

Impact of Environmental Pollution in Enggros Tribe Women's Forest

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Abstract: The environment has a close relation to the people, and the condition of the environment affects the livelihood of many people. The condition of women's forests as the source of livelihood of the Enggros Tribe has been in critical condition. Human activities have been causing a decrease in water quality and increased waste from upstream. This condition has been causing social, economic, and environmental impacts. This study explores women's forests' social, economic, and environmental impact on the Enggros Tribe. The study used in-depth interviews to collect the data. The result of this study shows that the social impact of the women's forest was that the space of the women of Enggros Tribe had been endangered, and the economic impact has been causing a decrease in the total catch of clams and fish. Also, the environmental impact has been causing the water to become polluted. A serious and effective effort to restore the condition was needed.

Keywords: Conservation; Customary forest; Enggros tribe; Impacts; Women's forest

Introduction

Ocean was one of the sources of livelihood in the coastal areas (Winata, 2023). However, the reality was that the condition of the ocean had been polluted, such as waste accumulation, smells, and changes in the watercolor, which is not decent to be consumed by human and have a negative potential for the environment and people that live in the area. The condition of the ocean that has been polluted also affects the condition of the mangrove forests in the coastal areas (Rasyid et al., 2022). The appearance of mangrove forest in coastal areas has much utilization of physical, biological, and economic aspects (Heriyanto &

Subiandono, 2011). The function of mangrove forest has provided physical utilization has been provided by the function of mangrove forest to preserve the preservation of mangrove ecosystem and the surroundings such as holding the abrasion of sea water and absorb the heavy pollutant (Heriyanto & Subiandono, 2011). Also, mangrove forests can be one of the global climate change mitigations through carbon saving and sequestration (Adame et al., 2018). The biological utilization of mangrove forest is closely related to providing natural resources and habitats for many floras and fauna (Adame et al., 2018). On the ecological aspects, mangrove could be the place of many species such as

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fish, crabs, and shrimps to survive (Purwantari & Darwati, 2023).

Mangrove forest management in Youtefa Bay, Jayapura, Papua have been done by customary law of Enggros Tribe (Titiyoga, 2020). The customary law has been stated the mangrove forest was only for women of enggros tribe through the tradition that caled "Ton" or "Tonotwiyat" or "Women's Forest" (Titiyoga, 2020). All area of the mangrove forest only for women and men will be finding fish on the ocean that if men going through the area of Women's Forest, they will be got a customary penalty by the head of customs. In other words, men were forbidden to going through the area of this mangrove forest (Elisabeth, 2019). However, the condition of mangrove in Women's Forest became a concern. Hamuna et al. (2018) in their research shows that the mangrove from 397,45 Ha in 1994 become 233,12 Ha in 2017, the decreasing of mangrove mainly caused by anthropogenic activities. Also, in the last few years there has been pollution in the Women's Forest on Youtefa Bay. Through the data by the service office of environment and forestry in Jayapura, it has been stated that the waste generation of Jayapura City have been reaching 253 ton/day or 7.597 ton/month or 91.170 ton/year (Service Office of Environment and Forestry Jayapura City Papua, 2020).

This waste accumulation has been dominated by the activities of the people in Jayapura that have been reaching 422.083 people that are dominated by household waste (Service Office of Environment and Forestry Jayapura City Papua, 2020). Abepura District, the location of Women's Forest was the most producer of waste that reaching 27.709 ton/year. In Abepura District also has mouth of Acai River that has been flowing the waste that going to the Women's Forest. This research aims to study the pollution impact of waste generation in Women's Forest. The waste generation that has been going through the Women's Forest can be causing various impact on the environmental, social, and economical aspects for Enggros Tribe's Women. Also, deforestation and pollution had tied each other. For example, Muttaqin et al. (2019) shows that by conducting environmental protection on forest could reduce the emission and could reduce forest degradation. Also, Bose (2023) argue the forest degradation could impacted the environment by threaten the biodiversity and socio-economic impact by ruining indigenous people livelihoods that relying to forest on their daily activities. The impact that caused by forest degradation in Indonesia was concerning because the impact will be affect in the long-term (Dekiawati, 2022). Therefore, this issue was important to be researched because of the deteriorating condition of

mangrove in Women's Forest causing serious concern to social, economic, and environmental aspects.

Method

This study was using descriptive analysis for primary and secondary data analysis. Nazir (2014) stated that descriptive qualitative analysis was a research method that studied the relation between human, object, condition, system thinking or vents that happen in the present time. Primary data of this study was obtained by conducting surveys and in-depth interviews. Also, secondary data was obtained through the literature study and other study from the related institution. The primary data was obtained by conducting in-depth interview to the head of customary of Enggros Tribe and 35 Enggros Tribe's Woman that hunting clams in Women's Forest. The location of the research has been conducted in Women's Forest, Youtefa Bay, Jayapura, Papua. This research has been conducted from December 2021 through May 2022. The conceptual framework could be seen in Figure 1.

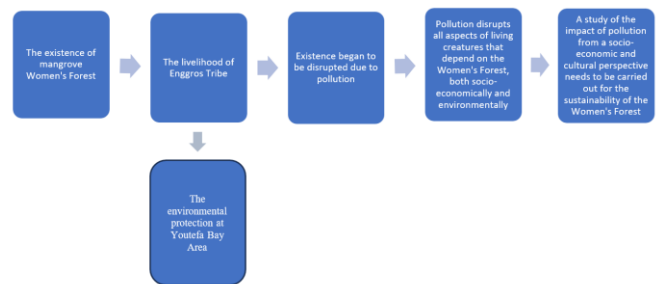


Figure 1. Conceptual framework of the study

Result and Discussion

The impact could be analyzed based on environmental, social, and economic impacts (Yudhistira et al., 2011). Environmental impact is the changing effect to the environment that caused by effort or activities (The Government of the Republic of Indonesia, 2021). Then, the social impact was the effect from social phenomenon that happen in the society (Soekanto, 2005). Social impact has both negative and positive characteristics (Soekanto, 2005). On the other hand, economic impact was an effect or cause from some event, situation, and policy that cause both negative and positive change to the economy (Wati et al., 2020). If there is a pollution to the environment such as water pollution both on the river and the ocean it will causing the impact to the people and environment such as social and economic impacts (Aprilia & Zunggaval, 2019).

Environmental Impact

The result of previous studies shows that the mangrove forest in Youtefa Bay has been degraded in the term of environmental quality that cause the decreasing of the ecosystem service utilization in the mangrove forest. Manalu (2021) stated that the mangrove ecosystem in Youtefa Bay was in the critical condition that causing the decreasing of crabs as one of the special biotas of mangrove ecosystem because the interference of wastewater to from the upstream, exploitation from the people, and the development by the massive land use. Adat people especially the Enggros Tribe, has been complained the decreasing of their catch such as fish, clams, and crabs. The women of Enggros Tribe also feels difficult to find the clams that called as *bia noor* as their main livelihood and source of foods (Elisabeth, 2019). Also, other previous study stated that Youtefa Bay have been experience the environmental degradation with the decreasing of some environmental parameters and enter a light pollution category with the parameter that have been surpassing the quality standards with the total of Ammonia, Fosfate, and Nitrate (Sari et al., 2020). This can be happened because the domestic waste and industrial waste from the massive activities in the upstream (Sari et al., 2020).

Social Impact

Women's forest has been the place to Enggros Tribe women to interact or tell their each other stories because in the customary law of Enggros Trime the women do not have many rights to speak and take decision. The women's forest from these customary law makes the women have their own medium to tell their stories (Titiyoga, 2020). Another specialty of this custom is because the mangrove forest was muddy, they do their own activities in Women's Forest without any clothes (Titiyoga, 2020).

However, the pollution in Women's Forest has been causing the space for women of Enggros Tribe slowly fade away. The women of Enggros Tribe couldn't stayed in the forest any longer because the condition of the forest that polluted by waste and the decreasing of water quality makes it feel uncomfortable to the body. Though, the condition in the past of both the water and environment quality in Women's Forest still natural, the women of Enggros Tribe can talk while finding clams from the morning until evening in Women's Forest. The result of this study shows that women of Enggros tribe feels not having space anymore to share their stories because their own space to tell the stories have been polluted by household waste.

Economic Impact

Kalor et al. (2021) stated that the ecosystem destruction, land use, and pollution causing the

decreasing of fish diversity on the mangrove water in Youtefa Bay. However, the women of Enggros Tribe finding the clams to consume and sold as source of livelihood from the Women's Forest (Elisabeth, 2019). The Econusa (2020) finds that the environmental damage in Women's Forest has been complained by the people of Enggros Tribe. Especially, the women of Enggros Tribe because the decreasing of the revenue have been caused an economic loss. The result of the study also shows that there are some decreasing of total catch from thirty-five informants from the women of Enggros Tribe. The total catch has been decreasing from 13.2kg per day to only 5 kg per day. The decreasing could be affecting the revenue of the women of Enggros Tribe.

Discussion

This study has identified the impact of social, economic, and environmental aspects. However, this study has shown that most of the damage in Women's Forest is anthropogenic. Hence, it needs many efforts to restore and reduce the human activities that can harm nature. The Enggros Tribe should be involved on the effort of decision making in forest management. Previous study shows that the conservation of customary land should be according to the residents prioritize and the indigenous tribe should have decision power on forest conservation because when the indigenous tribe doesn't have decision power it will make the participation deficient (Pelletier et al., 2019).

The women's participation in decision making also has been emphasized from another study that the women's participation also have many benefits to the sustainable conservation of forest such as increasing awareness of environmental protection (Begum et al., 2022). Hence, the effort of Women's Forest not only on the field aspects but it needs to involve the Enggros Tribe on decision making aspects with the government. The effort was needed because there is lack strong foundation of the regulation itself. Study by Sopaheluwakan et al. (2023) have been shows that there are still many problems on recognize the customary land because there is no formality on recognize customary forest and there is still lack of frameworks that could support such regulation to reduce forest degradation. A study by Budiman et al. (2021) also shows the regulation still not consider the customary communities rights on manage the forest. Therefore, the inclusion of the decision making was important because indigenous tribe also have their own knowledge on environmental protection and environmental management. Also, government should investigate their regulation on recognize the customary forest so the collaboration between the government and the indigenous tribe could

be done properly. Participation from the communities was needed in the effort of protecting the forest. The importance of government involvement because Wijayanto et al. (2022) argue the government was the main actor on enforcing the law of customary forest in Indonesia. Also, the intervention by the government has been shown from research by Ungirwalu et al. (2021) that the social forestry integration was needed because the uncertainty of customary forest needs to be solved. However, Harada et al. (2022) argue the recognition of customary forest in Indonesia still proceeding slowly that needs the involvement of Non-governmental Organization (NGO) on recognition of customary forest. Therefore, the importance of stakeholder's satisfaction should be considered.

Previous study shows that indigenous have their own knowledge by their customary laws, their belief of sacred place, and their knowledge on manage the environment (Mavhura & Mushure, 2019). On the other hand, the result of this study shows that the Women's Forest was source of their livelihood by catching clams, crabs, and shrimps as commodities and consumption of Enggros Tribe. The importance of mangroves in Women's Forest on economic aspects shows that mangrove have benefits on shrimp aquaculture and could boost shrimp production (Ahmed et al., 2023). However, there are negative aspects that shrimp aquaculture also could lead to the deforestation of mangroves because the mangrove replaced by shrimp ponds (Treviño & Murillo-Sandoval, 2021). Also, the environmental impacts of mangrove was the ecosystem service that has been provided by mangrove such as carbon stocks.

The carbon stocks by mangrove were one of the benefit to the environment that reduce the emission on the atmosphere, it is proven that in Indonesia that the total emission can be reduced to 10-31% of annual emission if the deforestation of mangrove was reduced (Murdiyarso et al., 2015). On the other hand, study by Ruslan et al. (2022) in Malaysia shows that mangrove not only providing benefit to the environment but, it provides to the socio-cultural aspects of human that deepening the relation between human and nature. Social forestry also could be one of the solutions. A study by Gunawan et al. (2022) have been shows that the integrating of social forestry has benefit by causing positive social, economic, and environmental impacts but it needs to ensure these three aspects should be balance Hence, the effort was needed not only collaboration between Enggros Tribe and the government but, it needs participation from many stakeholders. Building collaboration between every stakeholder needs trust building. Ostrom (2010) stated that trust was important to build that the collective

action can be implemented. Hence, to this study the collective action concept can be implemented on the collaboration between the government, the Enggros Tribe, and other stakeholder in effort to protect the mangrove. On the other hand, Fathima Mafaziya Nijamdeen et al. (2023) on their study shows the inconsistencies, lack of communication, and the financial was the constraint of the effort that it needs long-term collaboration, post-care, monitoring and evaluation on the mangrove restoration program.

Conclusion

Women's Forest aside become the medium as source of the livelihood for the women of Enggros Tribe, the forest was a social space of the women of Enggros Tribe to tell their own stories. The customary law of Enggros Tribe stated that the women of the Enggros Tribe does not have any rights to speak in the customs. From these customary laws the Women's Forest has been provided as their medium to share their stories. Unfortunately, the condition of Women's Forest has been experiencing pollution that is caused by household waste that decreases the water quality, decreasing the quantity of clams, and increasing the waste generation. The pollution can be caused environmental impact to Women's Forest and socio-economic impact to the people especially the women of Enggros Tribe. Serious efforts to restore the biological, ecological, and socio-economic function of the Women's Forest were needed. These effort needs to be done seriously and effectively because the restoration could be making the Women's Forest can be use again sustainability to the women of Enggros Tribe. However, the effort to protect and restore the forest needs participation from multi stakeholder. Also, it needs to engage stakeholders in making these efforts because the effort needs to base on the needs of each stakeholder.

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Author Contributions

Conceptualization, S.T. and H.H.; methodology, S.T., I.K and R.N.W.; software, S.T., F.N.R.P. and N.F.M.D.; validation, H.H., I.K. and R.N.W.; formal analysis, S.T and S.V.L.; investigation, S.T., H.H., I.K., R.N.W., S.V.L.; resources, S.T

and H.H.; data curation, S.T.; writing—original draft preparation, S.T. and H.H.; writing—review and editing, S.V.L., S.R., and M.N.R.; visualization, F.N.R.P., N.F.M.D., S.R. and M.N.R.; supervision, I.K. and R.N.W.; funding acquisition, H.H.

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Conflicts of Interest

The authors declare no conflict of interest.

References

- Adame, M. F., Najera, E., Lovelock, C. E., & Brown, C. J. (2018). Avoided emissions and conservation of scrub mangroves: potential for a Blue Carbon project in the Gulf of California, Mexico. *Biology Letters*, 14(12), 20180400. <https://doi.org/10.1098/rsbl.2018.0400>
- Ahmed, M. U., Alam, M. I., Debnath, S., Debrot, A. O., Rahman, M. M., Ahsan, M. N., & Verdegem, M. C. J. (2023). The impact of mangroves in small-holder shrimp ponds in south-west Bangladesh on productivity and economic and environmental resilience. *Aquaculture*, 571(July 2022), 739464. <https://doi.org/10.1016/j.aquaculture.2023.739464>
- Aprilia, I. S., & Zunggaval, L. E. (2019). Peran Negara Terhadap Dampak Pencemaran Air Sungai Ditinjau Dari Uu Pplh. *SUPREMASI Jurnal Hukum*, 2(2), 15–30. <https://doi.org/10.36441/supremasi.v2i2.115>
- Begum, F., Lobry de Bruyn, L., Kristiansen, P., & Islam, M. A. (2022). Forest co-management in the Sundarban mangrove forest: Impacts of women's participation on their livelihoods and sustainable forest resource conservation. *Environmental Development*, 43, 100731. <https://doi.org/10.1016/j.envdev.2022.100731>
- Bose, P. (2023). Equitable land-use policy? Indigenous peoples' resistance to mining-induced deforestation. *Land Use Policy*, 129, 106648. <https://doi.org/10.1016/j.landusepol.2023.106648>
- Budiman, I., Fujiwara, T., Harada, K., & Sato, N. (2021). Customary forest managements and its challenges in East Nusa Tenggara, Indonesia: An implication of constitutional court decision 2012. *Jurnal Manajemen Hutan Tropika*, 27(1), 69–79. <https://doi.org/10.7226/jtftm.27.2.69>
- Dekiwati, E. S. (2022). Law Enforcement of Illegal Logging in Indonesia: Problems and Challenges in Present and the Future. *Indonesian Journal of Environmental Law and Sustainable Development*, 1(1), 47–68. <https://doi.org/10.15294/ijel.v1i1.56777>
- Econusa. (2020). Hutan Perempuan-Menjaga Tradisi Merawat Bakau Enggros-YouTube. Retrieved from <https://econusa.id/id/ecoblog/hutan-perempuan-pelestarian-ekosistem-bakau-oleh-perempuan-enggros-bagian-i/>
- Elisabeth, A. (2019). Nasib Hutan Perempuan Kampung Enggros. *Mongabay.Co.Id*. Mongabay.co.id
- Fathima Mafaziya Nijamdeen, T. W. G., Ratsimbazafy, H. A., Kodikara, K. A. S., Ashara Nijamdeen, T. W. G. F., Thahira, T., Peruzzo, S., ... Hugé, J. (2023). Mangrove management in Sri Lanka and stakeholder collaboration: A social network perspective. *Journal of Environmental Management*, 330, 117116. <https://doi.org/10.1016/j.jenvman.2022.117116>
- Gunawan, H., Yeny, I., Karlina, E., Suharti, S., Murniati, Subarudi, ... Nurlia, A. (2022). Integrating Social Forestry and Biodiversity Conservation in Indonesia. *Forests*, 13(12), 1–27. <https://doi.org/10.3390/f13122152>
- Hamuna, B., & Tanjung, R. H. R. (2018). Deteksi Perubahan Luasan Mangrove Teluk Youtefa Kota Jayapura Menggunakan Citra Landsat Multitemporal. *Majalah Geografi Indonesia*, 32(2), 115. <https://doi.org/10.22146/mgi.33755>
- Harada, K., Habib, M., Sakata, Y., & Maryudi, A. (2022). The role of NGOs in recognition and sustainable maintenance of customary forests within indigenous communities: The case of Kerinci, Indonesia. *Land Use Policy*, 113(February 2020), 105865. <https://doi.org/10.1016/j.landusepol.2021.105865>
- Heriyanto, N. M., & Subiandono, E. (2011). Absorption of Heavy Metal Pollutants (Hg, Pb, and Cu) by Mangrove Species. *Jurnal Penelitian Hutan Dan Konservasi Alam*, 8(2), 177–188. <https://doi.org/10.20886/jphka.2011.8.2.177-188>
- Kalor, J. D., & Paiki, K. (2021). Dampak Kerusakan Ekosistem Mangrove terhadap Keanekaragaman dan Populasi Perikanan di Teluk Youtefa Kota Jayapura Provinsi Papua. ... *Biologi BIOSFERA: A Scientific Journal*, 38(1), 39–46. <https://doi.org/10.20884/1.mib.2021.38.1.1349>
- Manalu, K. A. A. (2021). Karakter Meristik dan Morfometrik Kepiting Bakau (*Scylla Serrata*, Forskal 1775) Serta Keterkaitannya dengan Ekosistem Mangrove pada Kawasan Teluk Youtefa Kota Jayapura dan Kalimantan Kabupaten Merauke Provinsi Papua (IPB University). IPB University. Retrieved from <http://repository.ipb.ac.id/handle/123456789/106305>
- Mavhura, E., & Mushure, S. (2019). Forest and wildlife

- resource-conservation efforts based on indigenous knowledge: The case of Nharira community in Chikomba district, Zimbabwe. *Forest Policy and Economics*, 105, 83-90. <https://doi.org/10.1016/j.forpol.2019.05.019>
- Murdiyarso, D., Purbopuspito, J., Kauffman, J. B., Warren, M. W., Sasmito, S. D., Donato, D. C., ... Kurnianto, S. (2015). The potential of Indonesian mangrove forests for global climate change mitigation. *Nature Climate Change*, 5(12), 1089-1092. <https://doi.org/10.1038/nclimate2734>
- Muttaqin, M. Z., Alviya, I., Lugina, M., Hamdani, F. A. U., & Indartik. (2019). Developing community-based forest ecosystem service management to reduce emissions from deforestation and forest degradation. *Forest Policy and Economics*, 108(May), 101938. <https://doi.org/10.1016/j.forpol.2019.05.024>
- Nazir, M. (2014). *Metode Penelitian*. Bogor: Ghalia Indonesia.
- Ostrom, E. (2010). Polycentric systems for coping with collective action and global environmental change. *Global Environmental Change*, 20(4), 550-557. <https://doi.org/10.1016/j.gloenvcha.2010.07.004>
- Pelletier, J., Gélinas, N., & Potvin, C. (2019). Indigenous perspective to inform rights-based conservation in a protected area of Panama. *Land Use Policy*, 83, 297-307. <https://doi.org/10.1016/j.landusepol.2019.01.027>
- Purwantari, S. I., & Darwati. (2023). Mangrove: Home and Livelihood. *STANDAR: Better Standard Better Living*, 2(1 SE-Cerita Tapak), 55-58. Retrieved from <http://majalah.bsilhk.menlhk.go.id/index.php/STANDAR/article/view/99>
- Rasyid, W., Hasan, N., Hamzah, H., & Syakiah. (2022). Juridical Analysis of Mangrove Forest pollution in Pannikiang Island, Barry District. *Malrev: Madani Legal Review*, 6(2). <https://doi.org/10.31850/malrev.v6i2.2026>
- Ruslan, N. F. N., Goh, H. C., Hattam, C., Edwards-Jones, A., & Moh, H. H. (2022). Mangrove ecosystem services: Contribution to the well-being of the coastal communities in Klang Islands. *Marine Policy*, 144, 105222. <https://doi.org/10.1016/j.marpol.2022.105222>
- Sari, A., Tuwo, A., Rani, C., & Saru, A. (2020). Water quality study and pollution index based on Physics-chemical parameters in the Youtefa Bay tourism area, Jayapura. *IOP Conference Series: Earth and Environmental Science*, 564(1). <https://doi.org/10.1088/1755-1315/564/1/012030>
- Service Office of Environment and Forestry Jayapura City Papua. (2020). *Waste Management Strategy Policy in Jayapura City*.
- Soekanto, S. (2005). *Sosiologi Suatu Pengantar*. Raja Grafindo Persada.
- Sopaheluwakan, W. R. I., Fatem, S. M., Kutanegara, P. M., & Maryudi, A. (2023). Two-decade decentralization and recognition of customary forest rights: Cases from special autonomy policy in West Papua, Indonesia. *Forest Policy and Economics*, 151, 102951. <https://doi.org/10.1016/j.forpol.2023.102951>
- The Government of the Republic of Indonesia. (2021). *Regulation of Government of The Republic Indonesia Number 22 of 2021 about Implementation of Environmental Protection and Management*. People's Consultative Assembly of the Republic of Indonesia.
- Titiyoga, G. W. (2020). Hutan Perempuan Kampung Injros. *Majalah Tempo*.
- Treviño, M., & Murillo-Sandoval, P. J. (2021). Uneven consequences: Gendered impacts of shrimp aquaculture development on mangrove dependent communities. *Ocean & Coastal Management*, 210, 105688. <https://doi.org/10.1016/j.ocecoaman.2021.105688>
- Ungirwalu, A., Awang, S. A., Runtuboi, Y. Y., Peday, M. Y., Marwa, J., Maitar, B., ... Fatem, S. M. (2021). Customary forests in west papua: Contestation of desires or needs? *Forest and Society*, 5(2), 365-375. <https://doi.org/10.24259/FS.V5I2.13350>
- Wati, S. S., Agustina, F., & Evahelda, E. (2020). Dampak Sosial Ekonomi Program Pemberdayaan Petani Kebun Kelapa Sawit Rakyat Di Kabupaten Bangka. *Journal of Integrated Agribusiness*, 2(1), 1-19. <https://doi.org/10.33019/jia.v2i1.1121>
- Wijayanto, A., Wiraraja, H. A., & Idris, S. A. (2022). Forest Fire and Environmental Damage: The Indonesian Legal Policy and Law Enforcement. *Unnes Law Journal*, 8(1), 105-132. <https://doi.org/10.15294/ulj.v7i1.52812>
- Winata, I. N. P. (2023). Empowering Coastal Communities Through Fishery Business Development Approach. *Jurnal Kelautan Dan Perikanan Terapan*, 1, 91-95. <https://doi.org/10.15578/jkpt.v1i0.12053>
- Yudhistira, Y., Hidayat, W. K., & Hadiyanto, A. (2011). Study of Environmental Damage Impact From Sand Mining Activities in Keningar Village Mountain Merapi Areas. *Jurnal Ilmu Lingkungan*, 9(2), 76-84. <https://doi.org/10.14710/jil.9.2.76-84>