International Journal of Education and Life Sciences (IJELS)
Vol. 4, No. 4 April 2026: 393-404

Community Behavior Patterns and Social Adaptation Strategies Due to River Pollution in Berok Nipah Village, Padang Barat Subdistrict, Padang City

Irwan Irwan[1*], Anisa Putri[2], Fadhia Gina Putri[3], Yayank Jupita Sari[4], Froilan D Mobo[5]
[1234]Sociology Education, Faculty of Social Sciences and Humanities, PGRI University of West Sumatra
[5]Professor of Social Sciences and Information Technology, Philippine Merchant Marine, Philippines
Corresponding Author: Irwan: irwan7001@gmail.com

ARTICLE INFO

Keywords: Rivers, River Pollution, Community Behavior Patterns, Social Adaptation, Environmental Sociology

Received : 12 February
Revised : 23 March
Accepted: 23 April

ABSTRACT

River pollution in urban areas is a complex problem that directly impacts community behavior patterns and social adaptation strategies, as seen in Berok Nipah Village, Padang Barat Subdistrict, Padang City. The river, which once served as a source of life, now faces declining water quality due to the dominance of domestic and small-scale industrial waste, with a Pollution Index value reaching 2,126 in some segments. This phenomenon is exacerbated by limited land availability, poor sanitation access, and inadequate waste management facilities, leaving the community heavily reliant on the river for daily needs and direct waste disposal. This study employs a qualitative approach using observation, in-depth interviews, and documentation, along with data analysis using the Miles and Huberman model. The findings reveal that community behavior patterns are dominated by traditional customs and limited economic conditions, while emerging social adaptation strategies include community-driven river cleanup efforts, vertical housing development, urban farming, and self-managed waste management initiatives. However, these adaptation efforts still face significant challenges related to low environmental awareness and limited infrastructure support. These findings emphasize that addressing river pollution requires a holistic approach that integrates community empowerment, improved sanitation facilities, and sustainable environmental management policies to ensure community resilience and environmental quality.

DOI: https://doi.org/10.59890/ijels.v4i4.317
ISSN : 3026-2429
https://ntlmultitechpublisher.my.id/index.php/ijels

INTRODUCTION

The lives of the people living along the riverbanks of Berok Nipah Village, Padang Barat Subdistrict, Padang City, are closely intertwined with the river as a source of water, a place for domestic activities, and even as a means of waste disposal (Abrori & Hadi, 2020). This phenomenon is not unique to Berok Nipah but is also prevalent in various urban areas across West Sumatra, where rivers have undergone drastic changes in function due to human activities. Field data and various studies indicate that river pollution in this area has reached alarming levels, both in terms of water quality and the social impacts it causes (Zulfa & Nugraheni, 2020)..

In Berok Nipah, the river that was once a source of life has now experienced a significant decline in quality. Based on research on rivers with characteristics similar to those in Berok Nipah, the water quality status is classified as lightly to moderately polluted, with the Pollution Index (PI) value in some segments reaching 2.126 (Cuadra-Martínez et al., 2019). The primary sources of pollution stem from domestic waste, small-scale industries, and market activities, which collectively account for 80.32% of the total waste entering the river (Sari, 2021). Liquid waste from domestic activities such as bathing, washing, and defecation, as well as solid waste from households and markets, is discharged directly into the river through drains without prior treatment (Adetya & S, 2023).

In addition, spatial analysis in the Batang Arau watershed area, which includes Padang Barat District, shows that 39.48% of this area is at a high to very high level of pollution (IP value between 1.542–2.57) (Prasetiyo et al., 2019). Pollution concentrations are generally found in downstream areas, including Berok Nipah, due to the accumulation of waste from upstream areas and surrounding regions. Other studies have also identified the presence of microplastics and other pollutants originating from domestic and industrial waste, further exacerbating the river's condition (Syafri et al., 2020a).

The behavior patterns of communities along the riverbanks are greatly influenced by internal factors such as traditional customs and low environmental awareness, as well as external factors such as limited infrastructure for waste and wastewater management. Many residents still view the river as a place to dispose of waste, not as a source of clean water (Putri & Sari, 2024). This is exacerbated by the lack of temporary waste storage facilities (TPS) and minimal penalties for those who dispose of waste into rivers (Syafri et al., 2020b).

However, amidst these conditions, social adaptation strategies have emerged among the community (Kurniawan et al., 2022). One form of adaptation is the collective effort to clean the river periodically, though it has not yet been optimal in addressing the root of the problem (Rahmawati, 2023). Another emerging initiative is the construction of communal septic tanks and self-managed household waste management initiatives (Abbas et al., 2019). Some community groups have also begun to develop collective awareness not to dispose of waste directly into the river, though this remains limited to a small portion of residents (Gull et al., 2019).

From the Berok Nipah case, a causal pattern emerges: River degradation → Behavioral change → Social adaptation. Communities develop locally-based strategies such as river conservation through community cooperation and vertical settlement transformation (Tuanaya, 2024). These findings reflect the theory of environmental adaptation: communities affected by pollution respond through structured social innovation, albeit limited by policy and resources (Arneliwati et al., 2019).. This study highlights the need for a holistic approach that integrates law enforcement, sanitation infrastructure, and economic empowerment for sustainable recovery (Hajam et al., 2023).

Rivers are an important element in the social life of communities. They are not merely flowing waterways, but spaces that are integrated with the economic, cultural, and even spiritual activities of the communities living around them. As cities develop, the function of rivers gradually shifts. From being a source of life, many rivers have now become dumping grounds for household waste, small industries, and other activities that contribute to environmental pollution. One concrete example of this shift can be seen in the condition of the Kalimati River, which flows through the Berok Nipah neighborhood in Padang Barat subdistrict, Padang City (Turner, 2022).

Berok Nipah is a densely populated area with complex social characteristics. Its community consists of people from various economic and cultural backgrounds, most of whom depend on the surrounding environment for their daily activities (Molinillo et al., 2020). The Kalimati River, which once served as a transportation route and source of clean water, is now severely polluted. Domestic waste, household trash, and inadequate sanitation infrastructure have caused a drastic decline in water quality. This pollution not only causes ecological damage but also directly impacts the health, habits, and way of life of the surrounding community (Agag & El-Masry, 2016).

However, what is intriguing to observe is how the community continues to survive and adapt amid deteriorating environmental conditions (Kubota et al., 2020). The community does not simply abandon their living environment. Instead, they have developed various ways to adapt, both individually and collectively (Sembiring et al., 2024). They have created survival strategies, from obtaining clean water and disposing of waste to reorganizing social activities so that they can continue even though the environment is no longer ideal. In this context, it is important to understand more deeply how community behavior patterns are formed and how social adaptation strategies are developed organically in response to river pollution (Suardi et al., 2018).

RESEARCH METHODS

This study was conducted in Berok Nipah Village, Padang Barat Subdistrict, Padang City, West Sumatra (Davik, 2022). This location was chosen because of the significant pollution of its rivers due to household and small industrial waste, as well as changes in community behavior patterns and the development of social adaptation strategies in the area (Fadillah & Ratnasari, 2023). The following data collection techniques were used: 1) participatory

observation to directly observe community activities along the riverbanks, the physical condition of the river, and patterns of waste utilization and disposal; 2) in-depth interviews with key informants such as household heads, community leaders, market managers, and environmental agency officials to explore perceptions, experiences, and social adaptation strategies; 3) documentation in the form of secondary data collection from official water quality reports, pollution zoning maps, and documentation of community programs and activities related to environmental management (Taufiq & Tsauro, 2024).

The units of analysis used by the researchers were: individuals and households as the main actors in the patterns of waste utilization and disposal into rivers, and social groups or communities that developed social adaptation strategies, such as mutual aid groups and urban farming communities. In the data analysis process, the researchers used the thinking of Miles and Huberman (Safitra et al., 2021)which includes three main components, namely: 1) data reduction, simplifying and sorting data to focus on the main issues. 2) data presentation, arranging data in the form of matrices, tables, and diagrams to facilitate interpretation. And 3) drawing conclusions and verification, triangulating data and member checking with informants to validate findings (Muliawaty et al., 2022). This process is cyclical and iterative until the data reaches saturation and credible conclusions can be produced (Sutarto, 2022).

RESULTS AND DISCUSSION

General Description of the River Area

Berok Nipah Village is a densely populated settlement with limited land and vertical housing along the riverbank (Bartolacci et al., 2019). The river experiences mild to moderate pollution with an IP of 2.126, mainly due to domestic and small industrial waste (Meliati & Sundayani, 2021). The settlement is prone to flooding and sedimentation due to waste accumulation, with the majority of residents having low incomes (ST et al., 2024).

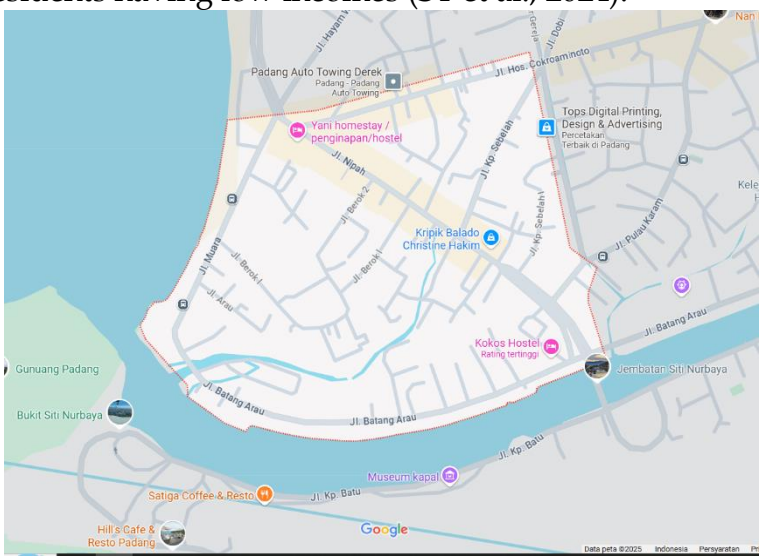

Figure 1. Berok Nipah Region

Table 1. Water Quality Assessment Index in the Batang Arau River, Padang City

		Titik Pengukuran	Indeks Pencemaran	Keterangan
Sungai Arau Padang	Batang Kota	Lubuk Paraku	0,37	Memenuhi Baku Mutu
		Jembatan Beringin	0,38	Memenuhi Baku Mutu
		Jembatan Lubeg ByPass	1,3	Tidak Memenuhi Baku Mutu
		Jembatan Aur Duri	1,5	Tidak Memenuhi Baku Mutu
		Subarang Padang	1,1	Tidak Memenuhi Baku Mutu
		Muaro (Siti Nurbaya)	1,65	Tidak Memenuhi Baku Mutu

Based on the table above, it shows that out of six measurement points in the Batang Arau River in Padang City, only two points (Lubuk Paraku and Jembatan Beringin) meet water quality standards, while the other four points (Jembatan Lubeg ByPass, Jembatan Aur Duri, Subarang Padang, and Muaro/Siti Nurbaya) do not meet the quality standards with relatively high pollution indices (ranging from 1.1 to 1.65). This indicates a serious issue regarding water pollution in most of the river's flow (Marasabessy et al., 2019).

Table 2. Types of Water Pollution in Batang Arau in 2022

No.	Jenis	Jumlah
1	Mikroplastik	144
2	Flamen	125
3	Fiber	16
4	Partikel	3

The data above shows that various types of water pollution were recorded in Batang Arau in 2022, with microplastics being the most prevalent type of pollution (144 cases), followed by flamen (125), fiber (16), and particles (3). The dominance of microplastics and flamen indicates that domestic and industrial waste, particularly plastic and textile waste, are the primary sources of river pollution (Hettiarachchi, 2019). This poses a potential threat to the river ecosystem and public health (Erul & Woosnam, 2022).

Table 3. Number of Villages/Subdistricts in Padang City Based on River Water Pollution in 2014, 2018, and 2021

No.	Kota Padang	Tahun		
		2014	2018	2021
		20	57	24

The table above shows the number of villages/subdistricts in Padang City affected by river water pollution in 2014, 2018, and 2021. The number increased dramatically from 20 villages/subdistricts in 2014 to 57 in 2018, then decreased to 24 in 2021 (Taweesan et al., 2025). This fluctuation indicates that water pollution in the area had spread extensively, although it later decreased. However, the number of villages/subdistricts affected in 2021 remains higher than in 2014, meaning the pollution issue has not yet been fully resolved (Linda Gea Vetrycia et al., 2024).

Community Behavior Patterns

The behavior patterns of the community in Berok Nipah Village are greatly influenced by local socioeconomic and cultural conditions (Brotosusilo et al., 2022). From interviews and observations, several main behavior patterns were identified: 1) Dependence on the river as a source of water and a place for waste disposal. The majority of residents use river water for daily needs such as bathing, washing, and sometimes cooking, even though the water quality has declined. This is due to limited access to clean water from other sources (da Silva et al., 2019). Additionally, the river is also used as a direct disposal site for household waste and liquid waste from small industries (Khan et al., 2022). This behavior is supported by traditional customs and a lack of awareness of the impacts of pollution on health and the environment. 2) Lack of Environmental Awareness and Waste Management Facilities, as found in similar studies along other rivers (Sungai Damar, Sungai Percut), the community shows a low perception of the importance of maintaining river cleanliness. The absence of adequate waste disposal facilities and waste transportation systems is the main factor driving the behavior of littering waste into the river (Budiman, 2021). In Berok Nipah, a similar situation occurs, where most residents do not sort their waste and dispose of it directly into the river or nearby drains. 3) Limited Social Activities in Environmental Management, community participation in collective efforts or volunteer work to clean the river and surrounding environment remains low. Only a small number of residents regularly participate in such activities, while the majority are reluctant or do not have the time and resources to participate. This is consistent with findings in Pedamaran Subdistrict and Percut Village, which show that less than 15% of residents regularly participate in community service activities (Zulfa & Nugraheni, 2020). 4) Limited Lifestyle Due to Economic Conditions; the majority of residents have low incomes, so their main priority is to meet basic needs. Awareness and ability to invest in environmental management or better sanitation are still very limited (Herdiansyah et al., 2021). This leads to a pragmatic behavior pattern that pays little attention to the long-term impacts of river pollution (Rakhimova, 2022).

Figure 2. River Pollution

Social Adaptation Strategies

Amidst pollution and limited facilities, the Berok Nipah community has developed various social adaptation strategies to survive and reduce the negative environmental impacts: 1) Mutual Assistance and Community Service, although participation is not yet evenly distributed, several community groups regularly organize community service activities to clean up trash along the riverbanks. These activities are a form of collective response to environmental degradation, while also strengthening social solidarity. 2) Vertical Housing Development: Due to land constraints, residents are building vertical homes along the riverbanks (Saad & Williams, 2016). This strategy allows them to optimize limited space, though it also poses new challenges such as increased sedimentation and flood risks. 3) Urban Farming and Food Security Initiatives (Singer et al., 2019): Some communities have begun developing vertical vegetable gardens and urban farming in their yards as an effort to improve food security and reduce dependence on external resources. Programs such as "PPKM Warga" that emerged during the pandemic are also examples of effective social adaptation at the local level. 4) Raising Awareness Through Socialization and Environmental Education: There are efforts by community groups and relevant agencies to raise environmental awareness through socialization, distribution of educational leaflets, and waste management training. Although not yet optimal, these steps are beginning to change the behavior of some residents to be more concerned about river cleanliness. And 5) Independent Waste Management, some households have begun to build simple septic tanks and manage domestic waste independently to reduce direct pollution into rivers (Chávez et al., 2020). This is a form of adaptation that emerged spontaneously as a response to deteriorating environmental conditions (Kurniawan et al., 2023)

The phenomenon occurring in Berok Nipah Village reflects a common pattern among riverside communities in urban areas in Indonesia, where river pollution is a complex issue involving social, economic, and environmental aspects. The physical conditions of densely populated and limited areas, combined with low awareness and inadequate waste management facilities, lead to environmentally unfriendly behavior among residents. Data from various case studies in other areas (Damar River, Percut River) show similar patterns: low

awareness of pollution, limited waste management facilities, and limited participation in environmental activities. This underscores that river pollution is not merely a technical issue but also a socio-cultural one requiring a comprehensive community empowerment approach (Hertati, 2023). Social adaptation strategies emerging in Berok Nipah, such as community cooperation, vertical housing, and urban farming, are important local innovations that need to be understood and supported. However, the sustainability of these strategies heavily depends on policy support, infrastructure provision, and enhanced community capacity (Sutarih et al., 2019). Therefore, efforts to address river pollution must integrate technical and social approaches, involving the active participation of communities, governments, and other stakeholders to create a healthy and sustainable environment along the Berok Nipah riverbanks and surrounding areas

CONCLUSION

Based on the results of research on community behavior patterns and social adaptation strategies due to river pollution in Berok Nipah Village, Padang Barat District, Padang City, several key conclusions can be drawn as follows: First, Berok Nipah Village is a densely populated residential area with limited land and vertical housing along the riverbank. The river experiences light to moderate pollution due to domestic and small-scale industrial waste, which degrades environmental quality and increases the risk of flooding and public health issues. Second, the community remains highly dependent on the river as a water source and waste disposal site, influenced by traditional customs and limited waste management facilities. Environmental awareness and active participation in environmental management remain low, primarily due to limited socio-economic conditions. Third, the community has developed social adaptation strategies such as collective river cleaning, vertical housing development, urban farming, and local food security programs. Efforts to raise awareness through socialization and independent waste management have begun, although policy and infrastructure support is still needed to ensure the sustainability of these adaptations.

Addressing river pollution in Berok Nipah requires a holistic approach involving community empowerment, improved sanitation facilities, and integrated environmental management policies to achieve the sustainability of the river ecosystem and the well-being of riverside communities

REFERENCES

Abbas, J., Aman, J., Nurunnabi, M., & Bano, S. (2019). The Impact Of Social Media On Learning Behavior For Sustainable Education: Evidence Of Students From Selected Universities In Pakistan. *Sustainability*, *11*(6), 1683. Https://Doi.Org/10.3390/Su11061683

Abrori, M. S., & Hadi, M. S. (2020). Integral Values In Madrasah: To Foster Community Trust In Education. *Istawa : Jurnal Pendidikan Islam*, *5*(2), 160. Https://Doi.Org/10.24269/Ijpi.V5i2.2736

Adetya, S., & S, Y. V. (2023). Analysis Of Self-Control As A Predictor Of Healthy Behavior In Adolescents. *Jurnal Eduscience*, *10*(2), 615–623. Https://Doi.Org/10.36987/Jes.V10i2.4606

Agag, G., & El-Masry, A. A. (2016). Understanding Consumer Intention To Participate In Online Travel Community And Effects On Consumer Intention To Purchase Travel Online And Wom: An Integration Of Innovation Diffusion Theory And Tam With Trust. *Computers In Human Behavior*, *60*, 97–111. Https://Doi.Org/10.1016/J.Chb.2016.02.038

Arneliwati, Agrina, & Dewi, A. P. (2019). The Effectiveness Of Health Education Using Audiovisual Media On Increasing Family Behavior In Preventing Dengue Hemorrhagic Fever (Dhf). *Enfermeria Clinica*, *29*, 30–33. Https://Doi.Org/10.1016/J.Enfcli.2018.11.013

Bartolacci, F., Cerqueti, R., Paolini, A., & Soverchia, M. (2019). An Economic Efficiency Indicator For Assessing Income Opportunities In Sustainable Waste Management. *Environmental Impact Assessment Review*, *78*, 106279. Https://Doi.Org/10.1016/J.Eiar.2019.05.001

Brotosusilo, A., Utari, D., Negoro, H. A., Firdaus, A., & Velentina, R. A. (2022). Community Empowerment Of Waste Management In The Urban Environment: More Attention On Waste Issues Through Formal And Informal Educations. *Global Journal Of Environmental Science And Management*, *8*(2), 209–224.

Chávez, J., Osorio, F., Altamirano, E., Raymundo, C., & Dominguez, F. (2020). Lean Production Management Model For Sme Waste Reduction In The Processed Food Sector In Peru. *Advances In Manufacturing, Production Management And Process Control: Proceedings Of The Ahfe 2019 International Conference On Human Aspects Of Advanced Manufacturing, And The Ahfe International Conference On Advanced Production Management And Process Con*, 53–62. Https://Doi.Org/Https://Doi.Org/10.1007/978-3-030-20494-5_5

Cuadra-Martínez, D., Sandoval-Díaz, J., Perez-Zapata, D., Castro-Carrasco, P., Véliz-Vergara, D., Guzman-Ávalos, J., & Ramos-Thompson, G. (2019). Helping One's Neighbor: Teaching And Learning Prosocial Behavior In A Religious Community. *Religions*, *10*(9), 515.

Da Silva, L., Marques Prietto, P. D., & Pavan Korf, E. (2019). Sustainability Indicators For Urban Solid Waste Management In Large And Medium-Sized Worldwide Cities. *Journal Of Cleaner Production*, *237*, 117802. Https://Doi.Org/10.1016/J.Jclepro.2019.117802

Davik, F. I. (2022). Evaluasi Program Sanitasi Total Berbasis Masyarakat Pilar Stop Babs Di Puksesmas Kabupaten Probolinggo. *Jurnal Administrasi Kesehatan Indonesia*, *4*(2), 107. Https://Doi.Org/10.20473/Jaki.V4i2.2016.107-116

Erul, E., & Woosnam, K. M. (2022). Explaining Residents' Behavioral Support For Tourism Through Two Theoretical Frameworks. *Journal Of Travel Research*,

61(2), 362–377. Https://Doi.Org/10.1177/0047287520987619

Fadillah, A. S., & Ratnasari, L. (2023). Fanaticism Of Consumptive Behavior Of Merchandise Purchasing In Student Boyband Fans. *Formosa Journal Of Science And Technology*, *2*(1), 27–38. Https://Doi.Org/10.55927/Fjst.V2i1.2339

Gull, H., Zafar Iqbal, S., Al_Qahtani, S. H., Alassaf, R. A., & Kamaleldin, M. M. (2019). Impact Of Social Media Usage On Married Couple Behavior A Pilot Study In Middle East. *International Journal Of Applied Engineering Research*, *14*(6), 1368–1378.

Hajam, Y. A., Kumar, R., & Kumar, A. (2023). Environmental Waste Management Strategies And Vermi Transformation For Sustainable Development. *Environmental Challenges*, *13*(April), 100747. Https://Doi.Org/10.1016/J.Envc.2023.100747

Herdiansyah, H., Saiya, H. G., Afkarina, K. I. I., & Indra, T. L. (2021). Coastal Community Perspective, Waste Density, And Spatial Area Toward Sustainable Waste Management (Case Study: Ambon Bay, Indonesia). *Sustainability (Switzerland)*, *13*, 2–14. Https://Doi.Org/10.3390/Su131910947

Hertati, D. (2023). Penta Helix Collaboration Model In Handling Problems Of Waste Management. *Nusantara Science And Technology Proceedings*, 371–377.

Hettiarachchi, H. (2019). The Peak Of Sustainable Waste Management Assures The Sustainability Of Natural Resources, But Only In A Circular Economy. *Proceedings Of The International Conference On Sustainability Of Natural Resources, Qassim, Saudi Arabia*, 5–6.

Khan, A. H., López-Maldonado, E. A., Alam, S. S., Khan, N. A., López, J. R. L., Herrera, P. F. M., Abutaleb, A., Ahmed, S., & Singh, L. (2022). Municipal Solid Waste Generation And The Current State Of Waste-To-Energy Potential: State Of Art Review. *Energy Conversion And Management*, *267*, 115905. Https://Doi.Org/10.1016/J.Enconman.2022.115905

Kubota, R., Horita, M., & Tasaki, T. (2020). Integration Of Community-Based Waste Bank Programs With The Municipal Solid-Waste-Management Policy In Makassar, Indonesia. *Journal Of Material Cycles And Waste Management*, *22*(3), 928–937. Https://Doi.Org/Https://Doi.Org/10.1007/S10163-020-00969-9

Kurniawan, T. A., Dzarfan Othman, M. H., Hwang, G. H., & Gikas, P. (2022). Unlocking Digital Technologies For Waste Recycling In Industry 4.0 Era: A Transformation Towards A Digitalization-Based Circular Economy In Indonesia. *Journal Of Cleaner Production*, *357*(April), 131911. Https://Doi.Org/10.1016/J.Jclepro.2022.131911

Kurniawan, T. A., Othman, M. H. D., Liang, X., Goh, H. H., Gikas, P., Kusworo, T. D., Anouzla, A., & Chew, K. W. (2023). Decarbonization In Waste Recycling Industry Using Digitalization To Promote Net-Zero Emissions And Its Implications On Sustainability. *Journal Of Environmental*

Management, *338*, 117765. Https://Doi.Org/10.1016/J.Jenvman.2023.117765

Linda Gea Vetrycia, D., Sukardi, Riki Mukhaiyar, & Nurfarhanah. (2024). Study Of The Concept Of Vocational Guidance And Counseling In Vocational Schools. *Jtp - Jurnal Teknologi Pendidikan*, *25*(3), 539–551. Https://Doi.Org/10.21009/Jtp.V26i1.45471

Marasabessy, S., Latuamury, B., Iskar, I., & Suhendy, C. C. V. (2019). Persepsi Masyarakat Mengenai Peranan Vegetasi Kawasan Sabuk Hijau Di Sempadan Sungai Das Wae Batu Gajah. *Makila*, *13*(1), 14–28. Https://Doi.Org/10.30598/Makila.V13i1.2317

Meliati, L., & Sundayani, L. (2021). Upaya Peningkatan Pengetahuan Remaja Dalam Pendewasaan Usia Perkawinan Dimasa Pandemi Covid-19. *Selaparang Jurnal Pengabdian Masyarakat Berkemajuan*, *5*(1), 919. Https://Doi.Org/10.31764/Jpmb.V5i1.6560

Molinillo, S., Anaya-Sánchez, R., & Liébana-Cabanillas, F. (2020). Analyzing The Effect Of Social Support And Community Factors On Customer Engagement And Its Impact On Loyalty Behaviors Toward Social Commerce Websites. *Computers In Human Behavior*, *108*, 105980. Https://Doi.Org/10.1016/J.Chb.2019.04.004

Muliawaty, L., Firdausijah, R. T., & Achmad, W. (2022). Implementation Of Waste Management Policies By The Main Waste Bank In Realizing The Effectiveness Of The Waste Program In The City Of Bandung. *Res Militaris*, *12*(2), 1906–1913. Https://Doi.Org/Https://Doi.Org/10.1016/J.Scs.2023.104765

Prasetiyo, W. H., Kamarudin, K. R., & Dewantara, J. A. (2019). Surabaya Green And Clean: Protecting Urban Environment Through Civic Engagement Community. *Journal Of Human Behavior In The Social Environment*, *29*(8), 997–1014.

Rakhimova, N. (2022). Recent Advances In Alternative Cementitious Materials For Nuclear Waste Immobilization: A Review. *Sustainability*, *15*(1), 689. Https://Doi.Org/10.3390/Su15010689

Saad, J. M., & Williams, P. T. (2016). Catalytic Dry Reforming Of Waste Plastics From Different Waste Treatment Plants For Production Of Synthesis Gases. *Waste Management*, *58*, 214–220. Https://Doi.Org/10.1016/J.Wasman.2016.09.011

Safitra, L., Yuliani, F., & Tofandi, A. (2021). Stunting Prevention Program In North Bengkulu Regency. *Jurnal Ilmu Sosial Mamangan*, *10*(2), 119–129. Https://Doi.Org/10.22202/Mamangan.V10i2.4942

Sembiring, M. M. B., Nathanael, E. E., & Tarigan, K. E. (2024). Pragmatic Functions Of Illocutionary Acts In Karo Wedding Rituals: Shaping Social Behavior And Community Identity. *Ina-Pra International Pragmatics Conference*, *1*(1), 9–30.

Singer, J., Kieu, K. T., & Pravitasari, A. E. (2019). Solid Waste Management In Tourist Destinations In Developing Nations: Case Studies In Hoi An, Vietnam, And Puncak, Indonesia. In *Environmental Sustainability And Education For Waste Management: Implications For Policy And Practice* (Pp. 189–206). Springer. Https://Doi.Org/10.1007/978-981-13-9173-6_11

St, A., Lubis, S. R. H., & Mardiana, D. (2024). Analysis Of Risk Factor Traffic Crashes And Implementation Of Road Safety: A Systematic Literature Review. *Jurnal Kesehatan*, 161–175. Https://Doi.Org/10.23917/Jk.V17i2.5354

Sutarto. (2022). Qualitative Study Of Local Cultural Wisdom And Health Services On Stunting Events. *Indonesian Journal Of Medical Anthropology*, *3*(1), 1–7. Https://Doi.Org/10.32734/Ijma.V3i1.7569

Syafri, S., Surya, B., Ridwan, R., Bahri, S., Rasyidi, E. S., & Sudarman, S. (2020a). Water Quality Pollution Control And Watershed Management Based On Community Participation In Maros City, South Sulawesi, Indonesia. *Sustainability*, *12*(24), 10260. Https://Doi.Org/10.3390/Su122410260

Syafri, S., Surya, B., Ridwan, R., Bahri, S., Rasyidi, E. S., & Sudarman, S. (2020b). Water Quality Pollution Control And Watershed Management Based On Community Participation In Maros City, South Sulawesi, Indonesia. *Sustainability*, *12*(24), 10260. Https://Doi.Org/10.3390/Su122410260

Taufiq, F., & Tsauro, A. (2024). Radical Turn: The Case Of Front Persaudaraan Islam (Neo-Fpi) In Indonesia. *Journal Of Asian Wisdom And Islamic Behavior*, *2*(1). Https://Doi.Org/10.59371/Jawab.V2i1.67

Taweesan, A., Kanabkaew, T., Surinkul, N., & Polprasert, C. (2025). Integrating Clustering Algorithms And Machine Learning To Optimize Regional Snapshot Municipal Solid Waste Management For Achieving Sustainable Development Goals. *Environmental Advances*, *19*(August 2024), 100607. Https://Doi.Org/10.1016/J.Envadv.2024.100607

Tuanaya, W. (2024). Building Eco-Friendly Cities: Government-Community Collaboration In Shaping Sustainable Urban Waste Management. *Baileo: Jurnal Sosial Humaniora*, *1*(3), 281–292. Https://Doi.Org/10.30598/Baileofisipvol1iss3pp281-292

Turner, C. R. (2022). Black Family Childcare Providers' Roles As Community Mothers During The Covid-19 Pandemic. In *Journal Of Human Behavior In The Social Environment* (Vol. 31, Issues 1–4, Pp. 313–332). Taylor & Francis. Https://Doi.Org/10.1007/978-3-030-96977-6_16

Zulfa, V., & Nugraheni, P. L. (2020). Effectiveness Of Community Empowerment In Waste Management Program To Create Sustainable Tourism In Karawang, West Java. *Iop Conference Series: Earth And Environmental Science*, *485*(1). Https://Doi.Org/10.1088/1755-1315/485/1/012087