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Papuan local wisdom and problem-based learning: Integrated into student books and its effect on students' conservation attitudes

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Abstract: Papua, which is known to be rich in local wisdom, has great potential in environmental conservation if supported by a strong conservative attitude from its citizens. This research aims to determine the influence of problem-based student books integrated with Papuan local wisdom on the conservation attitudes of class VII junior high school students. This research is experimental research conducted at junior high schools in the Tanah Merah area of Bintuni Bay. In this study, the sample used was class VII, consisting of 38 students. There were 19 students in the control and experimental classes each. A conservation attitude questionnaire was used to measure students' conservation attitudes. Data were analyzed using the t test. The results show that problem-based student books integrated with Papuan local wisdom have a better effect than the control class. Local wisdom adds to students' information regarding the management of endemic organisms where they live. The problem of extinction in PBL learning empowers students to think about how to conserve organisms so that extinction factors that influence the classification of living things can be prevented.

Keywords: Conservation attitudes, Papuan local wisdom, problem-based learning

Abstrak: Papua yang dikenal kaya akan kearifan lokal mempunyai potensi besar dalam pelestarian lingkungan jika didukung dengan sikap konservatif yang kuat dari warganya. Penelitian ini bertujuan untuk mengetahui pengaruh buku siswa berbasis masalah terintegrasi kearifan lokal Papua terhadap sikap konservasi peserta didik kelas VII SMP. Penelitian ini merupakan penelitian eksperimen yang dilakukan pada SMP di kawasan Tanah Merah Teluk Bintuni. Pada penelitian ini sampel yang digunakan yaitu kelas VII sebanyak 38 peserta didik sebaga. Siswa pada kelas kontrol dan eksperimen masing-masing berjumlah 19. Angket sikap konservasi digunakan untuk mengukur sikap konservasi siswa. Data dianalisis menggunakan uji t. Hasil menunjukkan bahwa buku siswa berbasis masalah terintegrasi kearifan lokal papua memiliki efek lebih baik dari kelas kontrol. Kearifan lokal menambah informasi siswa terkait pengelolaan organisme endemik yang ada di tempat tinggalnya. Masalah kepunahan dalam pembelajaran PBL memberdayakan siswa untuk berpikir bagaimana mengkonservasi organisme agar faktor kepunahan yang mempengaruhi klasifikasi mahluk hidup dapat dicegah.

Kata kunci: Sikap konservasi, kearifan lokal Papua, pembelajaran berbasis masalah

INTRODUCTION

In Indonesia, especially in Papua, the level of conservation is still considered low due to careless practices of felling trees and catching endemic animals (Awak et al., 2016; Pattiselanno et al., 2024). The lack of public awareness about the negative impacts of these

activities adds to problems in conservation efforts (Rophi et al., 2024). The need to improve conservation attitudes among the public is urgent to protect biodiversity in the region (Barnes et al., 2024; Levis et al., 2024). Papua, which is known to be rich in local wisdom, has great potential in environmental preservation if supported by a strong conservative attitude from its citizens (Awak et al., 2016; Mauzy & Mujahid, 2019; Prasetyo et al., 2024; Putri & Suroto, 2023; Yapsenang et al., 2022). Many biodiversity conservation decisions are made under severe constraints; for example, part of a species' habitat must be protected or a particular area cannot be included in a conservation area network—exchange is not permitted in relation to such areas (Sarkar et al., 2017).

Protected areas have become an important conservation strategy to protect wildlife; However, illegal activities carried out by local people in and around protected areas can undermine their conservation goals (Castilho et al., 2018). Børresen et al. (2023) recommend that educational programs related to threats to ecosystem services and biodiversity be included in school curricula, especially for students close to protected areas. Educators must be aware of attitudes towards organisms to support the protection of these organisms through learning that focuses on the affective domain (Damopolii et al., 2024). Conservation education must be taught from an early age to students, so that they have a strong foundation for protecting biodiversity (Yunus et al., 2023). Education that teaches biodiversity conservation is a solution for sustainable education.

Effective education and integration of conservation values in everyday life can be the key to changing people's views (Ariya & Momanyi, 2015). By increasing awareness of the importance of protecting living creatures, it is hoped that people will begin to appreciate and protect the natural wealth around them (Badola et al., 2012). These steps are important to ensure long-term protection of living creatures and their habitats. Thus, a strong conservation attitude will not only help in biological conservation but also in ensuring the sustainability of natural resources for future generations (Schönfelder & Bogner, 2017).

Local wisdom passed down from generation to generation is an important aspect in maintaining community cultural identity amidst the inevitable pace of modernization and globalization (Damopolii et al., 2019; Iwan et al., 2020). In Indonesia, especially in Papua, diverse local wisdom plays a crucial role in preserving cultural values and traditions. An example of local Papuan wisdom is "Sasi Laut or Sasisen". Sujarta et al. (2021) have studied that Sasisen or Tiyaitiki are local wisdom to maintain the preservation of coastal ecosystems. They found that since elementary school, people in Papua have been introduced to these two local wisdoms. Unfortunately, they further discovered that they only received these two local wisdoms from their parents in the form of fairy tales told directly. They don't get students' knowledge about local wisdom at school, but only from their parents' words. So there is an opportunity for this local wisdom to be presented in the classroom.

Sirait et al. (2024) have integrated Papuan local wisdom into learning to make it easier to identify Papuan sago plants. Papua has local potential which is maintained through local

wisdom, such as medicinal plants (Horota et al., 2023), fish diversity (Rumbruren et al., 2022), even related to religion (Nawas et al., 2022). To understand and study the richness of local wisdom, it is important for us to classify various elements of local wisdom into certain categories. Thus, learning about the classification system of living things which is integrated into the natural sciences curriculum can provide in-depth insight into how local wisdom is structured and maintained. This approach not only enriches local knowledge but also strengthens understanding and appreciation of unique cultural heritage, ultimately supporting conservation efforts in an ever-changing society.

The initial cornerstone in conservation is one's knowledge of the species (Härtel et al., 2023). Classification of living things is an important topic in the Natural Sciences curriculum, which includes learning about grouping living things based on type, genus and genus, as well as treatment methods to prevent extinction. Identifying and classifying living creatures is a conservation strategy to prevent extinction (Permana & Azizah, 2022; Purnomo et al., 2015). This learning process is very useful in improving conservation attitudes among students, helping them develop awareness of environmental sustainability (Kahar & Fadhilah, 2019). Material on the classification of living things can not only be accessed through textbooks and lesson modules, but also through problem-based student books. This problem-based book allows students to be actively involved in solving conservation-related problems (Damopolii et al., 2024), so that they understand not only classification theory but also real-life conservation practices, strengthening their understanding and motivating them to participate in conservation of biodiversity.

Based on the results of observations made at one of Tanah Merah Middle Schools, there are several problems, namely the lack of learning media which still uses textbooks. The level of student understanding in science learning is still low. Students' conservation attitudes are still low, where they catch endemic animals that are threatened with extinction such as cuscus, bird of paradise and throw rubbish carelessly, which has a negative impact on the surrounding environment. From these problems it can be seen that awareness in protecting the environment where they live is still low, meaning their conservation attitude is still low. Based on the results of the observations that have been made, the researchers concluded that these problems can influence students' conservation attitudes so that students' level of knowledge regarding the importance of conservation attitudes towards the surrounding environment is still low. Based on research findings (Damopolii et al., 2024), it was also found that junior high school students still need to improve their conservation attitudes.

Student books as learning textbooks play an important role in the educational process because they contain subject matter and evaluation questions designed to make it easier for students to understand and absorb the lessons taught by the teacher (Rumalolas et al., 2021). According to Nunaki et al. (2014), and Yomaki et al at. (2023), the book can be used as an effective supporting tool to improve the smoothness of student learning activities, both in the school environment and at home. Dimopoulos et al., 2008 used books to teach

conservation to students. Student science books have an effect on student attitudes (Klop et al., 2010). Damopolii et al. (2024) problem-based books (books combined with problem-based learning-PBL) are suitable for improving students' conservation attitudes.

The use of PBL in learning has had an impact on increasing students' understanding of conservation. For example, Suhirman and Yusuf (2019) found that PBL had an impact on students' environmental conservation knowledge. The problems presented in learning encourage students to think about how to carry out conservation which increases their knowledge. Lister (2000) explains that PBL is effective in preparing conservation practices to effectively address the indeterminate nature of most conservation problems, ensuring their versatility in various contexts. Rosita et al. (2014) found that PBL also had an impact on students' conservation soft skills. Ratnasari et al. (2022) PBL plus technology-based media has an impact on students' conservation attitudes. Regala (2019) designed a PBL-based book for ecosystem conservation material. He found that PBL can strengthen students' performance regarding environmental issues. Based on the description that has been explained, the researcher used the integrated student book Papuan local wisdom and PBL to investigate its influence on students' conservation attitudes.

METHOD

This research was carried out at junior high schools in the Tanah Merah area, Bintuni Bay, West Papua Province, with the research period being 30 October - 07 December 2023. The research was a quasi-experiment. Non equivalent control group design was used in this research. In this study, the sample used was class VII, consisting of 38 students (19 students in each group, control and experiment). Data was collected using a conservation attitude questionnaire consisting of 17 statements. The questionnaire was adopted from (Damopolii et al., 2024), where the conservation attitude indicator consists of three, namely protection, preservation, utilization, and has a reliability of 0.747. The normality test is needed to find out whether the sample studied is normally distributed or not. This testing stage is very important because subsequent testing depends on this stage. Normality testing is seen from the Kolmogorov Smirnov value. Determination of homogeneity using the Levene test. Hypothesis testing uses the independent samples t test.

RESULTS AND DISCUSSION

This research is experimental research carried out at junior high schools in the Tanah Merah area of Bintuni Bay. This research data is in the form of a questionnaire to measure students' conservation attitudes with a total of 17 statements. This questionnaire was given to students before learning activities (pre) and after learning activities (post).

Table 1. Data normality and homogeneity test

Data		Kolmogorov-Smirnov[a]			Levene Test	
		Statistic	df	Sig.	Statistic	Sig.
Pre-conservation attitude	Control	0.188	19	0.075	0.233	0.632
	Experiment	0.100	19	0.200*		
Post-conservation attitude	Control	0.165	19	0.187	2.291	0.139
	Experiment	0.134	19	0.200*		

Table 1 indicates that the pre-conservation attitude and post-conservation attitude data are normally and homogeneously distributed in both groups. This data has met the testing requirements with the t test.

Table 2. T-test results

Data	t	df	Sig. (2-tailed)
Pre-conservation attitude	-1.780	36	0.084
Posttest	-3.180	36	0.003

Table 2 reveals that before students were involved in learning, their conservation attitudes did not indicate any differences. Changes in students' conservation attitudes occur when they finish engaging in learning. The findings reveal that student involvement in learning that uses local Papuan wisdom and PBL which is integrated into student books has a better impact than those that do not. integrating local wisdom (Agustina et al., 2023) and PBL (Ratnasari et al., 2022) into student books helps train students' conservation attitudes

In this research, the local wisdom used is the wisdom of "Sasi laut or Sasisen". This is local Papuan wisdom that protects living creatures in the sea. With the aim that in the future people will still be able to identify marine organisms and use them. According to Sujarta et al. (2021), and Sumarsono and Wasa (2019), it has been studied that Sasisen and Tiyaitiki are local wisdom to maintain the preservation of coastal ecosystems. Mailissa et al. (2021) explains that Papua's coastal and marine areas are diverse and have economic potential. Many types of fish (Tapilatu & Kusuma, 2022), sea cucumbers (Rumlus et al., 2015), microalga (Purbani et al., 2019), and others. Papuan local wisdom is taught so that students can improve their attitudes towards conserving this diversity so that it does not become extinct. Awareness of conservation can be increased by integrating local wisdom in teaching it (Chaichana et al., 2019). Sasi local wisdom as community cultural capital has become a foundation and strategic issue related to the protection of marine and coastal natural resources in supporting and maintaining them (Mentansan et al., 2023).

Apart from that, other species are also introduced when students classify living things such as the Papuan bird of paradise (Cenderawasih), the Arfak mountain butterfly (Manihuruk et al., 2020), red fruit (Wawo et al., 2019), and Papuan black fruit (Ungirwalu et al. ., 2018). These species are presented in the book with information on their taxonomic composition. Wawo et al. (2019) explained that red fruit conservation is carried out by the

Wamena Biological Botanical Gardens ex-situ. By teaching and classifying these species, teachers have taught students to prevent these species from being recognized and not becoming extinct. Behavioral intentions focus primarily on protection and prevention, which underscores the need to anchor conservation in schools and thereby increase students' commitment to preserving nature and the environment (Christ & Dreesmann, 2023).

Human concern for species in nature can be determined by measuring their attitudes towards conservation (Putri et al., 2021). In fact, the high biodiversity that exists in indigenous regions throughout the world is the result of traditional knowledge and management practices (Diegues, 2014). The human population continues to increase and biodiversity is declining rapidly (Kopnina et al., 2022). One of the classification problems is extinction. So in this research, the problem of extinction becomes a support for implementing PBL. In PBL, the initial activity is giving problems to students (Damopolii & Kurniadi, 2019; Zannah et al., 2022). Figure 1 is a snapshot of the problem of extinction of the little Cenderawasih bird.

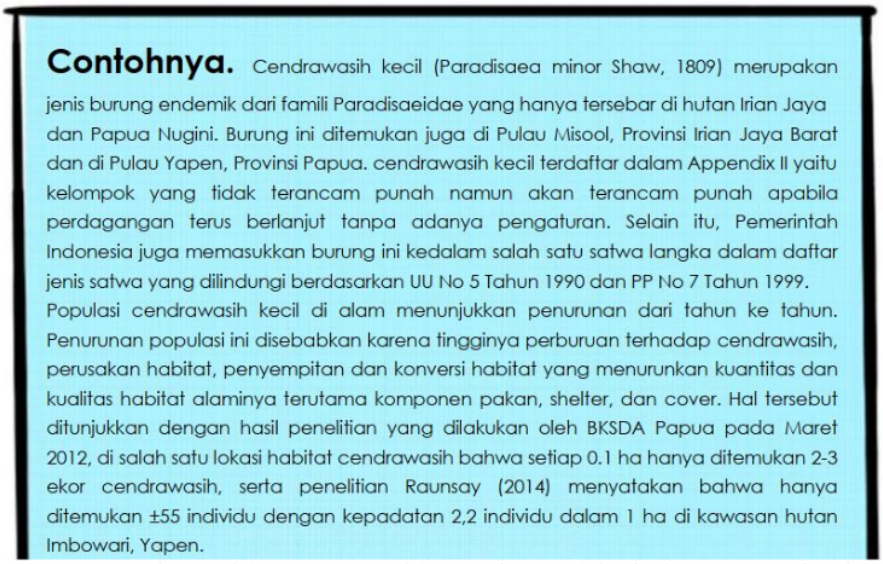

Figure 1. The problem of the extinction of the Cenderawasih bird of Papua in student books

The problem presented in Figure 1 teaches students to understand how extinction is one of the factors that influence classification. So that empowerment of conservation attitudes is carried out in this research so that students in the future can carry out conservation, especially endemic Papuan animals. According to Pattiselanno et al. (2015) modern hunting has displaced traditional hunting which has resulted in species overcrowding in Papua. However, valuable information from local wisdom is that it provides students with knowledge to protect marine species from the threat of extinction. Students' knowledge of environmental protection has an effect on their conservation attitudes (Mohiuddin et al.,

2018). Research has proven that the integration of local wisdom and PBL into students' books has an impact on improving students' conservation attitudes compared to classes that do not use this learning.

CONCLUSION

This research concludes that the integration of local Papuan wisdom and PBL can improve students' conservation attitudes. Local wisdom adds to students' information regarding the management of endemic organisms where they live. The problem of extinction in PBL learning empowers students to think about how to conserve organisms so that extinction factors that influence the classification of living things can be prevented. Local wisdom and PBL are a combination that can be used by teachers to empower their students' conservation attitudes.

REFERENCES

Agustina, D. W., Rachmadiarti, F., & Kuntjoro, S. (2023). Development of environmental pollution handling flipbook based on surabaya local wisdom to train students' ethno-conservation. *IJORER : International Journal of Recent Educational Research*, *4*(1), 16–30. https://doi.org/10.46245/ijorer.v4i1.268

Ariya, G., & Momanyi, S. (2015). Assessing Wildlife Consumption awareness and the attitudes of the local Lambwe Valley community towards Ruma National Park, Kenya. *Journal of Tourism & Hospitality*, *4*(3), 1–6. https://doi.org/10.4172/2167-0269.1000157

Awak, T. F., Fatem, S., & Yohanita, A. (2016). Sistem Perburuan landak moncong panjang (Zaglossus bruijnii) pada masyarakat kampung Waibem dan kampung Saukorem Tambrauw, Papua Barat. *Jurnal Ilmu Kehutanan*, *9*(1), 57–66. https://doi.org/10.22146/jik.10184

Badola, R., Barthwal, S., & Hussain, S. A. (2012). Attitudes of local communities towards conservation of mangrove forests: A case study from the east coast of India. *Estuarine, Coastal and Shelf Science*, *96*, 188–196. https://doi.org/10.1016/j.ecss.2011.11.016

Barnes, R. S. K., Seath, J. L., & Arendse, C. J. (2024). Differential sampling in the assessment of conservation and biodiversity merit: A comparison of the seagrass macrofauna in three nearby South African estuaries. *Biodiversity and Conservation*, *33*(2), 509–532. https://doi.org/10.1007/s10531-023-02754-0

Børresen, S. T., Ulimboka, R., Nyahongo, J., Ranke, P. S., Skjaervø, G. R., & Røskaft, E. (2023). The role of education in biodiversity conservation: Can knowledge and understanding alter locals' views and attitudes towards ecosystem services? *Environmental Education Research*, *29*(1), 148–163. https://doi.org/10.1080/13504622.2022.2117796

Castilho, L. C., De Vleeschouwer, K. M., Milner-Gulland, E. J., & Schiavetti, A. (2018). Attitudes and Behaviors of Rural Residents Toward Different Motivations for Hunting and Deforestation in Protected Areas of the Northeastern Atlantic Forest, Brazil. *Tropical Conservation Science*, *11*, 194008291775350. https://doi.org/10.1177/1940082917753507

Chaichana, D., Srijuntrapun, P., & Rawang, W. (2019). An integrative framework of environmental education for environmental crisis transformation. *Pertanika Journal of Social Sciences and Humanities*, *27*(4), 2475–2494. http://www.pertanika.upm.edu.my/pjssh/browse/regular-issue?article=JSSH-4713-2019

Christ, L., & Dreesmann, D. C. (2023). Protect + prevent = preserve? Exploring students' arguments for and attitudes toward conservation. *Environmental Education Research*, *29*(1), 45–62. https://doi.org/10.1080/13504622.2022.2128059

Damopolii, I., & Kurniadi, B. (2019). The development of android-based mobile learning supported by problem-based learning strategy for students' learning success. *International Journal of Scientific & Technology Research*, *8*(7), 190–193. https://www.ijstr.org/final-print/july2019/The-Development-Of-Android-based-Mobile-Learning-Supported-By-Problem-based-Learning-Strategy-For-Students-Learning-Success.pdf

Damopolii, I., Nunaki, J. H., Jeni, J., Rampheri, M. B., & Ambusaidi, K. A. (2024). An integration of local wisdom into a problem-based student book to empower students' conservation attitudes. *Participatory Educational Research*, *11*(1), 158–177. https://doi.org/10.17275/per.24.10.11.1

Damopolii, I., Nunaki, J. H., Nusantari, E., & Kandowangko, N. Y. (2019). Integrating local resources into inquiry-based teaching materials to training students' science process skills. *AIP Conference Proceedings*, *2120*, 060003. https://doi.org/10.1063/1.5115703

Diegues, A. C. (2014). The role of ethnoscience in the build-up of ethnoconservation as a new approach to nature conservation in the tropics. *Revue d'ethnoécologie*, *6*, 1–15. https://doi.org/10.4000/ethnoecologie.1956

Härtel, T., Randler, C., & Baur, A. (2023). Using species knowledge to promote pro-environmental attitudes? The association among species knowledge, environmental system knowledge and attitude towards theenvironment in secondary school students. *Animals*, *13*(6), 1–18. https://doi.org/10.3390/ani13060972

Horota, S., Damopolii, I., Kilmaskossu, J. P., & Nusantari, E. (2023). Development of an ethnobiology supplement book based on the study of medicinal plants in Wonawa District, Kepulauan Yapen Serui Regency. *Inornatus: Biology Education Journal*, *3*(1), 40–49. https://doi.org/10.30862/inornatus.v3i1.421

Iwan, I., Istisaroh, I., Sirait, S. H. K., & Damopolii, I. (2020). The development of teaching materials oriented problem-based learning integrating Tifa to train student's critical

thinking skills. *AIP Conference Proceedings*, *2215*, 030006. https://doi.org/10.1063/5.0000587

Kahar, A. P., & Fadhilah, R. (2019). Pengembangan perangkat pembelajaran biologi SMA berbasis potensi lokal, literasi lingkungan dan sikap konservasi. *Pedagogi Hayati*, *2*(2), 21–32. https://doi.org/10.31629/ph.v2i2.832

Klop, T., Severiens, S. E., Knippels, M. P. J., van Mil, M. H. W., & Ten Dam, G. T. M. (2010). Effects of a science education module on attitudes towards modern biotechnology of secondary school students. *International Journal of Science Education*, *32*(9), 1127–1150. https://doi.org/10.1080/09500690902943665

Kopnina, H., Muhammad, N. Z., & Olaleru, F. (2022). Exploring attitudes to biodiversity conservation and Half-Earth vision in Nigeria: A preliminary study of community attitudes to conservation in Yankari Game Reserve. *Biological Conservation*, *272*, 109645. https://doi.org/10.1016/j.biocon.2022.109645

Levis, C., Flores, B. M., Campos-Silva, J. V., Peroni, N., Staal, A., Padgurschi, M. C. G., Dorshow, W., Moraes, B., Schmidt, M., Kuikuro, T. W., Kuikuro, H., Wauja, K., Kuikuro, K., Kuikuro, A., Fausto, C., Franchetto, B., Watling, J., Lima, H., Heckenberger, M., & Clement, C. R. (2024). Contributions of human cultures to biodiversity and ecosystem conservation. *Nature Ecology & Evolution*, *8*(5), 866–879. https://doi.org/10.1038/s41559-024-02356-1

Lister, A. (2000). Indeterminate problems: Exploring the potential of problem-based learning in conservation education. *Studies in Conservation*, *45*(sup1), 114–117. https://doi.org/10.1179/sic.2000.45.Supplement-1.114

Mailissa, M. G., Sujarta, P., & Keiluhu, H. J. (2021). Keanekaragaman gastropoda dan pengetahuan masyarakat tentang gastropoda di Pulau Liki Kabupaten Sarmi Papua. *Jurnal Education and Development*, *9*(4), 140–147. https://doi.org/Marzeline Gesty

Manihuruk, S. R., Krey, K., & Maker, U. P. (2020). Tahapan perkembangbiakan kupu-kupu sayap burung (Ornithoptera goliath) di cagar alam pegunungan Arfak. *VOGELKOP: Jurnal Biologi*, *2*(1), 28–35. https://doi.org/10.30862/vogelkopjbio.v2i1.53

Maruzy, A., & Mujahid, R. (2019). Conservation Status of Medicinal Plants from Papua and West Papua Province (Indonesia). *Media Konservasi*, *24*(2), 114–123. https://doi.org/10.29244/medkon.24.2.114-123

Mentansan, G., Nauw, M., Awom, R., Ayorbaba, M., Universitas Papua, Reeve, D., & Universitas Papua. (2023). Sasi local wisdom as a cultural capital for sustainable tourism development in Raja Ampat Regency, West Papua. *International Journal of Green Tourism Research and Applications*, *5*(1), 52–59. https://doi.org/10.31940/ijogtra.v5i1.52-59

Mohiuddin, M., Al Mamun, A., Syed, F., Mehedi Masud, M., & Su, Z. (2018). Environmental Knowledge, Awareness, and Business School Students' Intentions to Purchase Green

Vehicles in Emerging Countries. *Sustainability*, *10*(5), 1534. https://doi.org/10.3390/su10051534

Nawas, A., Zuhri, M., & Sulaiman, U. (2022). Harmony in the Frame of Local Wisdom" One Furnace-Three Stones" in Education. *Dinamika Ilmu*, *22*(1), 109–130. https://doi.org/10.21093/di.v22i1.4284

Nunaki, J. H., Patiung, Y., Kandowangko, N. Y., Nusantari, E., & Damopolii, I. (2019). The validity and students response toward coordination system teaching material oriented guided inquiry. *Formatif: Jurnal Ilmiah Pendidikan MIPA*, *9*(1), 59–70. https://doi.org/10.30998/formatif.v9i1.2884

Pattiselanno, F., Manusawai, J., Arobaya, A. Y. S., & Manusawai, H. (2015). Wildlife management and conservation based on traditional wisdom in Papua. *Jurnal Manusia Dan Lingkungan*, *22*(1), 106–112. https://doi.org/10.22146/jml.18731

Pattiselanno, F., Ziembicki, M., Nasi, R., & Krockenberger, A. (2024). Target, tool, tenure and timing: The four T's limiting the impact of traditional hunting in Indonesian Papua. *Frontiers in Conservation Science*, *4*, 1266321. https://doi.org/10.3389/fcosc.2023.1266321

Permana, R., & Azizah, F. N. (2022). Status konservasi biota laut yang teridentifikasi di Tempat Pelelangan Ikan (TPI) Kabupaten Pangandaran, Jawa Barat. *Jurnal Ilmu-Ilmu Perikanan Dan Budidaya Perairan*, *17*(1), 48–57. https://doi.org/10.31851/jipbp.v17i2.7733

Prasetyo, B., Utami, S., & Wahyuni, N. S. (2024). Tree Kangaroos (*Dendrolagus* sp.) of Papua: Characteristics and Conservation. *E3S Web of Conferences*, *483*, 01006. https://doi.org/10.1051/e3sconf/202448301006

Purbani, D. C., Ambarwati, W., Kusuma, A. B., & Herliany, N. E. (2019). Identifikasi mikroalga laut dari Tambrauw, Papua Barat. *Jurnal Ilmu Dan Teknologi Kelautan Tropis*, *11*(3), 777–791. https://doi.org/10.29244/jitkt.v11i3.25862

Purnomo, D. W., Magandhi, M., Kuswantoro, F., Risna, R. A., & Witono, J. R. (2015). Pengembangan koleksi tumbuhan kebun raya daerah dalam kerangka strategi konservasi tumbuhan di Indonesia. *Buletin Kebun Raya*, *18*(2), 111–124. https://jurnal.krbogor.lipi.go.id/index.php/buletin/article/view/18_2_5

Putri, A., & Suroto, H. (2023). Jejak budaya sagu dan tradisi pengelolaan hutan sagu di kawasan danau Sentani, Papua. *Naditira Widya*, *17*(1), 1–16. https://naditirawidya.kemdikbud.go.id/index.php/nw/article/view/522

Putri, D. H., Maideliza, T., & Mahdi, M. (2021). Potential Valuation of plants based on utilization of plants, local wisdom and local resident attitude about plant conservation in Silokek National Geopark. *Jurnal Biologi Universitas Andalas*, *9*(2), 68–75. https://doi.org/10.25077/jbioua.9.2.68-75.2021

Ratnasari, D., Mahrawi, M., Wahyuni, I., & Risdatika, V. (2022). Pengaruh augmented reality berbasis web dengan model problem based learning terhadap sikap konservasi

peserta didiK. *AL-ULUM: Jurnal Sains dan Teknologi*, *8*(1), 6–12. https://doi.org/10.31602/ajst.v8i1.7904

Regala, G. Z. (2019). Problem-based learning module in the conservation of ecosystem. *Proceedings of 4th International Congress on Action Research, Action Learning*, 108–113.

Rophi, A. H., Kawatu, P. J., Rehiara, R. E., Raunsay, E. K., Megawati, R., & Jesajas, D. R. (2024). Sosialisasi upaya pelestarian satwa liar di kampung Persiapan Berber, Distrik Bonggo Barat, Kabupaten Sarmi. *Community Development Journal: Jurnal Pengabdian Masyarakat*, *5*(1), 2054–2058. https://doi.org/10.31004/cdj.v5i1.25740

Rosita, A., Sudirman, S., & Marwoto, P. (2014). Perangkat pembelajaran problem based learning berorientasi green chemistry materi hidrolisis garam untuk mengembangkan soft skill konservasi siswa. *Jurnal Pendidikan IPA Indonesia*, *3*(2). https://doi.org/10.15294/jpii.v3i2.3112

Rumalolas, N., Rosely, M. S., Nunaki, J. H., Damopolii, I., & Kandowangko, N. Y. (2021). The inquiry-based student book integrated with local resources: The impact on student science process skill. *Journal of Research in Instructional*, *1*(2), 133–146. https://doi.org/10.30862/jri.v1i2.17

Rumbruren, Y., Damopolii, I., & Nebore, I. D. Y. (2022). Diversity of fish caught by fishermen at Warido Amberimasi village: Development of supplement book for animal diversity course. *Inornatus: Biology Education Journal*, *2*(1), 11–23. https://doi.org/10.30862/inornatus.v2i1.271

Rumlus, R., Semangun, H., & JCM, O. K. (2015). Keanekaragaman jenis teripang di Fafanlap dan Gamta, Kepulauan Misool, Kabupaten Raja Ampat, Papua Barat dan uji aktivitas kandungan senyawa kimianya. *Bonorowo Wetl*, *5*(1), 1–10. https://doi.org/10.13057/bonorowo/w050101

Sarkar, S., Dyer, J. S., Margules, C., Ciarleglio, M., Kemp, N., Wong, G., Juhn, D., & Supriatna, J. (2017). Developing an objectives hierarchy for multicriteria decisions on land use options, with a case study of biodiversity conservation and forestry production from Papua, Indonesia. *Environment and Planning B: Urban Analytics and City Science*, *44*(3), 464–485. https://doi.org/10.1177/0265813516641684

Schönfelder, M. L., & Bogner, F. X. (2017). Individual perception of bees: Between perceived danger and willingness to protect. *PLOS ONE*, *12*(6), e0180168. https://doi.org/10.1371/journal.pone.0180168

Sirait, S. H. K., Sremere, F. M., Nunaki, J. H., & Tuwo, M. (2024). Development of plant diversity flipbooks integrated local wisdom. *Inornatus: Biology Education Journal*, *4*(1), 27–35. https://doi.org/10.30862/inornatus.v4i1.576

Suhirman, S., & Yusuf, Y. (2019). The effect of problem-based learning and naturalist intelligence on students' understanding of environmental conservation. *JPBI (Jurnal Pendidikan Biologi Indonesia)*, *5*(3), 387–396. https://doi.org/10.22219/jpbi.v5i3.9817

Sujarta, P., Renyoet, A., & Dimara, L. (2021). Kajian sistem etno konservasi laut masyarakat pesisir Papua: Sasisen dan tiyaitiki. *Jurnal Education and Development*, *9*(1), 103–110. https://doi.org/10.37081/ed.v9i1.2311

Sumarsono, A., & Wasa, C. (2019). Traditional *Sasi* wisdom in Papua-based nature conservation. *IOP Conference Series: Earth and Environmental Science*, *235*, 012092. https://doi.org/10.1088/1755-1315/235/1/012092

Tapilatu, R. F., & Kusuma, A. B. (2022). *BIodiversitas ikan ekonomis penting Papua Barat*. Cahya Ghani Recovery.

Ungirwalu, A., Awang, S. A., & Tokede, M. J. (2018). *Etnobotani Buah Hitam: Konstruksi Etnoekologi Etnis Wandamen-Papua*. Deepublish.

Wawo, A. H., Lestari, P., & Setyowati, N. (2019). Buah merah (Pandanus conoideus Lamk) bioresources Pegunungan Tengah Papua: Keanekaragaman dan Upaya konservasinya. *Jurnal Biologi Indonesia*, *15*(1), 107–121. http://dx.doi.org/10.14203/jbi.v15i1.3770

Yapsenang, D., Davinsa, D. A., Respati, B., Kurniawan, A., Maryani, M., & Mustagfirin. (2022). Ecological Index, status and challenges of the bird conservation programs (avifauna) among indigenous peoples of the Moi Lemas tribe, West Papua. *Indonesian Journal of Social Responsibility Review (IJSRR)*, *1*(2), 77–89. https://doi.org/10.55381/ijsrr.v1i2.36

sYomaki, E. K., Nunaki, J. H., Jeni, J., Mergwar, S. D. I., & Damopolii, I. (2023). Flipbook based on problem-based learning: Its development to bolster student critical thinking skills. *AIP Conference Proceedings*, *2614*(1), 020022. https://doi.org/10.1063/5.0126212

Yunus, Muh., Hasyim, A., Nur, S., Alang, H., & Astuti, W. W. (2023). Menanamkan jiwa konservasi dini pada siswa SDIT Nurul Fikri Makassar melalui materi "ayo menyayangi makhluk ciptaan Allah." *Jurnal SOLMA*, *11*(3), 557–563. https://doi.org/10.22236/solma.v11i3.10387

Zannah, N. L., Damopolii, I., Iwan, I., & Rahman, S. R. (2022). Examining student learning outcomes on the topic of invertebrates through problem-based learning. *Inornatus: Biology Education Journal*, *1*(2), 69–74. https://doi.org/10.30862/inornatus.v1i2.251

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