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**Community re-education on the urgency of keeping the river clean and sorting waste in Desa
Cikole Kec. Lembang**

Rachmat Ichwan Nurdin¹, Hafsa Nugraha², Isye Iswari Arbie³, Salma Almira Hamdani⁴, Rizza Lestari⁵, Ilvira Khoerunnisa⁶, Rima Rachmawati⁷, Tina Aprilia⁸, Muhammad Vidia Adhiyaksa⁹, Romi Samsuhardo¹⁰, Billy Idan Setiadi¹¹, Mupid Hidayat¹²
^{1,2,3,4,5,6,7,8,9,10,11,12}Universitas Pendidikan Indonesia, Bandung, Indonesia
hafsahnugraha@upi.edu²

ABSTRACT

Lembang area is one of the contributors to water pollution in the Cibeureum and Cikapundung rivers which empties into the Citarum river. One of the things that pollute it is animal waste because some residents habitually throw it directly into the river. The program's dedication in the form of Kuliah Kerja Nyata (KKN), published in this article, aims to increase the awareness of residents and students about the importance of sorting and processing waste. Also, providing education that maintaining cleanliness in Cikole has helped reduce the problem of the Citarum river. It includes education about composting as a way to process animal manure. The method used is value planting and a synergy approach. Some of the programs carried out are the Harum Citarum Seminar by the TNI SATGAS, river carcasses, composting, making organic, inorganic, and B3 trash cans, social services or cooperation, and the commemoration of the Republic of Indonesia's anniversary. After implementing the program, most residents and school students realized the importance of protecting the environment, as seen by the amount of waste disposed of carelessly in several areas. The community has also understood the importance of keeping the environment clean, especially around the river.

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ABSTRAK

Daerah Lembang merupakan salah satu penyumbang pencemaran air di sungai Cibeureum dan Cikapundung yang mengalir sampai sungai Citarum. Salah satu yang mencemarnya adalah kotoran hewan, karena beberapa warga memiliki kebiasaan membuang langsung kotoran hewan ke aliran sungai. Program pengabdian dalam bentuk Kuliah Kerja Nyata (KKN) yang dimuat dalam tulisan ini bertujuan untuk meningkatkan kesadaran warga dan juga peserta didik tentang pentingnya memilah dan mengolah sampah. Juga memberikan edukasi bahwa dengan menjaga kebersihan di Cikole telah membantu mengurangi masalah sungai Citarum. Memberikan edukasi tentang pembuatan kompos sebagai salah satu cara mengolah kotoran hewan. Metode yang digunakan adalah pendekatan penanaman nilai dan sinergitas. Beberapa program yang dijalankan yaitu Seminar Citarum Harum oleh SATGAS TNI, karbak sungai, pembuatan kompos, pembuatan tong sampah organik, anorganik, dan B3, kerja bakti atau gotong royong, dan peringatan HUT RI. Setelah program dilaksanakan, sebagian besar warga dan siswa sekolah telah menyadari akan pentingnya menjaga lingkungan terlihat dari kuantitas sampah yang dibuang sembarangan semakin sedikit di beberapa daerah. Masyarakat juga telah diberikan pemahaman akan pentingnya menjaga kebersihan lingkungan terutama lingkungan sekitar sungai.

Kata Kunci: Pembinaan pemilahan sampah; pembinaan pencegahan pencemaran sungai; program Citarum Harum; re-edukasi masyarakat.

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INTRODUCTION

Kuliah Kerja Nyata (KKN) is an activity that aligns with the three pillars of the Tri Dharma of Higher Education: Education and Teaching, Research and Development, and Community Service. This activity engages students in empowering the community, thereby facilitating the application of knowledge gained during lectures (Hidayat & Purnami, 2019). The Citarum Harum Pentahelix Thematic represents a novel initiative spearheaded by Universitas Pendidikan Indonesia, which entailed the engagement of academic institutions, local communities, entrepreneurs, local government entities, and mass media outlets. This collaborative endeavor aims to address the pressing challenges posed by the Citarum Harum river.

The Citarum Harum program has been reinforced by Perpres Nomor 15 Tahun 2018, which aims to expedite the management of pollution and mitigate damage to the Citarum River Basin. To expedite the implementation of the program, the government is collaborating with the Coordinating Minister for Maritime Affairs, the Governor of West Java, Pangdam III Siliwangi, and the West Java Police Chief. In addition to these parties, various universities in Indonesia, particularly in the West Java region, are involved through the Kuliah Kerja Nyata (KKN) program. The Citarum Harum thematic KKN program is divided into 22 sectors that span the areas where the Citarum River flows. One of the targeted areas is Sector 22, located in Bandung City and Lembang District.

Lembang is a significant contributor to the water pollution problem in the Cibeureum and Cikapundung Rivers, which flow into the Citarum River. A notable example of such pollutants is fecal matter, which is directly discharged into the river by some of the residents. The majority of employed farmers continue to dispose of their livestock manure into the river. A select few residents engage in the processing of manure into biogas and compost. This phenomenon has a direct impact on one of Citarum's tributaries, the Cikapundung River, which is currently of concern. The substantial quantity of organic waste has led to a decline in water quality, attributed to elevated concentrations of the parameters Nitrite, BOD, COD, and DO, which have been measured to exceed the quality standard. Pollution, caused by human waste and other activities such as agriculture, livestock, and industry, which have exceeded their capacity limits, is a significant contributor to water contamination (Rahayu *et al.*, 2018).

The Lembang sub-district is comprised of multiple villages. One of these villages is Cikole Village, which possesses considerable tourism potential. However, based on the author's observations, there are issues related to the management and awareness of cow dung waste that have the potential to reduce Cikole Village's potential. The author of the study endeavors to further examine the issues related to the management of cow dung waste and waste management in Cikole Village. The objective is to prevent the direct disposal of waste into the tributaries surrounding Cikole Village. This examination is based on the results of previous observations.

Cikole Village is situated in Lembang Sub-district, West Bandung Regency. Preliminary findings from observations and information searches conducted by the service team indicate that this village is a target of the Citarum Harum program. Furthermore, the service team has identified this village as a suitable location for implementing KKN activities focused on addressing issues related to waste management and cow dung waste. Cikole Village is situated 22 kilometers north of Bandung City and 4 kilometers from the center of Lembang Sub-district. The village is situated at the base of Mount Tangkuban Perahu, with an approximate elevation of 1,200 meters above sea level. The region experiences a temperature range of 18 °C to 27 °C. The total area of the village is 342.996 hectares.

Furthermore, the service team obtained data regarding the livelihoods of Cikole Village residents. The majority of Cikole Village's inhabitants are engaged in agriculture, primarily focused on vegetable farming and dairy production. This village has historically sold its agricultural produce to various destinations, both within and outside the immediate vicinity of the city. However, a lack of awareness regarding the proper

disposal of animal waste and land has led some farmers to dispose of their animal waste directly into rivers, thereby polluting rivers with cow feces. The scarcity of available land hinders farmers' ability to process it into compost or biogas.

Cikole Village has been identified as a locale with considerable tourism potential. The village's appeal as a tourist destination is mainly due to the diverse array of attractions it offers. However, the proliferation of tourists has concomitant adverse effects, including the production of waste that is not being adequately managed. A significant number of individuals engage in littering at tourist attractions due to a lack of awareness regarding proper waste disposal methods. This phenomenon extends beyond land to include water bodies, such as rivers, which are also utilized as disposal sites (Maliangkay *et al.*, 2021; Maslihah *et al.*, 2022). Furthermore, numerous forestry areas have been converted into tourist attractions, such as pine forests. This is primarily due to a lack of environmental awareness and education among the local populace. Consequently, some trees are still maintained, while others are damaged and cut down to meet the needs of the tourism site. Furthermore, there is evidence of tourist damage to the trees in the area.

Within the educational sector, Cikole Village boasts a well-developed array of institutions, encompassing early childhood education, kindergarten, elementary school, and high school. However, there remains a dearth of adequate waste management infrastructure in educational institutions. This phenomenon has led to a pervasive issue of schoolchildren improperly disposing of their refuse. The absence of adequate waste management infrastructure further complicates the situation, as schools are unable to effectively sort and process their waste, leading to the continued mixing of various types of waste. The procurement of various types of garbage cans according to their designated function is imperative in fostering the habit of sorting refuse from an early age. Furthermore, students have been instructed in the proper methods of sorting and processing waste.

As previously discussed, various issues have been identified concerning the management and awareness of cow dung waste, with Cikole Village being a notable target of the Citarum Harum program. This is due to the fact that the Citarum River's headwaters originate from the Cikole area. The cultivation of a positive perception of nature and the establishment of a habit of environmental stewardship are paramount. This can be achieved through socialization and education. The application of environmental education principles in both domestic and educational settings enables individuals of all ages to acquire knowledge regarding environmental issues and their global implications (Debrah *et al.*, 2021; Leonard & Hasanuddin, 2022).

The Citarum Harum program, administered by the government, is not without justification. The government's recent focus on addressing the Citarum River's environmental challenges has been prompted by the river's status as one of the most contaminated bodies of water in the world. Within the program, several key elements must be considered in the context of a comprehensive explanation of the river and its associated challenges.

Watershed

In Peraturan Presiden RI Nomor 15 Tahun 2018, the definition of watershed, hereinafter referred to as DAS Daerah Aliran Sungai, is as follows: a land area that is a unit with rivers and their tributaries, which functions to accommodate, store, and drain water originating from rainfall to lakes or to the sea naturally, whose boundaries on land are topographical dividers and boundaries at sea up to water areas that are still affected by land activities. Watersheds are defined as organic communities where organisms, biophysical environment, and chemical elements are in constant motion and where outgoing and incoming materials and energy are balanced (Gao *et al.*, 2019). Furthermore, regional development initiatives may incorporate managed watersheds as a component of natural resource management strategies, aiming to

enhance agricultural productivity sustainably. That is to say, the optimal utilization of water is achieved through watershed management that seeks to minimize natural damage while ensuring the equitable distribution of river water throughout the year (Geressu *et al.*, 2020). Watershed management can be defined as the process of developing and implementing activities or programs that involve the control of natural and human resources within the watershed area. The objective of watershed management is to benefit from production and services without causing damage to water and soil resources.

Watershed has several parts, namely upstream, middle, and downstream areas. Characteristics of upstream areas include conservation areas, higher drainage density, large slopes (greater than 15%), non-flood areas, water use arrangements determined by drainage patterns, and vegetation types that are generally forest stands. Then, for the downstream area of the watershed is characterized by several things, such as utilization, lower drainage density, minimal to tiny slopes (less than 8%), inundation of water in several places, water use arrangements determined by irrigation buildings, and vegetation types dominated by crops except for the estuary area which is dominated by mangrove or peat forests. The middle watershed is a transitional area comprising two parts: upstream and downstream watersheds (He *et al.*, 2023).

Cikole Village, located within the Citarum watershed, must be managed to prevent further damage that could lead to disasters, particularly for the community and other living organisms in the surrounding watershed. The Citarum Harum program is a government initiative aimed at managing natural and human resources, particularly in Cikole Village, and mitigating the damage that has occurred in the Citarum watershed. To optimize it, the government, as well as the community, needs to take an active role in maintaining the watershed environment so that it remains well-maintained and plays its proper role.

Watershed Pollution and Damage

According to Peraturan Presiden RI Nomor 15 Tahun 2018 on the Acceleration of Citarum River Watershed Pollution and Damage Control, watershed pollution is defined as the entry of living things, substances, energy, or other components into the watershed through human activities that exceed the established environmental quality standards. Watershed damage refers to a direct or indirect alteration in the physical, chemical, or biological properties of the environment that exceeds the standard criteria for environmental harm.

There are various causes of watershed pollution and damage, including land conversion. Based on UU Nomor 26 Tahun 2007 on Spatial Planning, at least 30 percent of each watershed must be forested or vegetated, and in urban areas, 30 percent is designated as green open space. Thanks to infrastructure development, paddy fields that serve as green, open spaces are being replaced by buildings and roads. An increasing human population around the watershed can also affect its quality (Luo *et al.*, 2020; Tahiru *et al.*, 2020). The number of residents exceeds the available land and supporting facilities. This situation results in dense slum areas around rivers, such as the Citarum River. The poor hygiene practices of people living along the river render the water unfit for consumption (Hanif *et al.*, 2020; Pramita & Ningrum, 2019).

Watershed utilization must be accompanied by integrated financial management to ensure sustainability and continued benefits. However, humans create new problems for the surrounding watersheds in the process of fulfilling their needs, resulting in impaired hydrological functions in many watersheds. One of the most common problems in watershed areas is land use change or conversion over time (Yangouliba *et al.*, 2023; Tang *et al.*, 2021). Studies indicate that significant land-use changes are occurring in watershed areas. This disrupts the watershed's hydrological function due to the significant difference in discharge between the wet and dry seasons. During the rainy season, water discharge becomes uncontrollable, while during the dry season, the river runs dry (Ekawaty *et al.*, 2018).

One of the most visible causes is people's habit of dumping all kinds of garbage and waste directly into the watershed. Many factories also dump untreated waste directly into the river. Farmers and ranchers also contribute to the problem by throwing vegetable scraps or animal waste into the river. This type of stream utilization that is detrimental to nature, such as land burning and watershed pollution from agricultural, industrial, and household waste, will eventually deteriorate natural resources and the environment, ultimately leading to natural disasters. Some of the most common disasters caused by damage to watershed resources are water quality degradation due to pollution, flooding, soil erosion, and river drought (Kumar & Verma, 2020; Zuriyani, 2016).

These problems also occur in the Cikole Village watershed. Residents are not sufficiently aware of the issue, so many still litter. Another problem is the inadequate processing of cow dung, resulting in people disposing of cow dung waste into the river. The manure pollutes the Citarum River and obstructs its flow when the river is low.

Countermeasures for Watershed Pollution and Damage

Various parties have taken countermeasures to prevent further pollution and damage to watersheds. Some of these measures are as follows:

First, policies are implemented to manage the environment. The government has issued several new laws and regulations, and the president is responsible for managing the environment. One such policy is the establishment of a regulation to restore the Citarum watershed through integrated steps. The policy is Peraturan Presiden RI Nomor 15 Tahun 2018 on the Acceleration of Citarum River Watershed Pollution and Damage Control (see: <https://peraturan.bpk.go.id/Details/73584/perpres-no-15-tahun-2018>). This step was taken because the Citarum River is in a strategic location and has been designated a strategic national river. The river serves as a reliable source of water for people who rely on it for irrigation, daily needs, and power generation. One of these policies' objectives is to prevent the conversion of forest land to non-forest land and of food land to non-food land, such as for settlements, industrial areas, cities, and offices. Land conversion is a serious problem in the watershed area. Watershed forests have been deforested to the extent that they can no longer serve as the primary protection mechanism for the watershed system (Alsa *et al.*, 2023).

Second, forest and land rehabilitation are necessary. The conversion of forests and surrounding land in the watershed decreases the quality of the soil and water, rendering the land less productive. Rehabilitation efforts are necessary to prevent this unproductive land from becoming critical land. Land use practices that do not employ soil conservation or preservation methods can lead to significant erosion, high surface runoff, nutrient loss, and environmental pollution from hazardous substances (da-Cunha *et al.*, 2022; Malik *et al.*, 2020).

The cooperation between the government and the community regarding the Citarum Harum program is a lengthy process. As part of their academic studies, students participate in community service and contribute to efforts aimed at addressing pollution and watershed damage. These efforts can include implementing environmental management policies and participating in forest and land rehabilitation.

Organic, Inorganic, and Hazardous Waste

Organic waste, also known as wet waste, is a type of waste that originates from biological materials that microorganisms can decompose. Examples of these materials include food waste, vegetables, fruits, and leaves, among others (Shitophyta *et al.*, 2021). This type of waste decomposes easily and can be used to

create other things. It can be used to create MOL (micro local organisms) solutions, which are commonly used to make compost or compost-based fertilizers.

In contrast, inorganic waste is not produced naturally by living things. Inorganic waste takes a long time, if it can be degraded at all. Examples of inorganic waste include Styrofoam, plastic, cans, and glass or shard materials (Santoso *et al.*, 2021). Because they are not easily decomposed, inorganic wastes need to be processed. One standard method is the 3R principle: reuse, reduce, and recycle. Reuse involves repeatedly using plastic materials. Reducing means buying or using fewer plastic materials. Recycling means reusing waste and other plastic materials (Amalia & Putri, 2021; Rhein & Sträter, 2021).

Based on Peraturan Pemerintah Republik Indonesia Nomor 101 Tahun 2014 concerning Hazardous and Toxic Waste Management, at Pasal 1 Ayat 1 defines Hazardous and Toxic Substances (B3) as substances, energy, and/or other components that due to their nature, concentration, and/or amount, either directly or indirectly, can pollute and/or damage the environment, and/or endanger the environment, health, and the survival of humans and other living things (see: <https://jdih.menlhk.go.id/new2/home/portfolioDetails/101/2014/7>). Examples of hazardous waste generated by industry include heavy metals, cyanide, pesticides, paints and dyes, oils, solvents, and other hazardous chemicals (Mahato *et al.*, 2021). Compared to other types of waste, hazardous waste can cause much greater environmental damage if not appropriately managed. Hazardous waste can also pose a risk to human health. The poor history of hazardous waste management in developed countries underscores the need for effective management to support rapid economic growth (Kurniawan, 2019).

Based on the background and field conditions described above, this paper is part of a community service project called a Kuliah Kerja Nyata (KKN). This paper aims to describe a suitable program to support the Citarum Harum Pentahelix Program in Cikole Village, increase community awareness of the importance of waste sorting and processing, educate the community on the benefits of maintaining cleanliness in Cikole, and educate the community on composting as a method for processing animal waste. Additionally, this paper provides suggestions and recommendations for follow-up community service activities in Cikole Village.

METHODS

Service Approach

The methodology employed by this service involves the implementation of a multifaceted approach that encompasses the inculcation of values and the promotion of synergy. The value inculcation approach is an educational methodology that emphasizes the cultivation of social values in students (Besari, 2021). In alignment with this objective, the program in Cikole Village entails the following activities: the disposal of refuse in designated areas, the sorting of refuse, the preservation of the natural environment, and the promotion of health and sanitation.

The synergy approach is defined as cooperation between organizations or communities to solve problems effectively, make joint decisions, share values, and build strength based on differences. This strategy enabled the service team program to garner support and cooperation from various stakeholders involved in village development, including community leaders, educational institutions, youth organizations, environmental care communities (Scrooge), and TNI ranks.

Stages of Service

In the preparatory stage, a survey of the KKN location was conducted. The site visited was the Cikole Village Head Office. The following individuals were in attendance: the village head, the village secretary, and several village officials. Primary data was extracted from the resource persons in the form of information related to the condition of Cikole Village itself, especially regarding environmental cleanliness. Subsequently, a meeting was held with additional sources, specifically the head of the Eco Village, to obtain further information regarding the programs implemented in Cikole Village to address the issue of waste management. Subsequently, the writing team convened with the head of RW 01 to further explore the circumstances of the community in that region, taking into account that the activity in question had been conducted in RW 01. Subsequently, the writing team initiated an approach toward the community to ensure its awareness of the team's engagement in KKN activities within the designated area. The team also communicated the details of the service initiative to be carried out in the program, which differed from those of previous years. The subsequent stage was the implementation stage, which was carried out in Cikole Village, Bandung Regency. The service team program is designed to benefit the residents of Kampung Lapang RW 01, Cikole Village, including RW Chairmen 01-15, PKK mothers, farmers, livestock groups, and students of SDN 4 Cibogo, SDN 7 Cibogo, and SMPN 5 Mutiara.

The KKN program is a collaborative effort between two primary partners: Sector 22 of the Citarum Harum SATGAS and the local government. The Citarum Harum program, administered by the Tentara Nasional Indonesia (TNI), was inaugurated in 2018 as a collaborative initiative supported by academic institutions and students in Indonesia. The collaboration with the Citarum Harum SATGAS entails active participation in the execution of the work program. In the implementation of KKN, the local government participates in the execution of programs initiated by students. Local government entities, including sub-district officials, village officials, RW heads, and RT heads, played a pivotal role in guiding and supporting all programs initiated by students within the scope of the work program or KKN activities in Cikole Village.

During the service implementation period, a series of programs were held. The series of programs was comprised of six distinct components: (1) the Citarum Harum Seminar facilitated by SATGAS TNI, (2) the Karbak River, (3) Composting, (4) the fabrication of organic, inorganic, and B3 trash cans, and (5) Community service/gotong royong. A variety of programs are also implemented to invigorate KKN activities, thereby fostering heightened resident engagement in initiatives spearheaded by the team that do not directly align with the Citarum Harum program.

RESULTS AND DISCUSSION

Seminar Program on Citarum Harum by SATGAS TNI

A salient issue that has been identified as a significant contributor to environmental degradation within the community is the improper disposal of waste, including the discharge of refuse into water bodies. This perspective is further substantiated by the prevailing mindset among individuals who regard it as a habitual practice. There are numerous methodologies for altering mindsets; one such approach is the Citarum Harum seminar. Consequently, an invitation was extended to furnish materials that would apprise the community of the actual impact of animal waste disposal into the river and the resultant sedimentation caused by the indiscriminate felling of trees. The objective of this activity is to impart knowledge about the significance of environmental protection by educating participants on the proper method for disposing of waste according to its type.

This activity was conducted on Wednesday, July 17, 2019, and was attended by representatives from village officials, RW heads, PKK mothers, hamlet heads, and farmer and livestock groups. It is hoped that these representatives will convey the message of the SATGAS to the Cikole Village community, thereby

raising awareness and encouraging environmental cleanliness. Subsequently, the awareness of the necessity to dispose of waste according to its type, as well as the conscientious handling of animal feces, became apparent.

The Karbak Sungai Program

The contamination of the Citarum River is not solely attributable to activities in the river's vicinity or downstream; activities upstream also significantly contribute to the degradation of the Citarum River. The rivers in Lembang are among the tributaries upstream of the Cibeureum River, a sub-watershed of the Citarum. This region has experienced a persistent decline in water quality, leading to the disruption of the Citarum River's ecological function. In light of these concerns, concerted efforts to mitigate watershed pollution are imperative. A notable initiative in this regard is the Citarum Harum program, which aims to restore the water quality of the Citarum River (Hermawan & Wardhani, 2021). The objective of this initiative is to undertake a comprehensive cleaning of the river in the Lembang area, aiming to address concerns about pollution reduction in the Citarum River.

This activity is carried out from Monday to Friday. The river undergoes a daily cycle of purification, as the river in Lembang is not a singular entity. This activity is conducted on a daily basis due to the perpetual presence of refuse in the river. River cleaning is carried out by directly visiting the river with the SATGAS TNI and collecting the garbage that flows, thereby preventing the river from becoming clogged.

Composting Program

The economic activities of a subset of the Cikole population consist of ranching and agriculture. The topography is conducive to the cultivation of vegetables and elephant grass, which is utilized as fodder for livestock. However, due to a lack of public awareness regarding the cleanliness of the surrounding environment, some farmers dispose of cow dung waste directly into the river, which eventually causes the river to become contaminated and malodorous. Rather than disposing of cow manure into the river, an alternative approach involves utilizing organic composting methods. Cow manure contains a significant amount of nitrogen and protein, which are nutrients found in plant parts that cows then consume. The release of this nitrogen occurs through the process of bacterial decomposition, in which proteins are broken down into simpler compounds. These compounds, in turn, are absorbed by plants through their roots (Ekawandani, 2019). Farmers must possess the knowledge to produce compost, thereby ensuring the effective utilization of livestock manure and preventing it from becoming organic waste. Consequently, the service team assisted farmers in RW 01 with the compost production process.

Through collaboration with SATGAS, residents acquire knowledge in waste management, which can subsequently be disseminated to the residents of RW 01 Cikole Village. Compost processing activities in Gudang Kahuripan Village are carried out on a daily basis. The program provides information regarding the processing of animal waste into organic compost, thereby ensuring that the waste does not enter the river system. The process of composting, which involves collecting and managing organic materials, has been shown to improve soil quality. The application of compost has been shown to loosen the soil, stimulate nutrient activity, and provide sustenance for microorganisms. These microorganisms, in turn, have been observed to promote plant growth (Ekawandani & Kusuma, 2019). Furthermore, the organic fertilizer produced can be sold to farmers, thereby increasing their income, given that agriculture is one of the primary livelihoods in Cikole Village.

Trash Can Procurement and Waste Sorting Program

A survey of schools in Cikole Village reveals that many of them still lack adequate trash bin facilities. The scarcity of trash receptacles has been identified as a contributing factor to the littering behavior exhibited by a significant proportion of the student population. The absence of waste bin facilities further complicates the situation, as schools are unable to effectively sort and process their waste, resulting in the continued mixing of various types of waste. Furthermore, there is a conspicuous lack of awareness among students regarding proper waste disposal practices. The presence of residual waste in the vicinity of the educational institution is indicative of this phenomenon. Consequently, the service team furnished three categories of trash receptacles: organic, inorganic, and hazardous waste cans. The team also guided the students on proper waste sorting methods.

The objective of this initiative is to cultivate students' awareness of the perils associated with environmental degradation resulting from waste disposal and to instill the importance of preserving the school environment and avoiding littering. This activity was carried out at Mutiara 5 Junior High School, SDN 4, and SDN 7 Cibogo. The activity begins with a presentation on the consequences of littering. Subsequently, the students applied the material by engaging in the activity of sorting waste according to its type,

The activity was designed to target students from SDN 4 Cibogo and SDN 7 Cibogo in grades 5 and 6, as well as the student council of SMPN 5 Mutiara. A total of 150 students participated in this activity, learning how to properly sort waste. The students were provided with guidance on proper waste sorting methods. The students were instructed in the creation of handicrafts from waste materials and the utilization of waste materials for the fabrication of bins. The refuse containers allocated to the educational institution are of three distinct types, distinguished by their respective colors. For organic waste, the color of the bin is green. Subsequently, inorganic waste is assigned a yellow color code, and B3 waste is designated a red bin.

The Gotong Royong Program

This program is a community service activity designed to promote environmental stewardship within the local community. This activity is also conducted to commemorate the 74th anniversary of Indonesian Independence Day. The following activities are to be carried out: cleaning up the side of the road and in culverts, burning inorganic waste, and removing weeds to make the area tidier and more visually appealing. The primary objective of this initiative is to benefit the residents of Kp. Lapang RW 01 Cikole Village. This community service initiative was executed in collaboration with the youth organization RW 01 Cikole Village and several residents who actively participated in the undertaking. The activities carried out included cleaning up garbage around the streets of Lapang Village, clearing weeds, transporting and disposing of household waste by the roadside, and collecting the remaining garbage for burning.

Program Outcomes

The results achieved from some of the above programs are outlined in the following table.

Table 1. Program Outcomes

No	Program	Condition Before Program	Condition After Program
1	Karbak Sungai Program	People are not very concerned when they see river waste	The community already cares about the state of the river
2	Compost Processing Program	People do not utilize animal waste, and throw animal waste into the river	The community can utilize animal waste and not throw it into the river

No	Program	Condition Before Program	Condition After Program
3	Watering and Tree Care	There is no maintenance or watering of existing tree seedlings	The maintenance of existing trees
4	Procurement of trash cans	Lack of trash cans in schools in Cikole Village; all types of waste are collected in a single trash can.	The school has three types of trash cans, each designated for specific waste categories, including organic, inorganic, and B3 waste.
5	Seminar and Assistance for Cikole Village Residents	Many people still litter and throw animal waste into the river.	The community realizes the importance of disposing of waste in its place and treating waste

Source: *Dedicated*, 2019

Supporting and Constraining Factors for the Program

Some of the supporting and constraining factors are outlined in the following table.

Table 2. Program Supporting and Constraining Factors

No.	Activities	Supporting Factors	Barrier Factors
1.	Socialization of Citarum Harum at the Cikole Village office	Willingness of the guests, ASN urban village, village head, and SATGAS, who became material speakers	Extended time caused by the lateness of the guests
2.	Making Organic, Inorganic, and B3 Trash Barrels	Materials that are easy to obtain	Lack of land where to place trash cans
3.	Socialization of Citarum Harum at SDN 4 Cibogo	<ol style="list-style-type: none"> 1. The school's response was very positive 2. The enthusiasm of the students was outstanding and orderly 3. There is a space for socialization 4. The facilities and infrastructure of the post are complete so that they can be used for socialization 	The time is quite limited
4.	Socialization of Citarum Harum at SDN 7 Cibogo	<ol style="list-style-type: none"> 1. The school's response was very positive 2. There is a space for socialization 3. The facilities and infrastructure of the post are complete so that they can be used for socialization 	The condition of the class is not conducive to the delivery of material being less effective
5.	Socialization of Citarum Harum at SMP 5 Mutiara	<ol style="list-style-type: none"> 1. The school's response was very positive 2. The enthusiasm of the students was outstanding and orderly 3. There is a space for socialization 4. The facilities and infrastructure of the post are complete so that they can be used for socialization 	The lack of public interest in reading the call on the banner
6.	Making Compost	Good response from the farmers to this program. Existing facilities. It is easy to obtain materials for making moles, such as organic waste.	The lack of land makes it difficult for some farmers to carry out composting activities. Lack of knowledge about the correct composting procedures.
7.	Karbak River	Getting a good response from the community around the river. Given a place to organize the Karbak Sungai Program for residents.	Waste that always appears every day.

Source: *Dedicated*, 2019

Discussion

It is imperative to undertake a systematic and sustained follow-up of the KKN program to ensure the long-term viability of the implemented programs. Several issues require attention from both KKN students and the community of Cikole Village, Lembang District, West Bandung Regency. These issues include:

1. Composting

Composting is one method of reducing river pollution. Furthermore, the finished organic fertilizer can be sold to farmers, thereby providing breeders with an additional revenue stream. It is hoped that the head of the livestock group and the local government will follow up on this program and the availability of additional land, as the program requires a considerable amount of land.

2. Waste Segregation

Schools that receive training have been shown to optimize the environmental socialization delivered by KKN students by continuing to educate students on waste segregation. The school community is also expected to protect and maintain the environment. Teachers are expected to perpetuate the socialization of the separation of organic and inorganic waste, as well as the deleterious impact of littering, which KKN students have imparted. This is achieved by continuously guiding students to dispose of waste in its designated location and to separate waste. Furthermore, KKN students are expected to monitor the program's continuity periodically.

3. Maintenance of trash cans

Maintenance of trash cans is also crucial for students to properly sort waste and promote sustainability. It is hoped that the school will provide follow-up to ensure the maintenance and separation of all types. The school has the option of painting the trash cans in three different colors, which would facilitate the sorting of refuse by students.

4. Citarum Harum Program

The Citarum Harum Program, in collaboration with the SATGAS team, is hereby recommended for the subsequent student successor of the Citarum Harum Pentahelix Thematic KKN. The objective is twofold: to perpetuate the existing program and to cultivate its development.

5. Assistance on Community Cleanliness in Cikole Village

Following the provision of assistance within the community, it is anticipated that the community will be able to establish effective waste management practices in their respective homes, including the separation of organic and inorganic waste. The community is expected to implement the 3Rs (reuse, reduce, and recycle) for household waste. Moreover, it is anticipated that the community will exhibit a reduced propensity for littering, attributable to a combination of shame and a shared desire to maintain the environment's cleanliness. It is hoped that the Cikole Village government will initiate subsequent monitoring to assess the management of waste.

The subsequent initiatives undertaken by the service team are progressing in accordance with the established plan. The Cikole Village community has been informed of the ongoing challenges related to waste management and cow dung waste in the area. These issues have been communicated to the community to raise awareness of the potential consequences of neglecting the area. These efforts are consistent with the Citarum Harum Program, a comprehensive initiative aimed at restoring the water quality of the Citarum River ([Hermawan & Wardhani, 2021](#)). Moreover, managing cow dung waste for compost production presents a valuable opportunity for the community to generate supplemental income. This assertion aligns with the findings of [Ekawandani & Kusuma \(2019\)](#), who contend that the sale of organic fertilizer or compost is permissible, as fertilizer is a necessary input for farmers to facilitate plant growth.

CONCLUSION

A review of the programs implemented during the Citarum Harum Pentahelix Thematic Community Service Program in Cikole Village, Lembang Subdistrict, West Bandung Regency, reveals that some community members are pretty enthusiastic about socialization activities related to environmental cleanliness. This enthusiasm is particularly notable among the school community, which includes children who are easily influenced, as well as other communities that understand the importance of protecting the environment. The service team and other affected entities can leverage the enthusiasm generated. It is imperative to ascertain the sustainability of associated programs. In addition to follow-up from the local government, students must provide their input to ensure the continuation of these activities.

The majority of the community has come to recognize the significance of environmental protection. This is evidenced by a decline in the amount of waste discarded irresponsibly in areas where the community has been educated on the importance of preserving environmental cleanliness. The support from various parties, including the SATGAS TNI, village officials, local RW and RT heads, and the surrounding community, is an indicator of changes in the behavior of the surrounding community regarding waste management and cow dung waste.

AUTHOR'S NOTE

Please state that there is no conflict of interest regarding the publication of this article. Moreover, the author also confirms that the article is free of plagiarism.

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