli Paripurna Kamiel^{a,2}, Dimas Putro Nugroho^{a,3}, Ferry Armansyah^{a,4}

^a Universitas Muhammadiyah Yogyakarta, Jalan Brawijaya Tamantirto Kasihan Bantul, Yogyakarta 55183, Indonesia

¹ saptutyingsih@umy.ac.id *; ² berlikamiel@umy.ac.id; ³ dimas.putro.fe19@mail.umy.ac.id; ⁴ ferry.armansyah.fe19@mail.umy.ac.id

* Corresponding author

ARTICLE INFO	ABSTRACT
<p>Article history Received: 2023-01-17 Revised: 2023-01-30 Accepted: 2023-02-02 Published: 2023-02-10</p> <p>Keywords Creative economy Recreation Rubbish River Technology</p>	<p><i>The development of digital technology and virtual reality has also given birth to virtual tourism innovations that have an impact on increasing the community's economy through training. This program is carried out to create virtual tourist villages, especially based on virtual tourism batik, so that batik craftsmen have more time to promote their products and the tourist aspect. The virtual tour-based batik village aims to empower the batik artisan community to be more active in utilizing digital application platforms to market their products and produce practical applications for marketing. This digital application makes it easier for buyers to find out the promotions being carried out by Bekasi batik by utilizing gadgets and taking advantage of the digital world. The training method uses a case study approach, discussion, lecture, and ends with a training evaluation. The results of the study are based on the evaluation results of the user experience of batik craftsmen in the city of Bekasi, out of 50 respondents it is found that 55% strongly agree that training materials and virtual tour systems that are socialized are easy to access, can develop digital villages based on web virtual tours and as a forum for batik promotion Bekasi city. In the aspect of achieving the goals of the Bekasi city batik craftsmen participants, out of 50 respondents the result was that 65% strongly agreed that the learning objectives of the training and virtual tour system met the expectations of the respondents. It is the hope of the training participants that the problem of marketing the virtual tour system will be a solution to expand the marketing of batik in the City of Bekasi.</i></p>
<p>Kata Kunci Ekonomi kreatif Rekreasi Sampah Sungai Teknologi</p>	<p>Mengoptimalkan potensi sungai melalui program “merti kali” untuk mendukung masyarakat yang berkelanjutan. Perkembangan teknologi digital dan virtual reality juga melahirkan inovasi virtual tourism yang berdampak peningkatan ekonomi masyarakat melalui pelatihan. Program ini dilakukan untuk menciptakan kampung wisata virtual terutama berbasis virtual tourism batik, sehingga pengrajin batik memiliki waktu lebih banyak untuk mempromosikan produknya dan aspek wisatawan. Kampung batik berbasis virtual tour bertujuan memberdayakan komunitas pengrajin batik agar lebih aktif dalam memanfaatkan platform aplikasi digital untuk memasarkan produknya dan menghasilkan aplikasi praktis untuk pemasaran. Aplikasi digital tersebut memudahkan pembeli mengetahui promosi yang dilakukan batik Bekasi dengan memanfaatkan gadget dan memanfaatkan dunia digital. Metode pelatihan menggunakan pendekatan studi kasus, diskusi, ceramah, dan diakhiri dengan evaluasi pelatihan. Hasil dari penelitian yaitu berdasarkan hasil evaluasi user experience pengrajin batik kota Bekasi, dari 50 responden di dapatkan bahwa 55% sangat setuju dimana materi pelatihan dan virtual tour sistem yang disosialisasikan mudah untuk diakses, dapat mengembangkan kampung digital berbasis web virtual tour serta sebagai wadah promosi batik kota Bekasi. Pada aspek pencapaian tujuan para peserta pengrajin batik kota Bekasi, dari 50 responden di dapatkan hasil bahwa 65% sangat setuju bahwa tujuan pembelajaran training dan virtual tour sistem sesuai harapan responden. Harapan peserta pelatihan agar permasalahan pemasaran virtual tour sistem menjadi solusi untuk memperluas pemasaran batik Kota Bekasi.</p> <p>Copyright © 2023, Saptutyingsih et al This is an open access article under the CC-BY-SA</p>

How to cite: Saptutyingsih, E., Kamiel, B. P., Nugroho, D. P., & Armansyah, F. (2023). Optimizing the potential of the river through the “merti kali” program to support the sustainable communities. *Journal of Community Service and Empowerment*, 4(1), 66-77. <https://doi.org/10.22219/jcse.v4i1.24524>

INTRODUCTION

Plumbon Hamlet, Banguntapan Village, is located in the northern part of Bantul Regency, with a lowland topography. There is no problem with the availability of water in Plumbon Hamlet both in the rainy season and in the dry season, so residents in Plumbon Hamlet do not experience water shortages. Because of its strategic location and directly adjacent to the City of Yogyakarta, there has been a change in Plumbon Hamlet which is significant from its land use which is mostly dominated by residential areas. With many settlements in Kauman Babadan and some of them live along the river flow, this has the potential to increase river pollution caused by the behavior of people who throw garbage in the river (Panggunharjo, 2019).

Plumbon Hamlet, Banguntapan Village has community empowerment programs. For programs per RT area, there are groups consisting of *dasa wisma*, groups of PKK and Karang Taruna women, as well as mosque marbot groups. In general, all existing community empowerment programs in Plumbon Hamlet have been well implemented. However, a better development and organization effort is needed. Besides that, the Kauman Babadan area is flowed by a river which can be used as a potential for residents to increase their income. In Kauman Babadan there are two mosques where the Marbot Group of the Ad Darajat Mosque and the Marbot of the Nur Rohman Mosque still need skills in managing natural and environmental potential, one of which is the river that flows in their area. The majority of members of the Marbot group at Ad Darajat Mosque and Nur Rohman Mosque do not have the skills to supplement their income, so certain activities and training are needed by utilizing the natural potential in the form of a river that flows through Kauman Babadan so that they can fulfill their daily needs and revive the group so that it has sustainability.

One of the main environmental issues is the waste problem in society. The behavior of people who throw garbage in the wrong place is still a problem in Indonesia. Based on previous research, the main problems in Indonesia are related to waste collection and the socio-cultural behavior of Indonesian people (Zainul et al., 2021). In several areas in Indonesia, there are still some people who throw garbage in the river to avoid accumulation of waste in settlements (Nurhidayat, 2013). In overcoming river problems caused by garbage, there are several technologies used, one of which is the Trash Wheel (Lindquist, 2016) which is used to pick up trash in the river. This technology has been utilized in the Baltimore River, United States. However, the condition of rivers in Indonesia is very different from the Baltimore river. In Indonesia, most of the rivers are left in accordance with their natural conditions, namely there are still many settlements on the banks of the rivers (Kardono, 2018).

Some of the problems experienced by the community based on our observations are: (1) There is a natural potential in the form of a river flow along the Kauman Babadan area, Plumbon Banguntapan Hamlet which has not been utilized properly. This is because the river is polluted by garbage originating from the upstream area. Thus there is a need for new innovations to be able to take advantage of this potential by cleaning up trash regularly, so that the quality of river water is good and feasible to be developed for fish farming as a water tourism attraction to improve the creative economy and will ultimately be able to increase people's income (Qodriyatun, 2014); (2) Lack of public awareness of environmental cleanliness, especially river cleanliness. (3) The lack of empowerment of the Marbot group of the Ad-Darajat Mosque and the Nur Rohman Kauman Babadan Mosque which can produce a product that utilizes village potential so that it becomes an alternative source of income for the people of Kauman Babadan, Plumbon Hamlet, Bantul Regency.

An area will develop if it is supported by infrastructure, natural resources and human resources. The potential of natural resources and human resources should be put to good use in order to increase people's income (Saleh et al., 2020). This PKM activity aims to take advantage of the natural potential in the form of rivers and the availability of human resources from the Marbot Group of Ad Darajat Mosque and Nur Rohman Mosque so that they can provide economic and social benefits to society through the creative economy. By cleaning the river from garbage pollution and using it as water tourism, it can increase local economic activities which can indirectly improve the welfare of the people of Kauman Babadan Banguntapan. The potential of natural resources and the environment around the community needs to be identified based on local wisdom so that it supports government programs in managing natural resources and the environment and is sustainable (Fadhil, 2007). Therefore, it is necessary to empower community groups. The International Labor Organization (2017) states that it is necessary to identify job opportunities for the community and increase people's income, and can provide innovative ideas for new businesses and job opportunities (International Labour Organization, 2017).

Based on observations, it was found that the natural potential in the form of a river that flows along Kauman Babadan Banguntapan needs to be utilized with human resources from the Marbot Masjid Ad Darajat and Nur Rohman to become Community based tourism in the form of water tourism. Community based tourism is a concept of developing tourist destinations by empowering local communities through their involvement in the process of planning, managing and conveying opinions (Goodwin & Santilli, 2009).

METHOD

This community service held in the Kauman Babadan, Plumbon Hamlet, Bantul Regency (Figure 1). Therefore, the Community Partnership Program Activity Plan is as follows: (1) Handling river waste managed by two groups of Marbot

Ad Darojat Mosque and Nur Rohman Kauman Babadan Mosque, Plumbon Hamlet, Banguntapan Village. (2) Outreach to the community concerned about the environment. (3) Creation of fish farming ponds with river insulation managed by the two Marbot groups. (4) Spreading fish seeds. (5) Initiation of making water tourism as community based tourism. (6) Making videos that are uploaded on social media.



Figure 1. Physical condition of Kauman Babadan, Plumbon Hamlet

The existence of natural potential in the surrounding environment and the lack of ability of community groups to utilize this natural potential, the Community Partnership Program (PKM) activities seek to solve these problems with several approaches carried out together as follows: (1) Group-based, all stages and types of activities that will be carried out by local communities using groups. Community groups will be used as learning media and mentoring, planning, implementing, and monitoring activities. (2) Comprehensive, this PKM program intervenes in all aspects to conduct training for the Marbot Masjid group in increasing expertise, skills and knowledge (fish farming techniques) through fish farming training and strengthening the Dasawisma group as a forum for activities through mentoring. (3) Based on local potential, making water tourism will be based on local potential in the form of a river that runs along the Kauman Babadan.

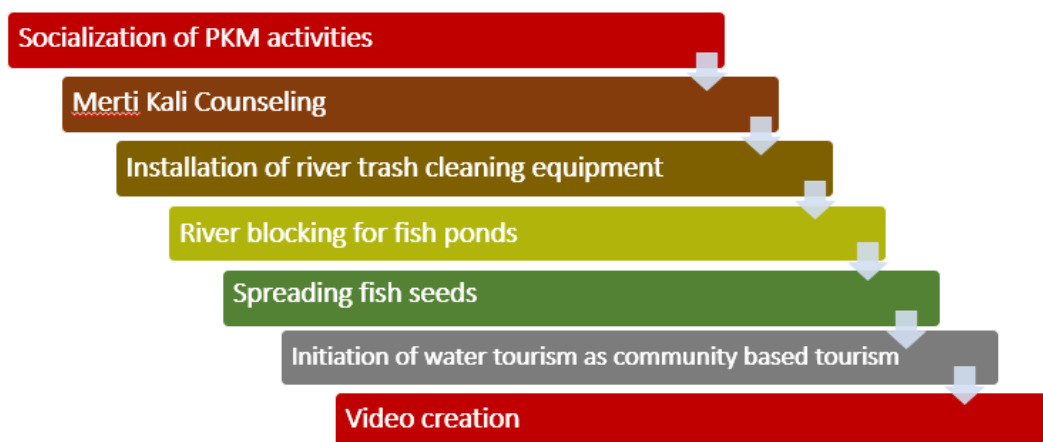


Figure 2. Stages of PKM activities

The further explanation is as follows:

Program Outreach

The initial step taken by the PKM Team was to ensure support from the community and takmir of the Ad Darojat Mosque and Nur Rohman Mosque for the program to be implemented, namely the dissemination of technology products to the community. The activities carried out included the introduction of all members of the PKM Team and requests for activity permits from the two Mosque Takmirs which were strung together with a presentation of the programs being carried out.

Merti Kali Extension

In the context of utilizing the river, which has been carried out by the "Merti Kali" program using a bar screen tool, it is necessary to provide counseling for the community to care about environmental cleanliness, especially the river environment which has the potential to be used as a source of income through fish farming. With this counseling, it is hoped that it can support the "Merti Kali" program so that the community's green economy is realized. This program

supports the initiation of water tourism development to increase people's income through the creative economy (Arismayanti et al., 2017).

Installation of river trash cleaning equipment

In the "Merti Kali" program, the PKM Team will donate a bar screen tool that is used to clean the river so that the river can be utilized by the community.

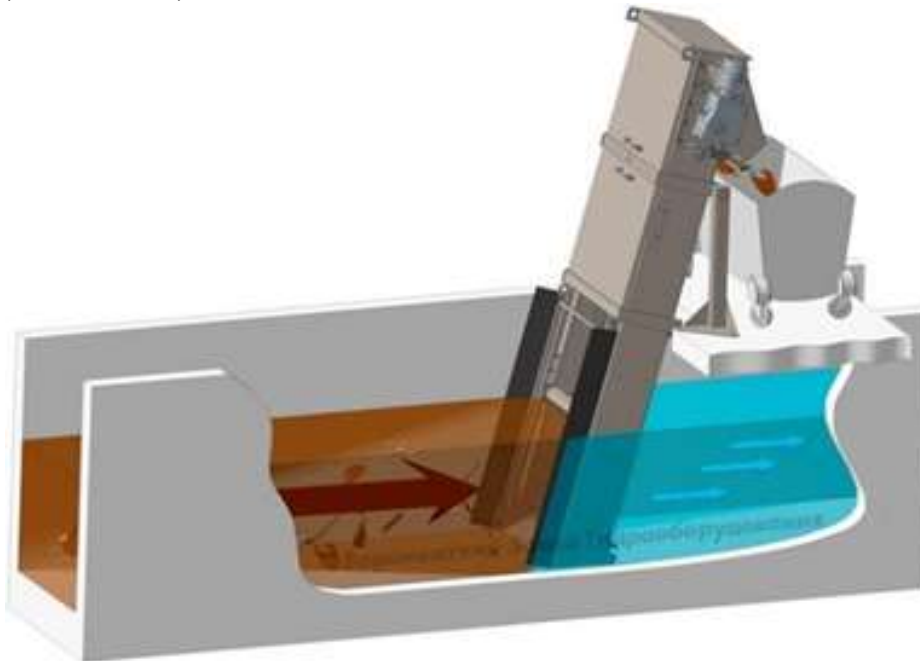


Figure 3. Mechanical bar screen trash cleaning tool

Mechanical bar screen is used to block and get rid of trash floating in the river (Saju et al., 2020). The residual size which is larger than the rod spacing is blocked by the screening surface while the sewage is flowing, the rake tooth plate teeth go deep into the screen chamber. The residue blocking the screen surface will be lifted up by the rake tine, under the driven chain driven and discharged by gravity when it reaches the top of the discharge outlet. Residue that falls from the discharge outlet will fall into the conveyor or bin (Suansri, 2003).

1. River blocking for fish ponds

The "Merti Kali" program which has been carried out will be followed up by blocking 250 meters with a river width of about 2.5 meters and a depth of about 1 meter. This blocking is carried out to create freshwater fish farming, in order to increase community income through the initiation of water tourism Besides, it can also be sold to the wider community.

2. Spreading fish seeds

The fish seeds that will be donated by the PKM implementation team to the two community groups are 5,000 tilapia fish. The PKM team assisted in fish farming in the river after training was conducted for the two Marbot groups.

3. Initiation of water tourism as community based tourism

The "Merti Kali" program, which is followed by spreading fish seeds and cultivating fish, needs to be supported by public awareness to keep the environment clean. Communities who care about environmental cleanliness can encourage the creation of river conditions that are used for fish farming as a tourist attraction. The initiation of water tourism which requires local wisdom is community-based tourism (Suansri, 2003) which requires support from the village government and related agencies, namely the irrigation service. This water tour can later encourage the creation of a creative economy in the surrounding area with various attractions, environmental beauty, and culinary as tourist attractions (Inskip, 1991).

RESULTS AND DISCUSSION

Several activities in the Community Partnership Program have been carried out including the Socialization of the Community Partnership Program to members of the Ad Darajat mosque marbot and the Nur Rohman mosque marbot and "Merti Kali" counseling to the community, especially in the context of keeping the river clean around their homes.

Socialization of PKM activities

The PKM socialization activity was carried out on July 9 2022 at 19.00 WIB at the Nur Rohman Mosque which was attended by 40 marbot members and administrators of the Ad Darajat Mosque and the Nur Rohman Mosque. This socialization activity is intended so that the takmir of the mosque and members of the marbot understand the purpose and benefits of this PKM activity for the local community, especially the marbot members of the two mosques. With this PKM activity, it is hoped that the rivers around the Ad Darajat Mosque and Nur Rohman Mosque will be cleaner from garbage and can be used to cultivate fish which can later be initiated into tourist attractions for the community, so as to improve the local community's economy (Figure 4).



Figure 4. Socialization of community services accompanied by filling out pre-counseling questionnaires Merti Kali

Merti Kali Counseling

Counseling activities have been carried out as part of this series of PKM activities on July 30, 2022 at the Nur Rohman Mosque (Figure 5). Around 45 participants attended this counseling consisting of RT administrators along the river and members of marbot as well as several heads of households living along the river. This counseling was given by Mr. Ir. Totok Pratopo. He is the Pioneer of Merti Kali on the Code River, which has now succeeded in making the Code River cleaner and a tourist spot for the people of Yogyakarta. This counseling aims to make people care about the cleanliness of the environment, especially the river environment which has the potential to be used as a source of income through fish farming. With this counseling, it is hoped that it can support the "Merti Kali" program so that the community's green economy is realized and support the initiation of water tourism development to increase people's income through the creative economy.



Figure 5. Counseling Merti Kali

The distribution of questionnaires was carried out before and after/after the Merti Kali counseling to find out whether there was an increase in the knowledge of the participants of Marbot Masjid Ad Darajat and Nur Rohman and residents along the river after attending the counseling (Figure 6).



Figure 6. Filling in the questionnaire after the Merti Kali Extension

Characteristics of Participants

The Merti Kali counseling was attended by 45 participants who came from members of the marbot of the Ad Darojat Mosque and Nur Rohman Mosque as well as several heads of households who live around the river. Before and after the Merti Kali Extension, questionnaires were distributed to the participants. The characteristics of the Community Partnership Program participants will be explained further (Table 1). Based on gender, 85 percent of the participants were male and 15 percent of the participants were female (see Table 1).

Table 1. Composition of participants based on gender

Gender	Total	Percentage
Male	38	85%
Female	7	15%

There were as many as 73 percent of all participants who were married, while the remaining 27 percent were single or not married (see Table 2).

Table 2. Composition of participants based on marital status

Marital Status	Total	Percentage
Married	33	73%
Unmarried	12	27%

Based on education level, 72 percent of all participants had high school education. There were 13 percent of participants with junior high school education or equivalent. Only 7 percent have a bachelor's degree, and the remaining 4 percent have primary and master's degrees or equivalent (see Table 3).

Table 3. Composition of participants based on education level

Education	Total	Percentage
Elementary School	2	4%
Junior High School	6	13%
Senior High School	36	72%
Vocational School	0	0%
Bachelor Degree	3	7%
Post graduate Degree	2	4%
Other		

There were as many as 56 percent of all participants who did not have certain skills. Meanwhile, 44 percent of the participants had certain skills (see Table 4).

Table 4. Composition of participants based on certain skills

Skill	Total	Percentage
Have	20	44%
Not have	25	56%

All of the Merti Kali counseling participants have not been involved in a formal business to date. There were 13 percent of all participants who were also not involved in formal or informal businesses. Meanwhile, 78 percent of all participants were involved in informal businesses. The remaining 9 percent are involved in formal businesses (see Table 5).

Table 5. Composition of participants based on involvement with the business

Involvement in business	Total	Percentage
Formal Business	4	9%
Informal Business	35	78%
Not involve	6	13%

Based on the use of river water for daily needs, there were 22 percent of all participants using river water for daily needs (flushing, washing vehicles, etc.. The remaining 78 percent of all participants did not use river water for daily needs (see Table 6).

Table 6. Composition of participants based on the use of river water for daily needs

Use of river water for daily needs (flushing, washing vehicles, etc.)	Total	Percentage
Yes	10	22%
No	35	78%

Based on the habit of throwing garbage in the river, 65 percent stated that local people throw garbage in the river. While the remaining 35 percent of participants stated that residents do not throw garbage in the river (see Table 7).

Table 7. Composition of participants based on their habit of throwing garbage into the river

Do you think that the residents around where you live sometimes still throw garbage in the river?	Total	Percentage
Yes	29	65%
No	16	35%

Judging from the composition of the participants, based on the participants' perceptions, if the river water around their residence is clean and safe for use for fish breeding, before the Merti Kali counseling, 56 percent of all participants agreed that the river water around their residence is clean and safe for use for fish breeding. Meanwhile, 44 percent of all participants disagreed. However, after the Merti Kali counseling there was an increase in the composition of participants who agreed that the river water around their residence was clean and safe to use for fish breeding, namely by 98 percent, while those who disagreed were only 2 percent (see Table 8).

Table 8. Composition of participants based on participants' perceptions if the river water around their residence is clean and safe to use for fish breeding

Do you agree that the river water around your residence is clean and safe to use for fish breeding?	Before "Merti Kali" Counseling		After "Merti Kali" Counseling	
	Total	Percentage	Total	Percentage
Yes	39	56%	44	98%
No	6	44%	1	2%

Based on the actions taken to improve river water quality, after experiencing Merti Kali Extension, there was an increase in the number of participants by 10 percent who thought that installing river cleaning tools could improve river water quality. In addition, there was an increase in the number of participants as much as 15 percent who thought that taking action not to throw garbage in the river could also improve the quality of the river (see Table 9).

Table 9. Composition of participants based on actions taken to improve river water quality

According to you, in order for the river water quality to be good, what actions need to be taken?	Before "Merti Kali" Counseling		After "Merti Kali" Counseling	
	Total	Percentage	Total	Percentage
Don't throw garbage in the river	8	18%	15	33%
Clean up river trash regularly	2	5%	1	3%
Providing education to the community about the importance of clean rivers	18	40%	12	27%
Install river cleaners	10	23%	15	33%
Formation of a river clean volunteer community	7	14%	2	4%
Other	0	0%	0	0%

Based on the frequency of river cleaning, after participating in the Merti Kali Counseling there was an increase in the number of participants by 23 percent who stated that it was necessary to carry out cleaning 2 times a month. The

percentage increase also occurred after counseling for those who thought that river cleaning needed to be done more than 3 times a month (see Table 10).

Table 10. Composition of participants based on river cleaning frequency per month

In your opinion, how many times per month should cleaning the river be done?	Before "Merti Kali" Counseling		After "Merti Kali" Counseling	
	Total	Percentage	Total	Percentage
No need	0	0%	0	0%
1	20	45%	4	9%
2	15	33%	25	56%
3	5	11%	7	15%
4	3	7%	4	9%
>4	2	4	5	11%

Based on the perception that the quality of river water will have an impact on the health of the community around the river, after the Merti Kali Extension there was an increase in the number of participants by 33 percent from 67 percent to 100 percent who thought that the quality of river water would have an impact on the health of the community around the river (see Table 11).

Table 11. The composition of participants based on the perception that the quality of river water will have an impact on the health of the people around the river

In your opinion, will the quality of the river water affect the health of the people living around the river?	Before "Merti Kali" Counseling		After "Merti Kali" Counseling	
	Total	Percentage	Total	Percentage
Yes	30	67%	45	100%
No	15	33%	0	0%

Based on the perception that the quality of river water will have an impact on the health of the community around the river, after the Merti Kali Extension there was an increase in the number of participants by 33 percent from 67 percent to 100 percent who thought that the quality of river water would have an impact on the health of the community around the river (see Table 12).

Table 12. Composition of participants based on the perception that waste in rivers can cause flooding

In your opinion, can trash in the river cause flooding?	Before "Merti Kali" Counseling		After "Merti Kali" Counseling	
	Total	Percentage	Total	Percentage
Yes	30	67%	45	100%
No	15	33%	0	0%

Based on the perception that the river needs to be maintained and preserved for posterity, as many as 100 percent of participants thought that the river needed to be maintained and preserved for posterity, both before and after participating in the Merti Kali Extension (see Table 13).

Table 13. Composition of participants based on the perception that waste in rivers can cause flooding

In your opinion, do rivers need to be maintained and preserved for future generations?	Before "Merti Kali" Counseling		After "Merti Kali" Counseling	
	Total	Percentage	Total	Percentage
Yes	45	100%	45	100%
No	0	0%	0	0%

Based on the perception that the river needs to be maintained and preserved for posterity, as many as 100 percent of participants thought that the river needed to be maintained and preserved for posterity, both before and after participating in the Merti Kali Extension (see Table 14).

Table 14. Composition of participants based on knowledge of the "Merti Kali" program

Do you know about the "Merti Kali" program?	Before "Merti Kali" Counseling		After "Merti Kali" Counseling	
	Total	Percentage	Total	Percentage
Not know	35	78%	0	0%
Just heard but don't know what to use	6	13%	0	0%
Already know but haven't done it yet	4	9%	45	100%
Already know and have done	0	0%	0	0%

Initially, only 22 percent of the participants stated that the "Merti Kali" program was beneficial to the community, while the remaining 78 percent stated that the "Merti Kali" program was not beneficial to the community. However, after participating in the Merti Kali Counseling as many as 100 percent of the participants stated that the "Merti Kali" program was beneficial to the community (see Table 15).

Table 15. Composition of participants based on knowledge of the "Merti Kali" program

If you know, is the "Merti Kali" program beneficial to the community?	Before "Merti Kali" Counseling		After "Merti Kali" Counseling	
	Total	Percentage	Total	Percentage
Yes	10	22%	45	100%
No	35	78%	0	0%

Before participating in the Merti Kali Counseling, 74 percent of the participants stated that they were willing to participate as volunteers for the clean river community around their residence, while the remaining 26 percent stated that they were not willing. However, after participating in the Merti Kali Counseling there was an increase in the number of participants who were willing to become community volunteers to clean the river around their residence (see Table 16).

Table 16. Composition of participants based on their willingness to participate as volunteers for the clean river community around their residence

Are you willing to participate as a volunteer for the clean river community around your residence?	Before "Merti Kali" Counseling		After "Merti Kali" Counseling	
	Total	Percentage	Total	Percentage
Yes	33	74%	40	89%
No	12	26%	5	11%

As many as 67 percent of participants stated that they did not know about mechanical bar screens, 24 percent had only heard but did not know what could be used, 9 percent already knew but had not used it before the Merti Kali Extension. However, after participating in the Merti Kali Counseling, there was an increase in the number of participants who knew about it even though they had not used it to as much as 89%. This is because the PKM activities which are planned to use the mechanical bar screen device are still ongoing and are in the process of ordering (see Table 17).

Table 17. Composition of participants based on knowledge of mechanical bar screens

What is Mr/Ms/Brother? know about mechanical bar screen?	Before "Merti Kali" Counseling		After "Merti Kali" Counseling	
	Total	Percentage	Total	Percentage
Not know	30	67%	1	2%
Just heard but don't know what to use	11	24%	4	9%
Already know but haven't used it yet	4	9%	40	89%
Already know and have used it	0	0%	0	0%

Initially there were as many as 83 percent of participants who stated that the mechanical bar screen was useful for improving river water quality. After participating in the Merti Kali Counseling, 100 percent of the participants stated that the mechanical bar screen was beneficial for improving river water quality (see Table 18).

Table 18. Composition of participants based on the benefits of mechanical bar screens for river water quality improvement

Do you think the use of mechanical bar screens is beneficial for improving river water quality?	Before "Merti Kali" Counseling		After "Merti Kali" Counseling	
	Total	Percentage	Total	Percentage
Beneficial	37	83%	45	100%
Useless	8	17%	0	0%

Based on the expectations of the participants, before participating in the Merti Kali Counseling as many as 93 percent of the participants stated that the river could be used for fish farming as well as a river tourism spot. After participating in the Merti Kali Counseling, as many as 100 percent said they had hope that the river could be used for fish farming as well as a river tourism spot (see Table 19).

Table 19. The composition of participants is based on the hope that the river can be used for fish farming as well as a river tourism spot

Do you hope that the river can be used for fish farming as well as a river tourism spot?	Before "Merti Kali" Counseling		After "Merti Kali" Counseling	
	Total	Percentage	Total	Percentage
Yes	42	93%	45	100%
No	3	7%	0	0%

Based on knowledge about freshwater fish farming, after participating in the Merti Kali Counseling there was an increase of 80 percent of participants who already knew how (see Table 20).

Table 20. Composition of participants based on knowledge of freshwater fish farming

Do you know about freshwater fish farming?	Before "Merti Kali" Counseling		After "Merti Kali" Counseling	
	Total	Percentage	Total	Percentage
Not know	10	22%	0	0%
Just heard but don't know what it's like	10	22%	2	4%
Already know but don't know how to make it	25	56%	7	16%
Already know how	0	0%	36	80%

Based on the willingness to participate in fish farming in the river later, after participating in the Merti Kali Counseling there was an increase in the number of participants who were willing, from initially as much as 89 percent to 100 percent willing to participate in fish farming in the river later (see Table 21).

Table 21. Composition of participants based on their willingness to participate in fish farming in the river later

Are you willing to participate in fish farming in the river in the future?	Before "Merti Kali" Counseling		After "Merti Kali" Counseling	
	Total	Percentage	Total	Percentage
Yes	40	89%	45	100%
No	5	11%	0	0%

As for some of the inputs/suggestions/criticisms in general from the participants related to the Community Partnership Program (PKM) activities, they are as follows (see Table 22).

Table 22. Inputs/suggestions/criticisms from this Community Service program

What are the inputs/suggestions/criticisms of this Community Service program?

- It is hoped that this program can continue and continue to be fostered so that the community can be empowered to the fullest
- Hopefully this program can run according to the expectations of the people on the banks of the river
- The community needs continuous support and motivation so they can use the river
- Hopefully the program will run smoothly and the river will be clean and people will care about the cleanliness of the river (don't throw garbage in the river)
- This program needs to be constantly monitored

Handover grants and installation of river trash cleaning equipment

In the "Merti Kali" program, the PKM Team will donate a mechanical bar screen device that is used to clean the river so that the river can be utilized by the community (Figure 7).



Figure 7. Submission of goods grants and installation of a mechanical bar screen device

Mechanical bar screen is used to block and get rid of trash floating in the river. The residual size which is larger than the rod spacing is blocked by the screening surface while the sewage is flowing, the rake tooth plate teeth go deep into the screen space. The residue blocking the screen surface will be lifted up by the rake tine, under the driven chain driven and discharged by gravity when it reaches the top of the discharge outlet. Residue that falls from the discharge outlet will fall into the conveyor or bin (Suansri, 2003).

River blocking for fish ponds

The “Merti Kali” program which has been carried out will be followed up by blocking 50 meters with a river width of about 2.5 meters and a depth of about 1 meter. This blocking is carried out to create freshwater fish farming, in order to increase community income through the initiation of water tourism, Besides, it can also be sold to the wider community (Figure 8).



Figure 8. River blocking for fish ponds

Spreading fish seeds

The fish seeds that will be donated by the PKM implementation team to the two community groups are 500 tilapia fish. The PKM team assisted in fish farming in the river after training was conducted for the two Marbot groups (Figure 9).



Figure 9. Spreading fish seeds

Initiation of water tourism as community based tourism

The “Merti Kali” program, which is followed by spreading fish seeds and cultivating fish, needs to be supported by public awareness to keep the environment clean. Communities who care about environmental cleanliness can encourage the creation of river conditions that are used for fish farming as a tourist attraction. The initiation of water tourism which requires local wisdom is community-based tourism (Nurfathiyah et al., 2011) which requires support from the village government and related agencies, namely the irrigation service. This water tour can later encourage the creation of a creative economy in the surrounding area with various attractions, environmental beauty, and culinary as tourist attractions.

CONCLUSION

This Community Partnership Program activity is considered quite beneficial for partners, namely the Marbot Group of Ad Darajat Mosque and Nur Rohman Mosque and residents on the banks of the Kauman Babadan River in Plumbon

Hamlet, Banguntapan Bantul. The existence of the Merti Kali Extension program which will later be followed by the installation of a Mechanical bar screen device which will be donated by the PKM Implementation Team is expected to improve the quality of river water so that it is suitable for fish farming and can later be used as a community-based tourist spot. With the Merti Kali Extension, there is an increased understanding of the importance of Merti Kali and the importance of the Mechanical bar screen device which will be installed later. Partners and the community are also willing to participate in a clean river community and carry out fish farming if the river water quality is proper. This activity cannot be separated from the role of the marbot of the two mosques to continue to encourage people on the banks of the river not to throw garbage in the river and to monitor the cleanliness of the waste. Partners hope that this PKM program can continue, so that by exploiting the potential of the river as a place for fish farming it can become river tourism which can later improve the economy of the surrounding community.

ACKNOWLEDGEMENT

Thanks are conveyed to the Directorate of Research, Technology and Community Services (DRTPM) for funding the activities of this Community Partnership Program with a Letter of Contract for the Implementation of Community Service Program for Academic Lecturers for Fiscal Year 2022 between LLDIKTI Region V and Muhammadiyah University Yogyakarta Number: 1991.7/LL5 -INT/RA.00/2022 with Sub-Contract Number 299.e/A.3-III/LPM/VI/2022.

REFERENCES

- Arismayanti, N. K., Widyatmaja, I. G. N., & Wiraatmaja, I. W. (2017). The Establishment of Rural Tourism Based Creative Economy Kendran Village, Gianyar. *Udayana Journal of Social Sciences and Humanities (UJoSSH)*, 1(1), 13. <https://doi.org/10.24843/ujossh.2017.v01.i01.p02>
- Fadhil, S. (2007). Pengelolaan Sumber Daya Alam dan Lingkungan Berbasis Pengetahuan dan Kearifan Lokal (Lokal Wisdom) di Kalimantan. *Jurnal Borneo Administrator*, 72–92. <https://doi.org/https://doi.org/10.24258/jba.v3i1.110>
- Goodwin, H., & Santilli, R. (2009). Community-Based Tourism: a success? *Tourism Management*, 11, 1–37.
- Inskeep, E. (1991). *Tourism Planning, and Integrated and Sustainable Development Approach* (an N. Reinhold, Ed.). New York.
- International Labour Organization. (2017). *Pelatihan Keterampilan Pedesaan: Manual Generik Pelatihan untuk Pemberdayaan Ekonomi Pedesaan (TREE)*.
- Kardono, K. (2018). Condition of Water Resource in Indonesia and Its Environmental Technology. *Jurnal Air Indonesia*, 3(2). <https://doi.org/10.29122/jai.v3i2.2331>
- Lindquist, A. (2016). Baltimore's Mr. Trash Wheel. *The Journal of Ocean Technology*, 11–12, 28–35.
- Nurfathiyah, Fera; Mara, Armen; Siata, Ratnawaty; Farida, Aulia; Lita, A. (2011). Pemanfaatan Video sebagai Media Penyebaran Inovasi Pertanian. *Jurnal Pengabdian Pada Masyarakat*. Retrieved from <http://online-journal.unja.ac.id/index.php/jlpm/article/view/92/81>
- Nurhidayat, A. (2013). Komposisi timbulan limbah padat dan kualitas air sungai sugutamu pada sub-das sugutamu. *FT UI*.
- Panggungharjo, D. (2019). Data Monografi Desa Panggungharjo Kecamatan Sewon, Kabupaten Bantul, DIY.
- Qodriyatun, S. N. (2014). Meningkatkan kesejahteraan masyarakat melalui pengelolaan sampah berdasarkan UU No. 18 Tahun 2008. *Aspirasi: Jurnal Masalah-Masalah Sosial*, (18), 21–34. Retrieved from <http://jurnal.dpr.go.id/index.php/aspirasi/article/view/450>
- Saju, J. A., Nawaj, S., Rubel, R., Rahman, M., & Nayan, S. B. (2020). Effectiveness of Manual Bar Screen in Separating Solid Waste from Municipal Sewers of Khulna City. *Australian Journal of Engineering and Innovative Technology*, 2(3), 31–41. <https://doi.org/10.34104/ajeit.020.031041>
- Saleh, H., Surya, B., Ahmad, D. N. A., & Manda, D. (2020). The role of natural and human resources on economic growth and regional development: With discussion of open innovation dynamics. *Journal of Open Innovation: Technology, Market, and Complexity*, 6(4), 1–23. <https://doi.org/10.3390/joitmc6040103>
- Suansri, P. (2003). Community based tourism handbook. In *Community Based Tourism Handbook*. Retrieved from <https://www.mekongtourism.org/wp-content/uploads/REST-CBT-Handbook-2003.pdf>
- Zainul Ikhwan, R. Hamdani Harahap, Lita Sri Andayani, & Miswar Budi Mulya. (2021). Model of the Importance of Socio-Cultural in Waste Management on Penyengat Island. *Lakhomi Journal Scientific Journal of Culture*, 2(4), 142–147. <https://doi.org/10.33258/lakhomi.v2i4.532>