
The Implementation of Case Methods Learning on Water Quality Toward Knowledge and Care Attitude of Students' Environment

***Didi Jaya Santri**¹⁾ **Susy Amizera**²⁾ **Nike Anggraini**³⁾

^{1), 2), 3)} **Biology Education Department, Faculty of Teacher Trainer and Education, Sriwijaya University**

*correspondence: dj_santri@unsri.ac.id

ABSTRACT

Various activities can cause changes in water quality conditions. One way that can do to change the way people point of view environmental changes is through learning. The aims of this study is (a) to determine the impact of the implementation of cased method learning on students' environmental knowledge and (b) to find out how students care about the environment. This study uses a combined research method (mixed method). The research was conducted from March to July 2022. The subjects of this study were 6th students of biology education at the Faculty of Teacher Training and Education, Sriwijaya University. The research subjects were 30 students who took the Limnology course. This study uses a one-group pre-test, post-test-only design. Quantitative data in this research was obtained through an instrument in the form of a written test. Furthermore, qualitative data was obtained through a tool like a questionnaire regarding students' environmental care attitudes. Quantitative data analysis using technique using Paired Sample T-test and qualitative data analyzed by student attitude questionnaire results. The results showed that cased method learning could increase students' knowledge of water quality problems. It is caused by a significant difference in student knowledge with the value of Sig. (2-tailed) which resulted from SPSS, was 0.00 for the material before and after learning the case method. In addition, students have an attitude of caring for the environment in the good category. Thus the case method learning can be an alternative learning to remind students' knowledge and environmental care attitude, which in the end has implications for management innovations on aquatic ecological problems.

Keywords: case method, water quality, knowledge, attitude, environment

INTRODUCTION

Water quality is a condition of the water that shows the level of water pollution based on predetermined quality standards. Several factors can influence changes in water quality. One of the factors that can lead to changes in water quality is human activities around river waters (Riyandini, 2020). In this regard, the results of the study show that human behavior such as throwing garbage in rivers, the existence of illegal garbage disposal sites on the riverbanks, and

the presence of domestic activities on the river can affect the quality of river waters (Kospa & Rahmadi, 2019).

Changes in water quality are one of the problems in the surrounding environment. Various activities can cause changes in water quality conditions. Changes in agricultural land use patterns domestic and industrial activities have a hydrological impact that causes water pollution (Rosyidah, 2018; Kamalia & Sudarti, 2022). Human activities, including industrialization activities and agricultural practices, cause damage and pollution that adversely affects water bodies which are the source of life's necessities (Owa, 2014).

Caring for the environment is an attitude that needs to be developed to prevent and repair the damage that occurs in the surrounding environment (Gusmadi, 2018) community involvement is critical to participate in managing and protecting the surrounding environment actively. In addition, concern for the surrounding environment, especially the aquatic environment, continues to be the focus of attention. It is due to changes in behavior and human intervention that affect river water ecosystems, such as changes in discharge, temperature, and biogeochemical characteristics, as well as impacting aquatic organisms. The aquatic environment must be managed holistically to overcome complex water quality problems. Therefore, this requires an increased understanding of the interrelationships between human activities and water quality conditions in the surrounding environment (Hannah et al., 2022).

One way that can be done to change people's perspective on environmental change is through education and learning process especially in university (Rahamningtyas, Purasani, & Tusyanah, 2018). Students collage are agents of change who can open up public knowledge about the importance of good water quality. Students' knowledge can be improved by understanding the theoretical model of environmental problems. According to (Apriyanti, 2021), through the knowledge possessed, it is possible to avoid problems related to water quality. It can support local sustainable development. Developing students' knowledge of the environment relates to the level of public awareness of the environment. It has implications for changes in values, attitudes, and individual characteristics. In addition, the human view of environmental problems also depends on knowledge of ecological sustainability and functions.

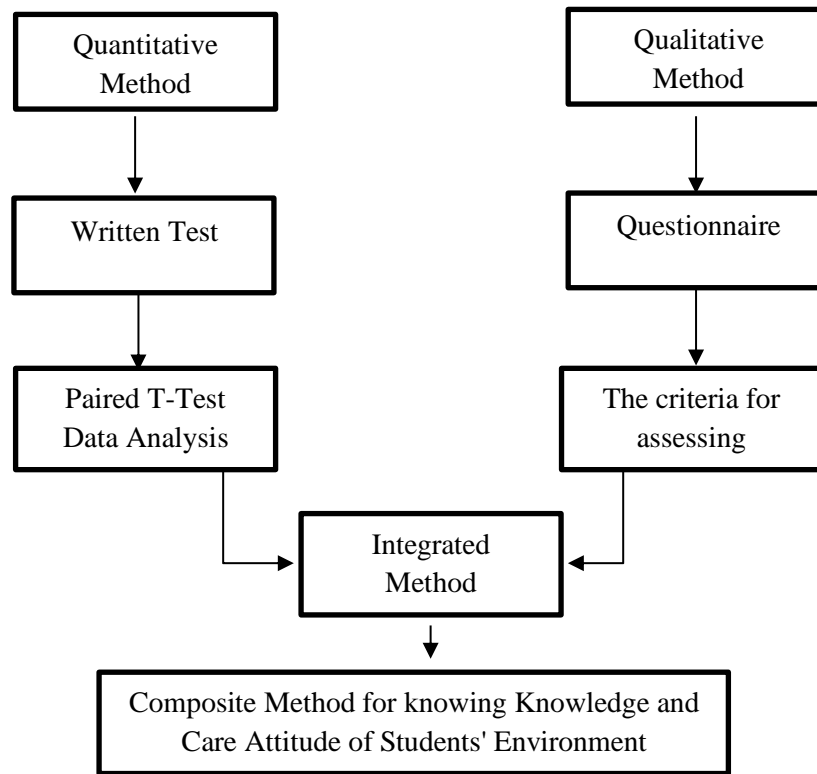
The learning method that can be applied in this condition is the case learning method. The case method learning is a learning method that uses media in the form of cases that occur (Faizah, Rustaman, Ambarwati, & Rahayu, 2021). The issues presented are part of the material in learning activities in the form of real and relevant problem scenarios to connect theoretical understanding with problems in the surrounding environment (Sari, 2021). The results of the study state that cased method learning can improve questioning skills so that it can support higher-order thinking skills on environmental pollution material (Kurniawati, Nasution, Bardin, Education, & Programs, 2021). The application of case method learning on materials related to environmental materials increases professional competence and raises the principles of environmentally

friendly behavior (Rudyshyn, Stakhova, Sharata, Berezovska, & Kravchenko, 2021). Case method learning can improve the ability to investigate an environmental change which can eventually lead to an attitude of caring for the environment (Afiera et al., 2020). Thus, cased method learning can not only increase students' knowledge but also can increase the attitude of caring for the environment so that this can have a positive impact on public awareness of environmental conditions, especially the aquatic environment (Simarmata, Daulae, & Raihana, 2018).

So far, the implementation of case method learning is mainly related to students' thinking ability (Laelasari & Anggraeni, 2017). The implementation of this learning is only associated with student learning outcomes. However, not many research discusses how students care about the environment after students gain knowledge about the material being taught. Therefore, this study will examine the cognitive abilities of students and their impact on students' environmental care attitudes after receiving material on water quality through cased method learning. The aims of this research are (a) to determine the impact of the implementation of cased method learning on students' environmental knowledge and (b) to determine how students' environmental care attitudes after getting material about water quality through cased method learning.

METHOD

This Research uses a combined research method (mixed method). Mixed method research is a combination of quantitative research and research (Creswell JW, 2018) Quantitative research aims to determine students' knowledge through cased method learning on water quality material. Meanwhile, qualitative study aims to obtain an overview of students' environmental care attitudes, especially regarding water quality. The Flowchart of Mixed Method can be seen in picture 1.



Picture 1. Flowchart of Mixed Method

The research was conducted from March to July 2022. The subjects of this study were 6th students of biology education at the Faculty of Teacher Training and Education, Sriwijaya University. The research subjects were 30 students who took the Limnology course. This study uses a one-group pre-test, post-test-only design. This research begins with an initial test, then case method learning is carried out, and a final test is given. The quantitative data of this study were obtained through research instruments in the form of a written test in the form of questions about the concept of water quality before and after the case method learning activities. Furthermore, qualitative data was obtained through an instrument in the form of a questionnaire regarding students' environmental care attitudes related to their willingness to identify and choose between value perspectives, as well as students' motivation to participate in environmental issues, especially water quality studies. Quantitative data analysis techniques in the form of pre-test and post-test results using the Paired Sample T-test with the help of the SPSS Version 20. Qualitative data analysis is in the form of questionnaires on student attitudes towards environmental problems, especially in water quality studies. The criteria for assessing student environmental care attitude are presented in Table 1.

Table 1. Criteria for Caring Attitude for the Environment of Students

Score	Criteria
24-48	Poor
48-72	Good Enough
72-96	Good
96-120	Very Good

RESULT AND DISCUSSION

Based on the results of the study obtained, data regarding students' knowledge of the concept of water quality. The significance of mastery of concepts is interpreted based on the results of tests on water quality material given to students before and after participating in case method learning. The paired sample T-test obtained a significant relationship between students' cognitive abilities. The results of the paired sample T-test are presented in Table 2.

Table 2. Result of Paired Samples T-test

	Paired Differences				t	df	Sig. (2-tailed)		
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference					
				Lower	Upper				
Pair 1	pre test - post test	-39.167	5.149	1.486	-42.438	-35.895	-26.349	11	.000

Based on table 2. it can be seen that the output value of Sig. (2-tailed) the resulting SPSS is 0.00. If the value of Sig. (2-tailed) produced by SPSS is smaller than 0.05, so there are differences in knowledge abilities made in each variable. It indicates a significant difference between the pre-test and post-test scores of students' knowledge after learning the case method is better than before learning.

Applying learning base cased methods can improve students' perceptions of learning objectives and learning outcomes. At the time of the research, the researcher noted several things, such as (1) the active participation of students in the learning process, (2) a better understanding of concepts, (3) stronger critical thinking skills, and (4) the ability to learn the material through various points of view. Through cased method learning, students are active in asking questions about cases, solving problems, interacting with group members, analyzing problems, and summarizing visible problems. In addition, the case method can relate the learning theory with

the practicum activity, also it can encourage the development of skills such as communication, critical thinking, and decision-making in solving problems that reflect their knowledge about water quality problems.

The implementation of case method learning is oriented toward a problem-solving approach. According (Wospakrik, Sundari, & Musharyanti, 2020) the case method learning method can develop critical thinking skills and skills in providing solutions to the problems presented. It can form a student-based learning to foster learning motivation, which impacts increasing student knowledge. The results of the research support that through the case method learning, students can choose the form of problem-solving for the case being studied to increase students' curiosity about the material being learned (Kurniawati et al., 2021). Through the case learning method, students can analyze problems contextually, then solve problems comprehensively (Andayani, Mustikowati, & Wahyu, 2022).

In the case of method-based learning, students also learn by fact, simple, and complex issues that refer to contextual learning. Contextual learning is a conception for helping the teacher and student to connect the content of subjects with real situations and motivate students to make connections knowledge with application in their daily life (Astuti, Novita, & Ismail, 2020). According to (Amizera, et al., 2022) contextual learning can improve students' mastery of concepts in materials related to the environment. In addition, contextual learning can make it easier for students to connect and apply the competencies of learning outcomes in everyday life. Students can construct their knowledge and learning skills gained with direct experience to make the learning process more effective and meaningful (Nurdin, Ikhsan, Kurnianto, & Apriyanto, 2017).

In this regard, learning about water quality has an essential role in efforts to restore river degradation which affect to water quality. Through the learning case method, a conceptual approach to rivers can be made from an ecosystem perspective and the ability to decide on the use and sustainable river management (Ladrera, Rodríguez-Lozano, Verkaik, Prat, & Díez, 2020). This is a more significant challenge than it offers to build students' knowledge, which is a component of a sustainable society transition, so they must be prepared for their current and future roles. The learning process not only aims to increase knowledge but can also form an attitude of caring for the environment in students. In this study, students' environmental care attitudes after learning the case method are presented in Table 3.

Table 3. Students' Environmental Care Attitude on Water Quality

Indicator	Score	Criteria
Sensitivity to water quality issues	83	Good
Attention to water quality issues	94	Good
Responsibility for water quality Issues	75	Good

Based on Table 3, it can be seen that the sensitivity of students to water quality problems is in the good category. This attitude can be improved through learning, especially through case method learning. According to (Yokosawa & Mizunoya, 2022) learning related to environmental problems can be an effort to solve problems with the quality of the assembly. In connection with that matter, sensitivity to water quality problems is related to students' sensitivity to phenomena that occur in the aquatic environment. Sensitivity can arise through observing the characteristics of changes that occur in the aquatic environment. The study's results (Amizera, et al., 2022) showed that changes in the quality of river waters could be monitored through observations of physical habitats and the presence of macro-invertebrates in the waters. Changes that occur can indicate the change that can increase our sensitivity to water quality problems. Thus, the sensitivity that arises can encourage to overcome of water quality problems.

Based on Table 3, it can be seen that students' attention to air quality problems is in a good category. Attention to environmental issues is important in increasing the character of caring for the environment. It can build a conscious and caring attitude toward various environmental problems and have the knowledge, attitudes, and commitment to solve and prevent environmental problems (Suwondo & Wulandari, 2019). Besides that, attention to environmental problems is associated with activities we can do to solve water quality problems. Attention to water quality problems can encourage the resolution of critical issues in the aquatic environment. According to (Zulfa, Max, Hukum, & Ilyas, 2015), Understanding critical environmental issues can raise awareness of the impact of environmental problems because water quality problems can affect humans and aquatic biota. Therefore, it is essential to pay attention to water quality issues.

Based on table 3, it can be seen that the responsibility for environmental problems is in a good category. Environmentally responsible behavior can be measured through readiness to participate in protecting the environment. it is a description of a person's understanding of environmental issues and his views on environmental problems (Mala, 2019). Also, responsibility for environmental issues is related to commitment to ecological management patterns. According to (Barok, Muktiningsih, & Vivanti, 2019), commitment and responsibility to the environment positively correlate with the achievement of environmental management performance. Thus, managing water quality problems can be achieved by preparing water resources management programs accompanied by responsibility and commitment to solving water quality problems.

Based on table 3, it can be seen that the motivation to overcome water quality problems is in a good category. Motivation to protect against environmental problems can increase good behavior towards the environment. The attitude of caring for the environment that is applied in

everyday life is an intrinsic and extrinsic appreciation that is felt from the role of the environment in life (Shafiei & Maleksaeidi, 2020). Motivation toward solving environmental problems is related to the level of knowledge of environmental issues. A high level of ecological knowledge can assist in designing innovations to prevent and overcome environmental issues (Setiani, Takarini, Hanani, & Budiyo, 2002). Increased knowledge of environmental materials can be increased through case-based learning which can influence the care attitude (Simarmata et al., 2018). The case-based learning method could improve learning outcomes on water pollution material (Sigit, Ernawati, & Qibtiah, 2017). Thus, through case-based learning, motivation towards problem-solving can be improved, especially on water quality issues.

Knowledge of the material can be increased through increased case-based learning that has an impact on attitudes toward the environment. The level of environmental quality, especially water quality, is highly dependent on human behavior patterns. Students as part of the transitional generation who will become agents of change and can influence the surrounding community. Moreover, they are essential in efforts to advance suitable solutions for changing environments based on technical knowledge. Therefore, developing scientific knowledge about what can change them to behave pro-environmentally is a significant concern that has practical uses for moving on the path to a sustainable future.

CONCLUSION

Based on the research results, it can be concluded that case method learning can increase students' knowledge of water quality problems. It is caused by a significant difference in students' understanding of the material before and after learning the case method. In addition, the students' environmental care attitude towards water quality problems is in a good category. Thus the case method learning can be an alternative learning to remind students' knowledge and environmental care attitude, which in the end has implications for management innovations on aquatic ecological problems.

ACKNOWLEDGMENT

The Research of this article was funded by DIPA of Public Service Agency of Sriwijaya University 2022.

SP DIPA-023.17.2.677515/2022, On Desember, 2021. In accordance with the Rector's Decree Number 0110/UN9.3.1/SK/2022. On April 28, 2022

REFERENCES

- Afiera, I., Azaman, M., Rahman, N. A., Ashikin, N., Yusop, M., Atikah, N., & Azami, C. (2020). *Exploration of Project Based Learning Among Teacher Trainees At the Riverbank of Malacca River , Malaysia*. 7(2), 53–65.
- Amizera, S., Destiansari, E., Santri, D. J., Arifin, Z., & Anggraini, N. (2022). *River Monitoring : In View of the Physical Habitat of the River and the Presence of Macroinvertebrates*. 8(2), 88–94.
- Amizera, S., Hartono, H., Destiansari, E., Anggraini, N., Laihat, L., & Santoso, L. M. (2022).

- Ekosistem Melalui Pembelajaran Kontekstual Berbantuan Real Life Video*. 42–45.
- Andayani, E., Mustikowati, R. I., & Wahyu, S. (2022). *Case Method : Mengoptimalkan Critical Thinking , Creativity Communication Skills dan Collaboratively Mahasiswa Sesuai MBKM di Era Abad 21*. 16(1), 52–60.
- Apriyanti, E. (2021). Hubungan antara Motivasi Hidup Sehat dengan Perilaku Bijak Mahasiswa Terhadap Lingkungan di Masa Pandemi Covid 19. *JEID: Journal of Educational Integration and Development*, 1(3), 147–157.
- Astuti, J., Novita, M., & Ismail, M. S. (2020). Peningkatan Motivasi Belajar Menggunakan Contextual Teaching and Learning di Madrasah Ibtidaiyah Swasta Raudhatul Mujawwidin Tebo. *Journal Educative : Journal of Educational Studies*, 5(1), 16. <https://doi.org/10.30983/educative.v5i1.1630>
- Barok, A. H., Muktiningsih, M., & Vivanti, D. (2019). Hubungan Komitmen Dan Tanggung Jawab Lingkungan Terhadap Kinerja Pengelolaan Hutan Pada Program Reboisasi. *Jurnal Green Growth Dan Manajemen Lingkungan*, 7(2), 91–100. <https://doi.org/10.21009/jgg.072.01>
- Creswell JW. (2018). *Research Design Qualitative, Quantitative, and Mixed Method Approaches by John W. Creswell (z-lib.org).pdf*. Singapore.
- Faizah, U., Rustaman, N. Y., Ambarwati, R., & Rahayu, D. A. (2021). *Persepsi Calon Guru Biologi tentang Keterampilan Memecahkan Masalah Biodiversitas : Kajian Terkait Society 5.0*. 2(September), 12–23.
- Gusmadi, S. (2018). Keterlibatan Warga Negara (Civic Engagement) dalam Penguatan Karakter Peduli Lingkungan. *Mawa'izh: Jurnal Dakwah Dan Pengembangan Sosial Kemanusiaan*, 9(1), 105–117. <https://doi.org/10.32923/maw.v9i1.718>
- Hannah, D. M., Abbott, B. W., Khamis, K., Kelleher, C., Lynch, I., Krause, S., & Ward, A. S. (2022). Illuminating the ‘invisible water crisis’ to address global water pollution challenges. *Hydrological Processes*, 36(3). <https://doi.org/10.1002/hyp.14525>
- Kamalia, D., & Sudarti. (2022). Analisis Pencemaran Air Sungai Akibat Dampak Limbah Industri Batu Alam di Kecamatan Depok Kabupaten Cirebon. *Jurnal EnviScience*, 6, 1–13.
- Kospa, H. S. D., & Rahmadi, R. (2019). Pengaruh Perilaku Masyarakat Terhadap Kualitas Air di Sungai Sekanak Kota Palembang. *Jurnal Ilmu Lingkungan*, 17(2), 212. <https://doi.org/10.14710/jil.17.2.212-221>
- Kurniawati, Z. L., Nasution, R., Bardin, S., Education, B., & Programs, S. (2021). Students’ questioning skills in environmental pollution course using case study methods. *ScienceEdu: Jurnal Pendidikan IPA*, 4(1), 46–49.
- Ladrera, R., Rodríguez-Lozano, P., Verkaik, I., Prat, N., & Díez, J. R. (2020). What do students know about rivers and their management? Analysis by educational stages and territories. *Sustainability (Switzerland)*, 12(20), 1–16. <https://doi.org/10.3390/su12208719>
- Laelasari, I., & Anggraeni, S. (2017). Improving Critical Thinking and Metacognition Ability Using Vee Diagram through Problem-Based Learning of Human Respiratory System. *Atlantis Press*, 45–51. <https://doi.org/10.2991/icmsed-16.2017.16>
- Mala, K. (2019). Social Competence as Related to Responsible Environment Behaviour of Adolescents. *GHG Journal of Sixth Thought*, 6(1), 18–21.
- Nurdin, E. A., Ikhsan, F. A., Kurnianto, F. A., & Apriyanto, B. (2017). Application of Contextual Teaching Learning To Learning Results in Understanding the Life Environment in Smp Negeri 2 Sukodono. *Geosfera Indonesia*, 1(1), 13. <https://doi.org/10.19184/geosi.v1i1.6189>
- Owa, F. W. (2014). ILNS-3-2014-1-6.pdf. *International Letters of Natural Sciences*, 3, 1–6.

- Rahamningtyas, W., Purasani, H. N., & Tusyanah. (2018). Implementasi Kaderisasi Konservasi di Perguruan Tinggi. *Jurnal Pendidikan Ilmu Sosial*, 27, 87–102.
- Riyandini, V. L. (2020). Pengaruh Aktivitas Masyarakat Terhadap Kualitas Air Sungai Batang Tapakis Kabupaten Padang Pariaman. *Jurnal Sains Dan Teknologi*, 20(2), 203–209.
- Rosyidah, M. (2018). Analisis Pencemaran Air Sungai Musi Akibat Aktivitas Industri (Studi Kasus Kecamatan Kertapati Palembang). *Jurnal Online Universitas PGRI Palembang*, 3(1), 21–32.
- Rudyshyn, S. D., Stakhova, I. A., Sharata, N. H., Berezovska, T. V., & Kravchenko, T. P. (2021). The effects of using a case study method for environmental education. *International Journal of Learning, Teaching and Educational Research*, 20(6), 319–340. <https://doi.org/10.26803/IJLTER.20.6.17>
- Sari, N. (2021). Penerapan Pembelajaran Berbasis Pemecahan Kasus (Case Method) untuk Menumbuhkan Generasi Sadar Pajak pada Mata Kuliah Perpajakan Program Studi Pendidikan Ekonomi FKIP Universitas Jambi Pembelajaran perpajakan pada Program Studi Pendidikan Ekonomi yang d. *Prosiding Seminar Nasional UNIMUS*, 4, 665–673.
- Setiani, O., Takarini, N. D., Hanani, Y., & Budiyono. (2002). *Motivasi Peran Serta Masyarakat dan Penerapan Sistem Pemantauan Lingkungan Berkala Terpadu dalam Pengendalian Pencemaran Sungai akibat Industri dan Pemukiman*. 1(1).
- Shafiei, A., & Maleksaeidi, H. (2020). Pro-environmental behavior of university students: Application of protection motivation theory. *Global Ecology and Conservation*, 22. <https://doi.org/10.1016/j.gecco.2020.e00908>
- Sigit, D. V., Ernawati, E., & Qibtiah, M. (2017). Hubungan Pengetahuan Lingkungan Hidup Dengan Kemampuan Pemecahan Masalah Pencemaran Lingkungan Pada Siswa Sman 6 Tangerang. *Biosfer: Jurnal Pendidikan Biologi*, 10(2), 1–6. <https://doi.org/10.21009/biosferjpb.10-2.1>
- Simarmata, B., Daulae, A. H., & Raihana, R. (2018). Hubungan Tingkat Pengetahuan Lingkungan Hidup dengan Sikap Peduli Lingkungan Siswa. *Jurnal Pelita Pendidikan*, 6(4). <https://doi.org/10.24114/jpp.v6i4.10584>
- Suwondo, S & Wulandari, S. (2019). Response and Improvement of Environmental Care Attitude from Students After Using the Environmental Education Module Based on Local potential as Teaching. *Proceedings of the UR*, 978–979.
- Wospakrik, F., Sundari, S., & Musharyanti, L. (2020). Pengaruh penerapan metode pembelajaran case based learning terhadap motivasi dan hasil belajar mahasiswa. *JHeS (Journal of Health Studies)*, 4(1), 30–37. <https://doi.org/10.31101/jhes.515>
- Yokosawa, R., & Mizunoya, T. (2022). Improving Water Quality in the Citarum River through Economic Policy Approaches. *Sustainability (Switzerland)*, 14(9). <https://doi.org/10.3390/su14095038>
- Zulfa, V., Max, M., Hukum, I., & Ilyas, I. (2015). Isu-Isu Kritis Lingkungan Dan Perspektif Global. *Jurnal Green Growth Dan Manajemen Lingkungan*, 5(1), 29–40. <https://doi.org/10.21009/jgg.051.03>