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# An Environmental Awareness Model Based on Scientific Learning of Environmental Pollution Issues

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**ABSTRACT** Human activities cause numerous environmental problems, including pollution of the environment as well as harm to living organisms. This is the reason why environmental problems should be reduced and resolved immediately for sustainability. In the educational sector, teachers must prepare students to have awareness of environmental problems in daily life. The focus of this research on environmental problems is water pollution. The problem-based learning model can be used to raise environmental literacy and awareness of environmental issues, enabling sustainable environmental management. The purposes of this study are two-fold: (1) to analyze information about environmental awareness among students, and (2) to propose an environmental awareness model. This study is based on a questionnaire survey of junior high school students and a literature review. The survey, using seven Coefficients (C), was conducted in Salatiga city, Central Java, with 112 Grade 10 students from three senior high schools who had completed integrated science learning at the junior high school level. The results show that students were aware of waste in their environment and of ways to reduce it. Students were aware enough of recycling and sorting waste; reusing water, in terms of using wastewater and collecting rainwater, in their environment. Further analysis showed that students were aware of water conservation and reducing water consumption in their environment. From the correlation between the Coefficient(s), the Environmental awareness model was outlined. This model can be used in the development of science learning curricula and in advancing the SDGs (Sustainable Development Goals) by 2030.

**Keywords:** Environmental pollution, Science learning, Awareness model, Curriculum, SDGs

## 1. INTRODUCTION

The environment is the complex interaction among biological, physical, and chemical elements in nature. The environment consists of the atmosphere, water, soil, sediments, suspended sediments, and biota (Connell, 2005). Regarding the Republic of Indonesia Law number 32/2009: "natural environment is the unity of space with all objects, forces, conditions, and living creatures, including humans and their behavior, which influence nature itself, the continuity of life, and the welfare of humans and other living creatures". It is our responsibility to conserve the natural environment so that it will be available to future generations.

Human activities cause environmental problems (Nogueira & de Oliveira, 2023; Kiryak et al., 2021), including pollution of the environment (water, soil, and air), and harm to living things (Ayaydin et al., 2023). Anthony & Kori (2018) note the effects of environmental problems, including the loss of primary forests, reduced soil fertility, and uncontrolled erosion/flooding. Environmental problems have become a critical issue in the current global context, including in Indonesia (Xuan, 2024) and China (Geng & Zhao, 2020), especially in the economic and educational sectors. This is the reason why environmental problems should be reduced and resolved immediately for the sustainability of the future.

In the educational sector, teachers can prepare students to be aware of environmental problems in their daily lives. For example, students learn about environmental problems in their coursework and research (Zouine et al., 2024), so solving environmental problems becomes their responsibility (Salsabila et al., 2019). It means that a sense of environmental responsibility can be cultivated among students.

The focus of this research on environmental problems is water pollution. Regarding the Republic of Indonesia

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Law number 32/2009: "environmental pollution is the entry or introduction of living things, substances, energy, and/or other components into the environment by human activities so that it exceeds the environmental quality standards that have been determined." Some research (Nogueira & de Oliveira, 2023; Kiryak et al., 2021; Ayaydin et al., 2023; Anthony & Kori, 2018) indicates that human activities produce waste as byproducts of industrial and domestic activities. The waste pollutes the air and soil and ends up in water bodies through the water cycle.

As mentioned previously, pollution in general is the most important global environmental issue. Water pollution degrades water quality, hindering the ability to meet environmental, social, and economic needs. Water pollution can be caused by various sources, including substances from waste (Orbanić & Kovač, 2021), particularly hazardous chemical waste (Koulougliotis et al., 2024). The environmental problems also include water quality, life-cycle thinking/analysis, and acidification. The "waste" refers to materials or processes that are discarded or planned for disposal, from household waste to industrial waste (Moshkal et al., 2024).

Waste should be managed from source to final disposal without polluting water bodies (above or below the surface). Lye et al. (2024) stated that solid waste problems in some developing countries stem from a lack of environmental knowledge among citizens. The knowledge consists of general and specific knowledge. As mentioned by Correira & Ramos (2024), the knowledge includes a change in the environment caused by pollution. For example, food waste in daily life contributes to water pollution (Piras et al., 2023).

Based on the explanation of environmental problems, in particular environmental pollution, a sustainable environment becomes the main goal for conserving nature. From an educational perspective, several studies examine environmental awareness. Anthony & Kori (2018) state that the media are needed to spread environmental awareness among people. This research is strengthening the foundation of developing learning media to gain environmental awareness. Gök & Boncukçu (2023) stated that students' environmental awareness develops when they face real-life problems, especially environmental ones.

Environmental awareness, therefore, is the first move to pro-environmental behavior (Esposito & Jalal, 2025a). In Burgos-Ayala et al. (2022), teachers in schools made some efforts to raise awareness of biodiversity conservation. School was organizing public events or designing programs to integrate communities in environmental decisions. In the curriculum, science teachers can develop pedagogical materials to raise environmental awareness (Gavrilas et al., 2024). In terms of environmental pollution, some activities serve as solutions, such as recycling, keeping the environment clean, reusing, collecting waste (such as oil), and raising awareness (Ayaydin et al., 2023; Hadzigeorgiou et al., 2015; Meng et al., 2023). Therefore, teachers should motivate students to analyze their surrounding environment. As per Shah et al. (2023), students take responsibility to reduce energy consumption due to environmental awareness. Environmental problems and active participation are also needed regarding waste issues and air and water pollution (Orbanić & Kovač, 2021; Genoveva & Syahrivar, 2020). Developing environmental awareness through several eco-friendly activities is a crucial step in addressing environmental challenges.

To make environmental awareness impactful for global development, it should also be linked to the Sustainable Development Goals (SDGs). For example, the environmental protection factor across four SDGs: goal 6, clean water and sanitation; goal 13, climate action; goal 14, life below water; and goal 15, life on land. Padilla et al. (2025) propose that SDG-related awareness should begin in elementary education, which can affect curricular and co-curricular activities. The United Nations Agenda stated that SDGs goals must be achieved by 2030 (Dziubaniuk et al., 2024). In the educational sector, comprehensive environmental management education programs should be designed to effectively integrate environmental, social, and economic themes and interactions, thereby facilitating future sustainable development (Greenland et al., 2023).

Based on the explanations of environmental pollution and environmental awareness, science education can serve as an intermediary to foster environmental awareness. According to Egbonyi et al. (2020), Hadzigeorgiou et al. (2015), and Zouine et al. (2024), environmental problems are incorporated into the school curriculum by infusing environmental topics into the teaching subjects. Preservice teachers are an important predictor of environmental literacy (Orbanić & Kovač, 2021; Cosby et al., 2025) because of their role in curriculum implementation (intracurricular and extracurricular) and also educational programs. For example, an educational program focused on the waste problem and the energy aspect to sustain the quality of science education. From a curriculum perspective, it is vital to integrate environmental awareness into science subjects (Baek, 2023; Obrecht et al., 2022; Skalstad & Munkebye, 2021), in which the environmental theme concepts are embedded (e.g, water cycle, biogeochemical cycle, ecosystem). Teachers' knowledge of environmental problems and the methods for teaching them is the key to lesson success (Tapilouw et al., 2017, 2018a).

**Table 1** Indicators of questionnaire coefficient

| Coefficient | Item |
|---|---|
| C1 Waste | Waste is the major problem in my house |
| | Waste is the major problem in school |
| | I find waste that is thrown consciously around the neighborhood |
| C2 Recycling waste | I recycle waste in my house |
| | I recycle waste in school |
| | I compost organic waste in my house |
| | I compost organic waste in school |
| C3 Reducing waste | I do not leave grains of rice/ side dishes on my plate |
| C4 Sorting waste | I sort waste in my house |
| C5 Water conservation | I know what is water conservation |
| C6 Reusing water | I compost organic waste in my house |
| | I collect rainwater for watering plants |
| C7 Reducing water | I reduce the use of water for daily activities in my house |
| | I reduce the use of water for daily activities in school |

In science education, environmental problems are incorporated into the curriculum (Corbacho-Cuello et al., 2025; Alegado et al., 2025) and into extracurricular activities (Correira & Ramos, 2024; Padilla et al., 2025). Some research shows that problem-based learning is best used for teaching environmental problems (Padilla et al., 2025; Gönen & Noyan, 2025). The problem-based learning model can be utilized in raising environmental literacy and awareness with issues of sustainable development, in terms of a sustainable environment (Gök & Boncukçu, 2023; Anokye et al., 2024; Weber et al., 2021; Tapilouw, 2023; Pangsuma et al., 2024; Koulougliotis et al., 2024). Reduce, Reuse, Recycle (3R) is an activity that can raise environmental awareness (Moshkal et al., 2024; Carbonell-Alcocer et al., 2025; Shafiei & Maleksaeidi, 2020).

Based on the explanation above, there is an urgent need to develop an environmental awareness model to be implemented in science lessons, especially on environmental themes. The focus of this study is environmental awareness through science lessons as a contribution to a sustainable environment for future generations. The purposes of this study are (1) to analyze information about environmental awareness among students, and (2) to propose an environmental awareness model. This research supports the Sustainable Development Goals and promotes environmental awareness.

## 2. METHOD

This study is a descriptive, quantitative study based on the results of a previous study on raising environmental awareness in science learning aligned with the Sustainable Development Goals (Tapilouw, 2023) and on pro-environmental behavior (Esposito & Jalal, 2025; Meng et al., 2023). Tapilouw (2023a) developed a program (Tapilouw et al., 2024) to foster environmental awareness and support the Sustainable Development Goals. The survey was conducted in Salatiga city, Central Java. The target of this study is more than 100 Grade 10 students from three Senior High Schools. The rationale for choosing Grade 10 is the completeness of integrated science learning following Junior High School. A total of 112 students from three Senior High Schools participated in an environmental awareness activity (Tapilouw et al., 2024). Figure 1 shows the research procedure of this study.

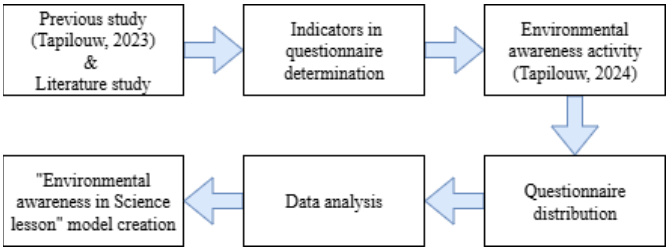


**Figure 1** Research procedure (modification Tapilouw et al., 2017)

The data were collected using a validated survey questionnaire adapted from Esposito & Jalal (2025) and Meng et al. (2023). To create an Environmental awareness model, a questionnaire was developed based on seven indicators. From these indicators, 14 statements were answered using a Likert scale (strongly agree – strongly disagree).

From Table 1, there are seven Coefficients. Data were collected and analyzed descriptively to obtain study results and examine participants' perspectives on waste management (C1-C2; C1-C3; C1-C4), water conservation (C5-C6; C5-C7), and daily water conservation in the neighborhood and at the school. The analysis was done descriptively. After that, correlation (r) analysis was done between the construct and the items. The analysis was using Pearson's Correlation Coefficient by Statistical Package for the Social Sciences (SPSS) Software. This analysis was used to determine the correlation between seven coefficients (Table 1), specifically C1-C2, C1-C3, C1-C4, C5-C6, and C5-C7. The correlation coefficient became a foundation for designing the Environmental Awareness Model. Analysis. To answer the study's second objective, the environmental awareness model was constructed based on the correlation between Coefficients and supported

literature. According to (Krištof et al., 2017), the correlation (r) was classified into three categories : (1) 0.1 < | r | < 0.3 (weak correlation), (2) 0.3 < | r | < 0.5 (medium/moderate correlation), (3) | r | > 0.5 (strong correlation).

## 3. RESULT AND DISCUSSION

Based on the purpose of the study, the result and discussion section will explain two main components: 1) environmental awareness analysis among students, 2) modeling environmental awareness. The results of this study are also explained below.

### 3.1 Analysis of Environmental Awareness

The coefficient C1 is about waste surrounding students: in-house, at school, and in the neighborhood. The core of the statements is the presence of waste in the environment. The majority of students stated that they disagree that waste is present in the environment and becomes a problem (Fig. 2). About 34.5% participants stated that they agree that waste is present in their vicinity. It means that waste was still found in their house. At school, about 47.8% of participants also agree that waste is a problem because it is present there. From Fig. 2, about 3.5% participants still strongly agreed that waste is a problem in their surrounding environment. The result of the C1 construct (waste) shows that students are aware of waste around them.

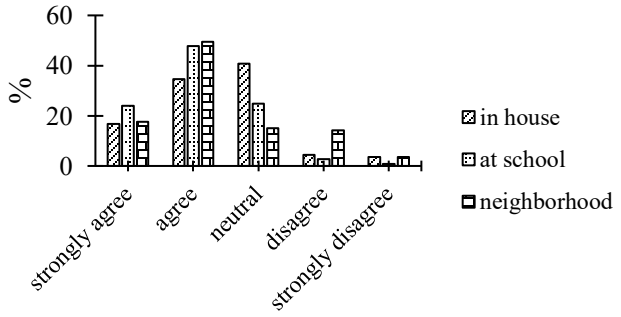


**Figure 2** Awareness about finding waste in the environment ("I find waste (a) in house; (b) at school; (c) in neighborhood")

Students were aware of waste in their environment. It is supported by the average agreement (3.71) across three statements in C1. They agreed that they found waste scattered in their house (3.6), at school (3.9), and in the neighborhood (3.6). The range of those third numbers is in agreement. These results strengthen the idea that students recognize that waste will cause environmental problems. For example, leaves, kitchen waste, and food waste are categorized as organic waste. Plastic, glass, and cans are categorized as inorganic waste. According to Fig. 2, waste remains a problem for students, despite their awareness of it. Waste becomes a problem in the environment, damaging water, soil, sediment, and biota (Connell, 2005).

The second coefficient (C2) concerns recycling waste, including composting, in-house and at school. The central core of three statements is "I am actively involved in recycling and composting." The majority of students stated that they were neutral about being actively involved (Fig. 3). Participants agreed that they were actively involved in composting in-house (16%) and at school (17.7%). It means that they are aware of recycling waste (inorganic waste). According to Fig. 3, participants still reported being actively involved in composting at home (30.1%) and at school (24.8%). The result of the C2 coefficient (recycling waste) shows that students are aware of recycling waste (organic and inorganic).

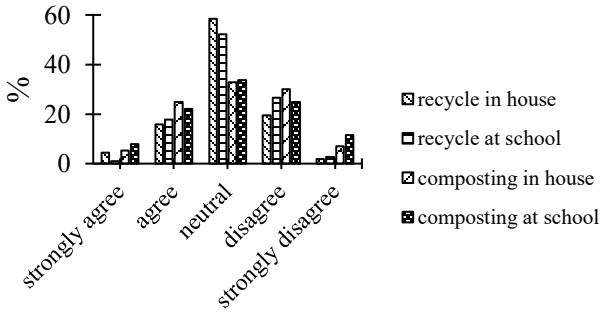


**Figure 3** Awareness about recycling and composting waste

Students were aware enough of recycling waste in their environment. It is proven by stating the neutral of four statements in C2 (2.93). They were neutral about whether they actively recycled waste at home (3.02) and at school (2.88). In composting organic waste, they reported being neutral about actively composting at home (2.91) and at school (2.90). The range of those fourth numbers is in neutral scope. Students are still in the separating waste stage. These results strengthen the case for including recycling activities in science instruction, especially composting, such as composting dry leaves into compost available for planting or farming.

To prevent environmental pollution, action must be taken (Xuan, 2024; Geng & Zhao, 2020). For example, students can learn about recycling inorganic and organic waste. This is a form of environmental awareness. Students have to learn to be responsible for Environmental problems (Zouine et al., 2024; Salsabila et al., 2019). Moreover, how to overcome it. The results of Fig. 3 support the inclusion of recycling in science education.

The third Coefficient (C3) is about reducing waste in daily life. The statement is "I do not leave grains of rice/side dishes on my plate." The majority of students agreed that they did not leave grains of rice/side dishes on their plates (Table 2). About 26.6% participants stated strongly agree. It means that they are aware of reducing waste. Table 2 also shows the result of C4 (sorting waste)

**Table 2** Student's respond of C3 and C4

| Coefficient | strongly agree (%) | Agree (%) | Neutral (%) | Disagree (%) | strongly disagree (%) |
|---|---|---|---|---|---|
| C3 Reducing waste | 26.6 | 46.0 | 23.0 | 2.7 | 1.8 |
| C4 sorting waste | 12.4 | 27.4 | 45.1 | 12.4 | 2.7 |

**Table 3** Student's respond of C5 and C6

| Coefficient | strongly agree (%) | Agree (%) | Neutral (%) | Disagree (%) | Strongly disagree (%) |
|---|---|---|---|---|---|
| C5 Water conservation | 12.4 | 46.0 | 27.4 | 13.3 | 0.9 |
| C6 Reusing water | | | | | |
| • Using water-used | 18.6 | 39 | 26.6 | 14.2 | 1.8 |
| • Collecting rainwater | 14.2 | 29.2 | 33.6 | 19.5 | 3.5 |

responses. The statement is: "I sort waste in my house." According to Table 2, the majority of respondents reported neutrality. Only 12.4% strongly disagreed with sorting waste. The reason was the collection system, or trash-gathering system.

Students were aware of reducing waste in their environment. It is proven by stating "agree" on average (3.93) of one statement in C3. They agreed that they did not leave grains of rice/side dishes on their plate. The range of this number is in agreement. These results strengthen the idea that students recognize that reducing waste can be a solution to environmental problems. For example, finishing food on a plate so that the drains do not get clogged.

Students were aware enough to sort organic and inorganic waste (plastic, glass, and cans) in their environment. It is demonstrated by stating that a single statement is neutral in C4 (3.35). They were neutral because they actively sorted waste. Students do not always separate waste because sometimes they forget, and it has not become a habit. In one case, they were sorting waste, but when the sanitation worker picked it up, the waste was still bundled.

To prevent environmental pollution, we have to reduce waste in our daily lives, for example, in our eating habits. Regarding Piras et al. (2023), food waste contributes to water pollution. So, we have to begin reducing it from our plates. Sorting waste is also an action based on waste substance (Orbanić & Kovač, 2021; Koulougliotis et al., 2024). In education, students must know about environmental change (Correira & Ramos, 2024; Lye et al., 2024). Reducing and sorting waste are efforts in minimizing waste before it pollutes the environment (Moshkal et al., 2024).

The fifth Coefficient (C5) is about water conservation. The statement is "I know what water conservation is." The majority of students (46%) were aware of water conservation (Table 3). Students should know that water must be conserved to ensure water is available for the future. To conserve groundwater, bio-pores can be used/ constructed. Besides that, human behavior can help conserve water (C6 Coefficient). For example, we can reuse and recycle water.

Regarding water reuse, major participants stated they agreed they were actively reusing water. From Table 3, they are using water from washing rice and vegetables daily. The water is used for watering plants. Moreover, they collect rainwater during the rainy season for watering plants and washing houseware, equipment, and motorcycles. From Table 3, participants still disagreed with actively reusing water (14.2-19.5%). The results of the C6 coefficient (reusing water) show that students are aware of reusing water (both used water and rainwater).

Further analysis showed that students were aware of water conservation in their environment. It is shown by the disagreement in the average (3.6) for one statement in C5. They agreed that they knew water conservation. The range of those third numbers is in agreement. These results strengthen the idea that students are aware that they should conserve water in daily life and groundwater. For example, they use water wisely.

Students were aware of reusing water, including using wastewater and collecting rainwater. It is proven by stating the neutrality of two statements in C6 (3.45). They were neutral in that they actively reused rainwater (3.31). At the same time, they agreed to reuse the water (3.58). Some students thought that using (rice and vegetable) washing water is beneficial for plants and can save on tap water usage. In the student's opinion, another way to reuse water is to use collected rainwater to water plants.

Another way to conserve water is to reduce water consumption (C7) in students' daily activities at home and school. The simple environmental awareness forms are turning off the water tap while using hand soap and preventing pipe/ tap leaks. From Fig. 4, most students agreed on reducing water use at home (43.4%) and at school (46.2%). No students (0%) strongly disagreed with reducing water use at home, and no students (0%) disagreed with reducing water use at school.

**Table 4** Correlation between constructs

| Waste Coefficients (C) | correlation | Water conservation Coefficientsns (C) | correlation |
|---|---|---|---|
| C1 – C2 | 0.152 | C5 – C6 | 0.209** |
| C1 – C3 | 0.058 | C5 – C7 | 0.267* |
| C1 – C4 | 0.030 | | |

Note: ** Correlation is significant at the 0.01 level (2-tailed)
* Correlation is significant at the 0.05 level (2-tailed)

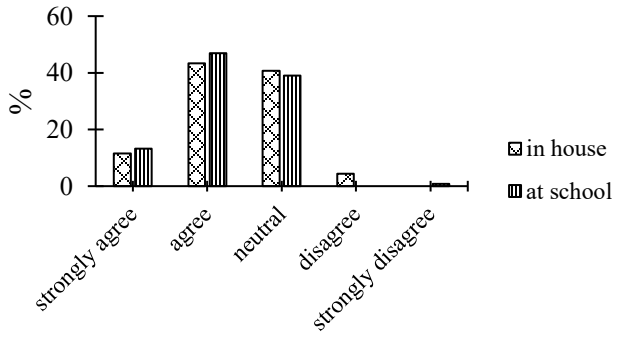


**Figure 4** Awareness about reducing water-use

Students were aware of reducing water use in daily activities. It is supported by the average agreement (3.56) for the C7 statement. They agreed that they reduced water use in the house (3.63) and at school (3.72). The range of this number is in agreement. These results strengthen the idea that students recognize that reducing water consumption can be a solution to water management. They do not leave the water tap on without use, for example, while showering at home or washing their hands at school.

From Table 3 and Fig. 4, water conservation is an effort to sustain water in the environment and to use it effectively. One environmental problem is the degradation of water quality. This situation becomes a reason why citizens must be equipped with environmental knowledge (Lye et al., 2024), including environmental change (Correira & Ramos, 2024).

### 3.2 Environmental Awareness Model

In this section, correlations between constructs are analyzed. Correlation analysis was performed using the nonparametric Spearman's Rho in SPSS. The first part is the correlation between coefficients: waste (C1) and recycling (C2); Reducing (C3); sorting (C4). Based on Table 4, correlation C1-C2 is 0.152; correlation C1-C3 is 0.058; correlation C1-C4 is 0.030. All the correlations in the 'waste' section are weak regarding Krištof et al. (2017) because the values are between $0.1 < r < 0.3$. The weakness of these correlations could be a potential for applying the waste problem and three solutions (Recycling, Reducing, Sorting) in science lesson development.

The second part concerns the correlation between water conservation (C5), reuse (C6), and reduction (C7). In Table 4, correlation C5-C6 is 0.209; correlation C5-C7 is 0.267. The correlation in the 'water conservation' section is weak because the values are between $0.1 < r < 0.3$. Same with the 'waste' section: these correlations are potentially helpful for applying water conservation in science lesson development and, of course, for raising environmental awareness, especially regarding environmental pollution. The correlations were used to develop the environmental awareness model and the science curriculum.

The quantity and quality of waste (C1) cause terrible environmental pollution. This is why students must have environmental awareness: they are the future generation in each country. Students must learn about environmental problems (Zouine et al., 2024), especially environmental pollution, by facing real-life problems (Gök & Boncukçu, 2023).

The environmental awareness model (Fig. 5) was developed based on a literature review, the descriptive analysis of the questionnaire's Coefficient (C), and the correlation between the Coefficient (C). The environmental problem serves as the starting point for this model. Continuing with water pollution and waste (C1). On the right side, water conservation (C5) is an action to sustain water availability and reduce water pollution. On the center side, there are waste and water management solutions to minimize water pollution. These actions serve as a guarantee of water sustainability. In this model (Fig. 5), the Sustainable Development Goals (SDGs) also raise concern about environmental awareness (Padilla et al., 2025; Tapilouw, 2023). At the end, environmental awareness is contributing to the development of the science learning curriculum and to achieving the SDGs in 2030 (Dziubaniuk et al., 2024; Greenland et al., 2023).

According to Fig. 5, environmental awareness is expressed through five actions: reducing waste (C2), sorting waste (C3), recycling waste (C4), reusing water (C6), and reducing water (C7). Based on Table 4, the material on waste and solutions to overcome it (recycling, reducing, sorting) is potentially integrable into the science curriculum and existing pedagogical frameworks. Teachers can select science material (Class 7, 8, 9) by designing a simple web-based activity on an environmental theme (Tapilouw et al., 2018b). For example, energy in the life system (Class 7, semester 1), Environmental pollution (Class 7, semester 2), Substance pressure and its application in daily life (Class 8, semester 1), and analyze environment-friendly technology products and processes for sustainable life (Class 9, semester 2). This opinion relates to Baek (2023), Obrecht et al. (2022), and Skalstad & Munkebye (2021), who state

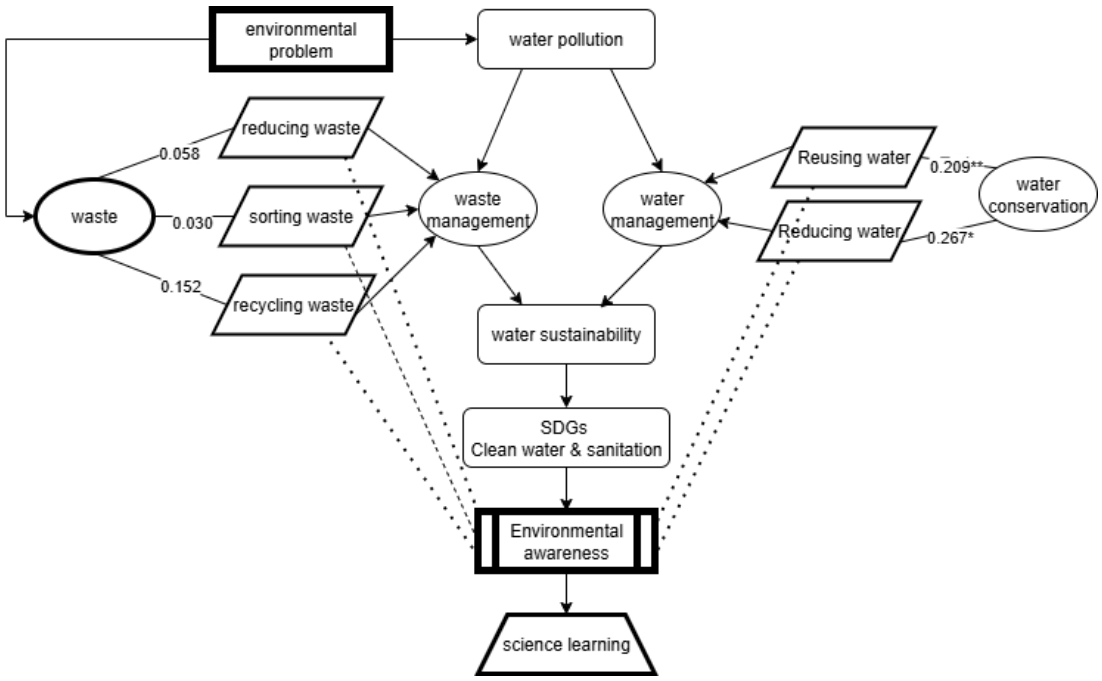


**Figure 5** Environmental awareness model

that environmental theme concepts are embedded (e.g, water cycle, biogeochemical cycle, ecosystem).

The material on water and ways to conserve it (reusing, reducing water use) has the potential to be integrated into the science curriculum across the cognitive, affective, and psychomotor domains. In class 7, students can learn to observe water pollution in their neighborhood, school, and their region. The teacher can prepare a student worksheet for observation. Another way is a scientific experiment on a living organism in polluted water. Teachers can also foster environmental awareness to reduce environmental pollution by encouraging waste reduction, recycling, and sorting. In class 8, students can learn to observe the impact of environmental pollution on the organ system (morphologically and physiologically). Students can search the literature on the health effects and also develop a poster to engage people in reducing environmental pollution to protect their health. Another way is to conduct a scientific experiment on watering plants with water, checking plant morphology.

Teachers can also prepare students for environmental awareness to reduce water consumption and reuse water. Teachers can also foster environmental awareness to reduce environmental pollution by encouraging waste reduction, recycling, and sorting. In class 9, students can create an environmentally friendly product or model in order to reduce the effects of environmental pollution. The product can be used for waste management and also for water management. Teachers can develop a project by using problem-based learning. Also, students can learn more about environmental issues through literature and observation. Teachers can develop worksheets to assist students in the observation process.

Several studies support this model's influence on student awareness (Shah et al., 2023). Environmental awareness can be initiated in schools through the curriculum (Egbonyi et al., 2020; Gavrilas et al., 2024; Ayaydin et al., 2023; Hadzigeorgiou et al., 2015; Meng et al., 2023) to foster pro-environmental behavior (Esposito & Jalal, 2025; Burgos-Ayala et al., 2022). In science lessons, teachers and students must actively participate to gain environmental awareness (Orbanić & Kovač, 2021; Genoveva & Syahrivar, 2020; Cosby et al., 2025).

This awareness model (Fig. 5) applies to environmental problems; environmental pollution is included in the curriculum: intra-curricular (Corbacho-Cuello et al., 2025; Alegado et al., 2025) and extracurricular activities (Correira & Ramos, 2024; Padilla et al., 2025). In the implementation of this model, science teachers can use the problem-based learning model (Padilla et al., 2025; Gönen & Noyan, 2025) that can be utilized in gaining environmental literacy and awareness, in terms of a sustainable environment (Gök & Boncukçu, 2023; Anokye et al., 2024; Weber et al., 2021; Pangsuma et al., 2024; Koulougliotis et al., 2024). For example, the Reduce, Reuse, Recycle (3R) waste reduction strategy is an activity to raise environmental awareness (Moshkal et al., 2024; Carbonell-Alcocer et al., 2025; Shafiei & Maleksaeidi, 2020).

## 4. CONCLUSION

There are two main conclusions based on the study findings. The first conclusion is that environmental awareness, students' awareness about waste (C1), reducing waste (C2), recycling waste (C3), and sorting waste (C4) are good (60-79%). Regarding water conservation, students' awareness of water conservation (C5), Reusing water (C6),

and reducing water use (C7) is good (69-79%). The second conclusion is about the environmental awareness model. The correlations in the waste management section are positively weak (0.03 -0.15). At the same time, the correlations in the water management section are positively sufficient (0.209-0.267). The environmental awareness model can be implemented in science learning on an environmental theme and contribute to science curriculum development.

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