

COMMUNITY PARTICIPATION TO ENHANCE ENVIRONMENTAL AWARENESS IN SUNGAI BULAN SUB DISTRICT, NORTH SINGKAWANG

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Abstrak: Kegiatan Pengabdian pada Masyarakat (PPM) di Kelurahan Sungai Bulan, Kecamatan Singkawang Utara, Kota Singkawang dilakukan sebagai respon dari masalah kebersihan lingkungan yang dihadapi warga, di mana sering terjadi aktivitas pembuangan sampah di lahan kosong pada wilayah tersebut. Tujuan dari kegiatan ini adalah untuk menyosialisasikan pentingnya kebersihan lingkungan, mendorong partisipasi serta keterlibatan masyarakat dalam menjaga kebersihan lingkungan secara bersama-sama, meningkatkan kesadaran, memperkenalkan praktik berkelanjutan, serta menginspirasi perubahan perilaku dalam masyarakat, khususnya melalui pengelolaan limbah plastik. Kegiatan ini diikuti oleh 25 orang partisipan dari masyarakat Kelurahan Sungai Bulan. Melalui sosialisasi, kerja bakti, pemasangan plang larangan membuang sampah, serta demonstrasi pembuatan paving block dari plastik bekas, kegiatan ini menerapkan metode Asset-Based Community Development (ABCD). Hasilnya menunjukkan adanya tingkat partisipasi masyarakat yang tinggi dan antusiasme yang kuat dari warga Kelurahan Sungai Bulan, serta pelaksanaan kegiatan yang lancar. Manfaat dari kegiatan ini meliputi pemahaman yang meningkat tentang pentingnya kebersihan lingkungan, partisipasi aktif masyarakat dalam menjaga lingkungan, peningkatan informasi tentang pengelolaan sampah, serta perbaikan lingkungan yang lebih bersih dan terjaga. Dengan demikian, kegiatan ini tidak hanya berfungsi sebagai upaya untuk memecahkan masalah kebersihan lingkungan, tetapi juga sebagai alat edukasi yang efektif dalam meningkatkan kesadaran dan partisipasi masyarakat.

Kata Kunci: kebersihan, lingkungan, partisipasi, plastik, sampah

Abstract: The community service program in Sungai Bulan Sub District, North Singkawang District, Singkawang City, was conducted in response to the environmental cleanliness issues faced by the residents. The area frequently experiences waste disposal activities on vacant lands. This program aims to promote the importance of environmental cleanliness, encourage community participation and involvement in maintaining a clean environment collectively, raise awareness, introduce sustainable practices, and inspire behavioral changes within the community, mainly through plastic waste management. Twenty-five participants from the Sungai Bulan Sub-District attended this program. Through socialization, communal work, installation of signs prohibiting littering, and demonstration of making paving blocks from recycled plastic, this program applies the Asset-Based Community Development (ABCD) method. The results show high levels of community participation, strong enthusiasm from Sungai Bulan residents, and smooth implementation of the activities. The benefits of this program include increased resident's understanding of the importance of environmental cleanliness, active community participation in ecological preservation, increased information on waste management, and improved cleanliness and preservation of the environment. Thus, this program serves as an effort to address environmental cleanliness issues and as an effective educational tool to raise awareness and community participation.

Keywords: cleanliness, environment, participation, plastic, waste

Introduction

Indonesia's population has been growing significantly in recent years. According to data from the Badan Pusat Statistik Indonesia (2023), the projected population of Indonesia reached 278.7 million people in 2023. Alongside this growth, the amount of waste produced has also dramatically increased. According to data from the Coordinating Ministry for Human Development and Cultural Affairs (2023), around 7.2 million tons of waste were improperly managed in 2022 by the government. Population growth, urbanization, industrialization, economic expansion, income growth, and shifts in consumption patterns contribute to the increased potential for waste accumulation per capita in Southeast Asian cities (Ngoc & Schnitzer, 2009). One urban area experiencing such growth is Singkawang City.

Waste management is a critical environmental issue that requires serious attention. Waste is unwanted residual material at the end of a process (Gusmarti, Oktavia, & Walid, 2020). The presence of waste, particularly household waste, is unavoidable and contributes significantly to the increasing volume of waste in the environment (Tamyiz et al., 2020). According to data from the publication "Kota Singkawang Dalam Angka 2024" (Badan Pusat Statistik Kota Singkawang, 2024), the volume of waste in Singkawang City has shown a significant upward trend year by year. Based on the data from the Singkawang City Environment Agency, in 2022, the volume of waste reached 34,297.93 tons, and in 2023, it increased to 34,813.50 tons. However, the number of waste disposal sites has continuously decreased over the past three years. Consequently, the daily capacity of waste disposal sites has also diminished, as evidenced by data from the Singkawang City Environment Agency, which shows a reduction from 761.13 m³ in 2021 to 540.03 m³ in 2023.

Meanwhile, to this day, the majority of the public's perspective on waste management still revolves around waste collection, transportation, and disposal (Alfian & Phelia, 2021; Gusmarti, Oktavia, & Walid, 2020). In other words, most waste is still not being appropriately managed. The results in accumulation at final disposal sites and open land, as seen in Sungai Bulan Sub District, North Singkawang District, Singkawang City, West Kalimantan (Figure 1). Indiscriminate waste disposal on vacant land still frequently disrupts environmental cleanliness and health. This condition threatens not only the environment but also public health, leading to increased disease risk, air and soil pollution, and a subsequent decline in quality of life (Budihardjo et al., 2023; Emmerik et al., 2022; Myszograj, 2022; Szabová et al., 2021).



Figure 1. Piles of Waste along Demang Akub Road, Sungai Bulan Sub District

In response to the conditions mentioned above, concrete efforts are required to change

the mindset and behavior of the community in waste management through the Community Service Program (PPM). The objectives of this program are to raise awareness about the importance of environmental cleanliness, encourage community participation and involvement in maintaining a clean environment collectively, increase awareness, introduce sustainable practices, and inspire behavioral changes within the community, mainly through plastic waste management. The community must know the importance of maintaining environmental cleanliness and adequately managing waste. With awareness and active participation from all community elements, a clean, healthy, and sustainable environment is hoped to be achieved in Sungai Bulan Sub District. Furthermore, collaboration among all parties within the community, including the government, the public, and other relevant stakeholders, is crucial for successfully addressing this issue (Fitriana et al., 2023). Therefore, we are conducting a Community Service Program in this area.

Methods

The PPM program were held in Sungai Bulan Sub District, North Singkawang District, Singkawang City, West Kalimantan Province, specifically on Demang Akub Road (RT 10), employing the Asset-Based Community Development (ABCD) method. This method comprises several stages: asset reinventing, designing, communicating, implementing, and evaluating (Figure 2). The ABCD method is a common strategy used in community empowerment activities, particularly those focusing on raising awareness among the community to understand the obstacles to achieving a better social life (Santoso et al., 2022). The first stage involves data collection through observation, discussion, and consultation with the Head of Sungai Bulan Sub Districts (Figure 3). The second stage is designing activities that address the identified problems. The third stage is socialization and discussion with the community. The fourth stage involves implementing activities such as socialization, discussions, community service, signboards, and demonstrations of making paving blocks from recycled plastic. Finally, the fifth stage is evaluating activities through surveys or questionnaires.

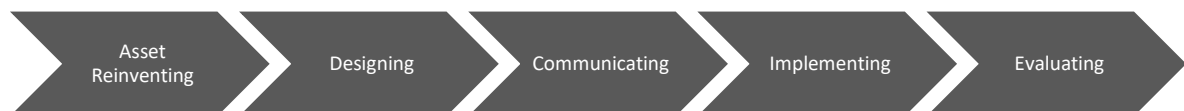


Figure 2. Workflow of the Program Using the ABCD Method

Based on the observations and discussions conducted, we decided to carry out activities, including socialization and discussions on the importance of maintaining environmental cleanliness, community service activities, and processing plastic waste by making paving blocks from recycled plastic. Overall, the activities were conducted from February 19 to March 10, 2024, from the observation stage to Evaluation. The peak of the activities was from March 8 to 10, 2024, with the most effective time being March 9, 2024. The community service activities were held on Demang Akub Road, Sungai Bulan Sub District, North Singkawang District, Singkawang City. This location was chosen based on the issue of waste accumulation on vacant

land along this road. The schedule of the PPM program is shown in [Table 1](#) below.

Table 1. Schedule of PPM Program in Sungai Bulan Sub District

Time	Activity
08.00 – 08.45	Presentation on Environmental Cleanliness and its Impact; Discussion with Participants/Community
08.45 – 10.30	Community Service Activities
10.30 – 10.50	Installation of "No Littering" Sign
10.50 – 11.50	Demonstration of Making Paving Blocks from Recycled Plastic
11.50 – 13.00	Closing

Source: PPM Program, 2024

In the final stage, Evaluation, we interviewed participants using a closed-ended questionnaire regarding the activities we had carried out. From the results of these interviews, we analyzed the data collected from the questionnaires to understand the impact and effectiveness of the activities. This evaluation process is a crucial step in ensuring the sustainability and improvement of the quality of the program we implemented.

Results and Discussion

Sungai Bulan Sub District is one of the seven sub-districts in North Singkawang District. According to its development, Sungai Bulan Sub District is classified as a self-sufficient village. A self-sufficient village is a village undergoing development, where its residents are beginning to optimize available resources but still face challenges related to financial shortages (Haruma, 2022). Sungai Bulan Sub District is the only village classified as self-sufficient, while the other villages are classified as self-reliant villages.

In the asset reinventing stage, we conducted thorough observations and discussions to identify the main issues faced by the Sungai Bulan Sub District community, particularly concerning environmental cleanliness. It was found that vacant lots used as dumping grounds have disrupted the cleanliness and aesthetics of the surrounding environment, specifically along Demang Akub Road in Sungai Bulan Sub District. Despite the existence of community work traditions, especially leading up to the month of Ramadan, the distant location of the final disposal site has posed difficulties for residents, leading them to dispose of waste in these vacant lots. It is suspected that involvement in this behavior extends beyond residents from outside Sungai Bulan Sub District, potentially involving local residents either through imitation or other reasons. Community complaints about these conditions serve as tangible evidence of the urgency of addressing environmental cleanliness issues in the area.

The observations and discussions conducted were consistent with research principles related to identifying environmental issues at the local level. During this stage, we performed observations, field surveys, and direct interactions with the community to identify existing problems ([Figure 3](#)). In identifying and addressing these challenges, the active involvement of community members is essential. The results of observations and field surveys indicated the presence of vacant lots used as dumping grounds. It was further underscored by community complaints regarding the environmental conditions, specifically the disposal of waste in vacant

lots that disrupt the living environment of residents around the waste disposal site. These findings align with research (Chukwuone, Amaechina, & Ifelunini, 2022), highlighting illegal dumping as a significant environmental cleanliness issue in urban areas.

The participatory approach adopted in data collection, where the community directly engages in the problem identification process, is also consistent with findings from research (Sulistyaningsih, 2022), emphasizing the importance of community participation in addressing environmental issues. These findings indicate that the methods used in this study align with recognized best practices in ecological research and sustainable development. Furthermore, the analysis of illegal waste dumping issues on Demang Akub Road, Sungai Bulan Sub District, is also linked to research findings by Gupta (2021), highlighting the importance of efficient waste management infrastructure in minimizing illegal dumping issues in urban areas. Therefore, recommended steps to address these issues, including enhancing community awareness and developing waste management infrastructure, align with recommendations from related published research.

The second stage, designing, aims to produce sustainable solutions that can be effectively implemented to improve environmental cleanliness in Sungai Bulan Sub Districts. In this stage, our implementation team will design a series of steps to address environmental cleanliness issues in Sungai Bulan Sub-Districts. The solutions we propose include raising awareness through socialization and discussions about the importance of maintaining ecological hygiene, organizing community clean-up activities, installing signs prohibiting littering, and demonstrating plastic waste processing. One of the innovations we suggest is converting plastic waste into paving blocks.

The design stage in developing solutions to address environmental cleanliness issues in the Sungai Bulan Sub-District is a crucial step that leads to concrete actions that are implementable by the community. Through adequate socialization and discussions involving active participation from residents, awareness of the importance of environmental preservation is expected to increase. This step aligns with research findings by Alber et al. (2020), which demonstrate that targeted environmental education and socialization can serve as important catalysts for changing community behavior related to the environment.

Furthermore, the periodic implementation of community clean-up activities (known as 'kerja bakti') is also a significant step in maintaining environmental cleanliness. Research by Fu & Guo (2022) highlights the effectiveness of community participation in these activities for enhancing environmental hygiene and fostering a sense of ownership toward the local environment. Additionally, as an innovative waste management approach, the demonstration of plastic waste processing into paving blocks can have a significant positive impact. References from Hamid et al. (2019) indicate that converting plastic waste into alternative building materials like paving blocks can reduce the amount of plastic waste ending up in the environment and enhance the value derived from such waste.



Figure 3. Coordination with the Head of Sungai Bulan Sub District and Installation of Banners at the Sungai Bulan Sub District Office

In the context of sustainability, these steps must be supported by ongoing commitment from the local community. Active participation in community clean-up activities, implementing environmental hygiene practices, and responsible waste management should become part of everyday culture and routines. Concerns about waste issues can be mitigated by increasing public awareness about proper waste handling (Putra & Wahid, 2019). Furthermore, Pathak et al. (2020) emphasize that establishing sustainable habits for environmental stewardship requires continuous support from various stakeholders, including local governments, community organizations, and individuals. Therefore, the designing phase aims not only to create practical solutions but also to ensure their adoption and long-term sustainability by the community.

Next, the Communicating phase is done through socialization activities and discussions with the community (Figure 4). We conduct this socialization and discussion by sending letters to the mayor, district, and relevant village authorities. Discussions are also held face-to-face or virtually with the Head of Sungai Bulan Sub District. Additionally, we install banners in front of the village office to inform the community about the upcoming community service activities. We take these steps to ensure effective coordination of the activities and to garner maximum support from all relevant stakeholders.



Figure 4. Socialization and Community Service for Cleaning Waste in Sungai Bulan Sub District

The Communicating phase emphasizes the importance of effective communication with relevant stakeholders and the community. This step aligns with research findings by Fontão et al. (2018), which demonstrate that good communication between project organizers and external stakeholders is crucial for successfully implementing community development projects. In this context, letters are sent to the mayor, district, and village authorities to inform them

about project plans and seek their support and collaboration.

Direct discussions with the Head of Sungai Bulan Sub District are also a crucial step in this phase. Research by Zanbar & Ellison (2019) highlights the importance of direct interaction with local leaders in identifying community needs and formulating appropriate solutions. Through face-to-face discussions, event organizers can receive direct input from local leaders regarding effective communication strategies and potential obstacles.

Additionally, modern communication technologies such as WhatsApp or phone calls play a significant role in facilitating communication between event organizers and the community. Research by Camarena & Fusi (2021) demonstrates that leveraging information and communication technology enhances accessibility and efficiency in engaging with the community, especially in community service activities. Therefore, the Communicating phase is not merely about conveying information but also building strong cooperation and coordination among event organizers, local government, and the community.

The next stage, Implementing, takes various forms, including socialization, discussions, Q&A sessions, signage installation, community clean-up, and a demonstration of creating paving blocks from recycled plastic (Figure 5). Twenty-five participants, aged 25 to 54, actively engage in these activities. The community's high enthusiasm reflects strong support for environmental improvement efforts in Sungai Bulan Sub District. These aligns with research findings by Malik et al. (2021), emphasizing the importance of community participation in achieving sustainable and significant environmental enhancements through community service activities.



Figure 5. The installation of prohibition signs against littering and the process of creating paving blocks from recycled plastic

In the Implementation phase, various activities such as socialization, discussions, Q&A sessions, signage installation, community clean-up, and a demonstration of creating paving blocks from recycled plastic are carried out to address environmental cleanliness issues in Sungai Bulan Sub District. 83.33% of the targeted 30 participants participated actively in implementing these activities. The high level of enthusiasm and active engagement from the community reflects their awareness of the importance of environmental preservation.

Making paving blocks from used plastic begins with preparing the necessary materials and tools. The materials used consist of plastic waste, such as plastic bottles and bags that have been dried, motor oil, or cooking oil used as mold lubricant. Most plastic waste is high-density polyethylene (HDPE) and polypropylene (PP). HDPE is often found in milk bottles, detergent bottles, and other packaging products that require high resistance to impact and chemicals

(Hutagaol, Lubis, & Siahaan, 2023). Meanwhile, PP is usually used for food containers, drink bottles, and other household products (Puspita & Noviani, 2021). These two types of plastic were chosen because they have long-lasting and stable properties, making them suitable for use as basic materials for intense and long-lasting paving blocks (Damayanti et al., 2022). The tools needed include a paving block mold, a cauldron or used pan for melting plastic, a heat source such as gas or wood, an old bucket, water for soaking, gloves, and a nose mask for safety reasons.

The first step in this process is to don gloves and a nose mask for personal protection. Next, ignite the flame and place the container to melt the plastic. Dry plastic pieces, cut into small fragments, are placed into the container, and the flame is carefully maintained to expedite the melting process. The melted plastic must be continuously stirred to prevent it from adhering to the container. Meanwhile, the paving block molds are coated with used oil or grease to facilitate the later release of the blocks. Once the plastic is fully melted, it is poured slowly into the molds and compacted by tapping the mold on the ground or striking its top surface with an iron plate. Subsequently, the mold containing the plastic is immersed in water in a bucket for approximately 5 minutes until the material solidifies. Finally, the solidified paving blocks are removed from the molds and ready for use.

No effort has been made to ascertain whether this program's paving blocks are environmentally friendly. However, more comprehensive steps should be added for further research or activities to ensure the paving blocks produced are genuinely environmentally friendly. These steps can include choosing the right type of plastic, such as high-density polyethylene (HDPE) and polypropylene (PP), which are more stable and durable (Siswoyo, Prayitno, & Rahma, 2022). Mixing plastic with additional materials such as sand or cement can also be carried out to ensure the strength and integrity of paving blocks to reduce the risk of releasing microplastic particles (Yusrianti, Noverma, & Hapsari, 2019). In addition, periodic quality and durability tests of the final product need to be carried out to ensure that the paving blocks do not quickly degrade or crumble over time. This approach allows high-quality paving blocks from used plastic to be produced and is safe for the environment, thereby minimizing negative impacts on the ecosystem and human health.

In this program, the Sungai Bulan Sub District Head also expressed his commitment to continue efforts to maintain the cleanliness of the location on Jalan Demang Akub, which will be used as a *juadah* market during the month of Ramadan with the condition that residents must maintain the cleanliness of the local environment. The Waste Task Force will continue to hold similar activities by introducing more about making paving blocks from used plastic to the local community, showing its seriousness in expanding plastic waste management initiatives. In addition, the program continued with the installation of signs prohibiting littering, which also served as education regarding Singkawang City Regional Regulation Number 3 of 2006 concerning Waste Management/Cleanliness and the threatened criminal sanctions (Pemerintah Kota Singkawang, 2006). Article 22 states that throwing any rubbish that violates the Regional Regulation will result in criminal sanctions in the form of imprisonment for a maximum of 6 months or a fine of up to 50 million Rupiah. Most of the new participants are aware of criminal

sanctions and penalties imposed by these regulations.

The importance of active community participation in community service activities to achieve significant results in improving the environment aligns with research findings by Naku, D.W.C., Kihila, J., & Mwageni (2021). In this context, the high level of participation of the Sungai Bulan community in implementation activities shows that the approach adopted in implementing the activities has successfully motivated and mobilized the community to keep their environment clean. Therefore, this Implementation stage is not just about carrying out activities but is also an essential step in building awareness and active involvement of the community in sustainably maintaining environmental cleanliness.

Implementing the Community Service Program reveals a significant difference in the environment before and after cleaning activities. Initially, the vacant land was cluttered with piles of trash, disrupting the scenery. However, after the clean-up, it is evident that the roadside area has become more spacious, and the overall ambiance is more pleasant (Figure 6). This positive transformation results from collaboration among all parties involved in environmental clean-up efforts.



Figure 6. Comparison before and after environmental cleaning activities

The final stage, Evaluation, is conducted by assessing the activities through questionnaires or surveys. The results in Table 2 indicate that most participants express high interest and a strong desire to engage in independent activities (54.55%) and explore plastic recycling as a business opportunity (45.45%). These reflect respondents' high awareness and enthusiasm regarding plastic waste management efforts and its potential utilization. Furthermore, the questionnaire evaluation results show unanimous agreement among all participants that similar activities should be repeated, emphasizing the importance of continuity in educating and managing plastic waste within the community. These findings suggest significant potential for expanding public understanding and participation in plastic waste management and opportunities for developing sustainable initiatives in its utilization.

The findings from the Evaluating stage highlight the high level of awareness and interest of the Sungai Bulan community in plastic waste management and its use as a business opportunity. This finding is strengthened by Gupta's (2021) research, which emphasizes the importance of active community participation in plastic waste management efforts to achieve sustainable results. In this context, respondents' high interest in processing plastic into business

opportunities shows excellent potential for developing sustainable economic initiatives based on recycling plastic waste.

Table 2. Percentage of Questionnaire Answers from PPM Socialization and Community Service Participants in Sungai Bulan Sub District

No.	Question	Answer	Percentage
1.	Are you previously aware of the process of creating paving blocks from plastic?	Not Aware Aware	63.64 36.36
2.	What would you typically do if you encounter a significant amount of plastic waste?	Discard it Burn it Repurpose it	36.36 9.09 54.55
3.	Is this program beneficial in enhancing your knowledge about environmental pollution and using plastic waste as paving blocks?	Not beneficial Beneficial Highly beneficial	- 27.27 72.73
4.	Are you interested in independently conducting similar activities in the future?	Not interested Interested Very Interested	18.18 27.27 54.55
5.	Are you interested in exploring plastic recycling as a business opportunity?	Not interested Interested Very Interested	9.09 45.45 45.45
6.	Do you agree that similar community service activities should be repeated?	Agree Not Agree	100.00 -

Source: PPM Activities, 2024

In addition, the agreement from all participants that similar activities need to be carried out again shows the importance of continuity in education and management of plastic waste in society. References from research by Wibowo & Lestari (2024) support these findings by highlighting the importance of sustainable programs in changing behavior and building community environmental awareness. Thus, the evaluation results strongly encourage continuing development of efforts to educate and manage plastic waste in the Sungai Bulan Sub-District as part of efforts towards a more environmentally sustainable society.

Conclusion

The community service program in Sungai Bulan Sub District was successfully carried out. Through collaboration among students, community members, and relevant stakeholders, awareness about the importance of environmental cleanliness has increased. The stages of solution development, including asset reinventing, designing, communicating, implementing, and evaluating, illustrate the efforts made to address environmental hygiene issues in the area. Various activities such as socialization, community clean-up, and a demonstration of creating paving blocks from recycled plastic have successfully increased community participation and deepened understanding of environmental issues and their health impacts. Support from local government and community members has further strengthened the effectiveness and sustainability of this community service initiative. The results demonstrate high community participation and strong enthusiasm from Sungai Bulan Sub District residents. For future

research or activities, it is recommended to incorporate more comprehensive steps to ensure that the resulting paving blocks are durable, long-lasting, and environmentally safe. Thus, this community service program has positively impacted the residents of Sungai Bulan Sub District and is expected to serve as a foundation for ongoing efforts in building an empowered community and a cleaner, healthier environment.

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References

- Alber, J. M. et al. (2020). Highlighting Contributions of Behavioral and Social Sciences in Advancing Public Health: Where We've Come, Where We're Headed. *Journal of Public Health Management and Practice*. <https://doi.org/10.1097/phh.0000000000001114>
- Alfian, R., & Phelia, A. (2021). Evaluasi Efektifitas Sistem Pengangkutan Dan Pengelolaan Sampah Di Tpa Sarimukti Kota Bandung. *JICE (Journal of Infrastructural in Civil Engineering)*, 2(01), 16. <https://doi.org/10.33365/jice.v2i01.1084>
- Badan Pusat Statistik Indonesia. (2023). Mid Year Population (Thousand People), 2022-2023. Diambil 19 Maret 2024, dari <https://www.bps.go.id/en/statistics-table/2/MTk3NSMy/jumlah-penduduk-pertengahan-tahun--ribu-jiwa-.html>
- Badan Pusat Statistik Kota Singkawang. (2024). *Kota Singkawang Dalam Angka 2024*. Singkawang: Badan Pusat Statistik Kota Singkawang.
- Budihardjo, M. A. et al. (2023). Open Bin Composter Method as an Alternative to Organic Waste Processing in Temanggung Regency. *Iop Conference Series Earth and Environmental Science*. <https://doi.org/10.1088/1755-1315/1248/1/012032>
- Camarena, L., & Fusi, F. (2021). Always Connected: Technology Use Increases Technostress Among Public Managers. *The American Review of Public Administration*. <https://doi.org/10.1177/02750740211050387>
- Chukwuone, N., Amaechina, E. C., & Ifelunini, I. A. (2022). Determinants of Household's Waste Disposal Practices and Willingness to Participate in Reducing the Flow of Plastics Into the Ocean: Evidence From Coastal City of Lagos Nigeria. *Plos One*. <https://doi.org/10.1371/journal.pone.0267739>
- Damayanti, D. et al. (2022). Current Prospects for Plastic Waste Treatment. *Polymers*, 14(15), 3133. <https://doi.org/10.3390/polym14153133>
- Emmerik, T. van et al. (2022). Hydrology as a Driver of Floating River Plastic Transport. *Earth S Future*. <https://doi.org/10.1029/2022ef002811>
- Fitriana, K. N. et al. (2023). *Collaborative Governance in Developing Tourism Potential Through Tourism Villages*. https://doi.org/10.2991/978-2-494069-35-0_20
- Fontão, A. et al. (2018). Supporting Governance of Mobile Application Developers From Mining and Analyzing Technical Questions in Stack Overflow. *Journal of Software Engineering Research and Development*. <https://doi.org/10.1186/s40411-018-0052-6>
- Fu, Y., & Guo, Y. (2022). Community Environment Moderates the Relationship Between Older Adults' Need for and Utilisation of Home- and Community-based Care Services: The Case of China. *Health & Social Care in the community*. <https://doi.org/10.1111/hsc.13766>
- Gupta, P. (2021). Plastic Waste Management, a Concern for Community. *The Holistic Approach to Environment*. <https://doi.org/10.33765/thate.11.2.3>
- Gusmarti, D., Oktavia, D., & Walid, A. (2020). Pemanfaatan Limbah Sampah Rumah Tangga Untuk Mengurangi Pencemaran Lingkungan di Permukiman. *TIN: Terapan Informatika Nusantara*, 1(4), 154–156. Diambil dari <http://ejurnal.seminar-id.com/index.php/tin/article/view/448>

- Hamid, N. B. et al. (2019). Development of Paving Blocks Using Waste Materials. *International Journal of Innovative Technology and Exploring Engineering*. <https://doi.org/10.35940/ijitee.i3288.0789s319>
- Haruma, I. (2022). Apa Itu Desa Swadaya, Swakarya dan Swasembada? *Kompas.com*. Diambil dari <https://nasional.kompas.com/read/2022/07/27/01000031/apa-itu-desa-swadaya-swakarya-dan-swasembada->
- Hutagaol, L. P., Lubis, S. Y., & Siahaan, E. (2023). Analisis High Density Polyethylene Berserat Bambu Terhadap Kekuatan Tarik Dengan Variasi Temperature Melting Komposit Polimer. *Jurnal Teknik Industri Terintegrasi*, 8(1), 313–320. <https://doi.org/10.31004/jutin.v6i2.16418>
- Kementerian Koordinator Bidang Pembangunan Manusia dan Kebudayaan Republik Indonesia. (2023). 7,2 Juta Ton Sampah di Indonesia Belum Terkelola Dengan Baik. Diambil 19 Maret 2024, dari <https://www.kemenkopmk.go.id/72-juta-ton-sampah-di-indonesia-belum-terkelola-dengan-baik>
- Malik, A. et al. (2021). Community Partnership Program: Mangrove Planting in the Coastal Area of Garassikang Village, Jeneponto Regency, South Sulawesi. *Engagement Jurnal Pengabdian Kepada Masyarakat*. <https://doi.org/10.29062/engagement.v5i1.436>
- Myszograj, M. (2022). (ECO)Ethical Issues in Organizations Including Healthcare Facilities. *Civil and Environmental Engineering Reports*. <https://doi.org/10.2478/ceer-2022-0038>
- Naku, D. W. C., Kihila, J., & Mwageni, E. (2021). Community Participation Methods and Their Influence on Effective Community Participation in Development Programs in Tanzania. *International Journal of Social Science Research and Review*. <https://doi.org/10.47814/ijssrr.v4i4.131>
- Ngoc, U. N., & Schnitzer, H. (2009). Sustainable solutions for solid waste management in Southeast Asian countries. *Waste Management*, 29(6), 1982–1995. <https://doi.org/https://doi.org/10.1016/j.wasman.2008.08.031>
- Pathak, S. et al. (2020). *How Strategy Environment and Wealth Shape Altruistic Behaviour: Cooperation Rules Affecting Wealth Distribution in Dynamic Networks*. <https://doi.org/10.1101/2020.05.05.077131>
- Pemerintah Kota Singkawang. *Peraturan Daerah Kota Singkawang Nomor 3 Tahun 2006 Tentang Pengelolaan Persampahan/Kebersihan*. , (2006).
- Puspita, F., & Noviandri, I. (2021). Optimasi Pembuatan Elektroda Pasta Karbon Termodifikasi Poli (Metil Jingga) Untuk Penentuan Bisphenol a Secara Voltammetri. *Warta Akab*, 44(2). <https://doi.org/10.55075/wa.v45i1.3>
- Putra, H. P., & Wahid, S. N. (2019). Pembuatan Trainer Tempat Sampah Otomatis Guna Menyiasati Masalah Sampah Di Lingkungan Masyarakat. *JEEE-U (Journal of Electrical and Electronic Engineering-UMSIDA)*, 3(1), 120–137. <https://doi.org/10.21070/jeee-u.v3i1.2087>
- Santoso, B. et al. (2022). Upaya Penguatan Ketahanan Sosial Budaya Masyarakat melalui Literasi Digital. *Jurnal Inovasi Hasil Pengabdian Masyarakat (JIPEMAS)*, 5(3), 436–446.
- Siswoyo, E., Prayitno, A. H., & Rahma, N. S. (2022). Paving Block Ramah Lingkungan Berbasis Lumpur Dari Instalasi Pengolahan Air Minum. *Jurnal Permukiman*, 17(1), 9. <https://doi.org/10.31815/jp.2022.17.9-15>
- Sulistyaningsih, E. (2022). Community Participation in Improving Environmental Protection and Effort Management. *Top Conference Series Earth and Environmental Science*. <https://doi.org/10.1088/1755-1315/1030/1/012021>
- Szabová, E. et al. (2021). Assesment of the Marine Litter on the Romanian Black Sea Beaches. *Cercetări Marine - Recherches Marines*. <https://doi.org/10.55268/cm.2021.51.49>
- Tamyiz, M. et al. (2020). Pelatihan Pengelolaan Sampah Rumah Tangga Di Desa Kedungsumur, Kecamatan Krembung, Kabupaten Sidoarjo. *Journal of Science and Social Development*, 1(1), 16–23. <https://doi.org/10.55732/jossd.v1i1.162>
- Wibowo, A., & Lestari, E. (2024). Challenges and Opportunities in Building Environmental Awareness in the Keduang Watershed Region in Indonesia. *Top Conference Series Earth and Environmental Science*. <https://doi.org/10.1088/1755-1315/1302/1/012073>
- Yusrianti, Y., Noverma, N., & Hapsari, O. E. (2019). Analisis Sifat Fisis Penyerapan Air Pada Paving Block Dengan Campuran Variasi Limbah Abu Ketel Dan Limbah Botol Plastik. *Al-Ard Jurnal Teknik Lingkungan*, 5(1), 1–8. <https://doi.org/10.29080/alard.v5i1.747>

Zanbar, L., & Ellison, N. R. B. (2019). Personal and Community Factors as Predictors of Different Types of Community Engagement. *Journal of Community Psychology*.
<https://doi.org/10.1002/jcop.22219>