Investigation of students' pro-environmental behavior around Indonesia's new capital city

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Article Info

ABSTRACT

The relocation of the capital city of Indonesia needs the utmost support for its sustainability. This paper is an explorative study on the pro-environmental behavior (PEB) of students from the buffer cities closest to the new capital city. Data were collected using a questionnaire based on the two major environmental values and appreciation instruments. The questionnaire contained 21 items that measured PEB in relation to three aspects: preservation, utilization, and appreciation. Data were collected from 280 junior high school students who participated in an online questionnaire. The data analysis used descriptive statistics and correlations. Utilization was identified as having the highest score among the three aspects, indicating that most students in the buffer cities hold exploitative utilitarian preferences for nature. Interventional education programs are needed to reduce human over-exploitation of the environment and prevent further environmental degradation. The highest correlation was found between appreciation and preservation, which was significant and positive. Gender was not a variable that affected PEB. However, the location of the buffer cities was the factor that showed the most significant differences in the scores. Our results could provide relevant insights for the design of environmental education to support the sustainability of Indonesia's new capital city.

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1. INTRODUCTION

Since the plan to relocate the capital city of Indonesia was announced in the 2020-2024 National Medium-Term Development Plan, preparation for the relocation has been recognized as crucial, with sustainability being of particular concern [1]. The relocation plan locates the new capital in the administrative regions of Penajam Paser Utara (PPU) and Kutai Kartanegara (Kukar) Regency, in East Kalimantan. The new capital city, to be called Nusantara, will occupy an area of 256.142 hectares and will combine the concepts of forest and smart city [2]. The intention is that the city will offer great opportunities for innovation, culture, science, commerce, and social development, while the new area will offer citizens diverse opportunities for employment, education, and lifestyle [3]. With the imminent relocation of the capital, educational preparation is needed to ensure that the community is ready to face issues relating to the environmental impact of the new capital city.

In the context of Indonesia's tropical environment, finding an equilibrium between preserving nature and utilizing it is an ongoing challenge. In Kalimantan, significant damage has been done to the natural forests through human utilization, including illegal logging, replacing forest with plantations, and mining [4]. The loss of forest cover has resulted in several health problems, as indicated by the

environmental quality index [5] and supporting the need for forest preservation measures. As reported, the quality of the Kalimantan environment needs special attention in terms of its air quality index [6], water quality index [7], and coastal area conditions [8]. The environmental quality of the new capital city and its surrounding areas has become of critical concern to environmental researchers [9].

In this regard, junior high school students are considered as essential stakeholders since they will face the burden of both past and current environmental carelessness. Consequently, we argue that it is important to investigate the pro-environmental behavior (PEB) of junior high school students in the new capital's buffer cities. The PEB exploration focuses not only on the preservation and utilization of nature but also on appreciation as a positive form of nature utilization. In addition to exploring each aspect of PEB, an exploration based on gender and location was also conducted to further clarify the discussion.

Measuring the environmental perceptions of children has assumed increasing significance since it correlates with their PEB and indicates the need for research into future environmental education [10]. PEB refers to actions that prevent harm to or safeguard the environment [11]. Environmental perceptions are often measured using one of two standard tools: the revised New Ecological Paradigm (NEP) scale and the Two Major Environmental Values (2-MEV) scale. According to NEP, the individual will either have a bio-centric (preservation) or an anthropocentric (utilization) perspective, while 2-MEV identifies environmental perception as a two-dimensional construct, which treats preservation and utilization as two distinct, and not necessarily related components [12]. It has been suggested that the NEP does not fully explore all aspects of perceptions of the environment, unlike the 2-MEV model [13]. In addition to preservation and utilization, Bogner added a third factor (Appreciation of Nature) to the normal 2-MEV model [14]. This factor represents certain positive aspects of nature utilization, such as relaxing and enjoying a natural landscape, in the belief that appreciation is a strategy for preventing individuals from pursuing exploitative utilization.

Gender differences are another concern for environmentalists, especially in relation to junior high school students. For example, female students exhibit more positive behavior, from the environmental perspective, toward energy use [15]. However, in small group interactions, male students tend to be more active in initiating actions [16]. The differences are also evident in academic results [17], where female students tend to underachieve. A deeper exploration by gender will provide important information for further research aimed at supporting the enhancement of PEB.

In the context of the forest city planned for Nusantara, PEB is important in shaping the environmental literacy of its young citizens [18]. Misconceptions regarding the environment can cause serious environmental problems [19], and the situation is intensified when it is given insufficient attention by teachers [20] and adult behavior is inadequate [21]. Apart from the cognitive aspect of environmental literacy, there is an increasing need to shape PEB [22]. This behavior can be affected by external factors, such as the environment, social behaviors, and the social media [23]. Creating a positive environmental attitude in citizens will positively impact their environment [9]. It has been argued that PEB is able to reduce greenhouse emissions [24]. The readiness of Nusantara's buffer cities varies: some cities, such as Samarinda, already have Adiwiyata Schools, or Green Schools, which facilitate their students' awareness of environmental problems [25], while other regions lack the opportunity for such interventions. It is essential that the public participates in reducing or solving the existing environmental problems caused by the capital city's relocation and thereby prevents an even more critical situation from developing. Since the buffer cities around Nusantara have different characteristics, an exploration of the different locations would provide an interesting variable for consideration.

2. RESEARCH METHOD
2.1. Participants

A total of 280 ninth-grade students from 10 junior high schools were involved in the study. These schools were representative of all junior high schools in the buffer cities around the new Indonesian capital city. These buffer cities are Samarinda, Balikpapan, Kutai Kartanegara, and Paser-Penajam Paser Utara. The participants ranged in age from 14 to 16 years, and their demographics can be seen in Table 1.

Table 1. Demographics of participants (n=280)

	Demographic	Number of students	Percentage (%)
Location	Samarinda (1)	106	38%
	Balikpapan (2)	33	12%
	Kutai Kartanegara (3)	108	38%
	Paser – Penajam Paser Utara (4)	33	12%
Gender	Female	172	61%
	Male	108	39%
	Total	280	100%

2.2. Instrument

The data were collected through an online structured questionnaire [14], which has been used for measuring PEB [14]. The questionnaire consisted of 21 items divided into three categories: appreciation, utilization, and preservation. Each category included seven items adapted for the Indonesian context. Preservation indicated preferences for environmental conservation, utilization assessed preferences for the exploitation of nature, while appreciation was an additional item on this questionnaire used to measure the positive aspects of benefitting from nature. The response pattern adopted a Likert-type scale (1=totally disagree to 5=totally agree). The overall score was calculated by adding all responses in a category.

2.3. Data analysis

Data collected from the PEB questionnaire were analyzed quantitatively, using descriptive statistics, with the assistance of Microsoft Excel and IBM SPSS Statistics version 26. Data analysis included averaging the PEB scores of students, correlations among the dimensions of PEB, the significance of differences between the male and female students' scores, and also differences between buffer cities. The graphs for this study were created according to Origin 2016.

3. RESULTS AND DISCUSSION
3.1. PEB results and correlation of all aspects

This study aimed to explore the PEB of junior high school students living in the buffer cities to the new Indonesian capital city. The scores of the students for each aspect of PEB are presented in Figure 1. The descriptive analysis shows that the average score for Utilization was higher than those of the other dimensions. The average utilization score was 3.44, against a maximum score of 5, which is higher than the hypothetical medium score (2.5 out of a maximum score of 5). Utilization questions, such as "Damaged natural environment can recover by itself" and "We do not need to make shelters for endangered animals," tended to score high in our sample. Most students still believe that nature will recover on its own without humans needing to take action on behalf of the damaged natural environment or to protect the animals that are endangered by the exploitation. It could be concluded that these students preferred to exploit nature rather than conserve their environment or even appreciate the way nature can be utilized. This result indicates that most junior high school students in the buffer cities have exploitative utilitarian preferences, and this tendency could interfere with their career choices in the future [26]. There is therefore a need for educational interventions to reduce human over-exploitation of the environment so as to prevent further environmental degradation and to reduce or resolve the existing environmental problems, particularly in relation to the development of the new capital of Indonesia.
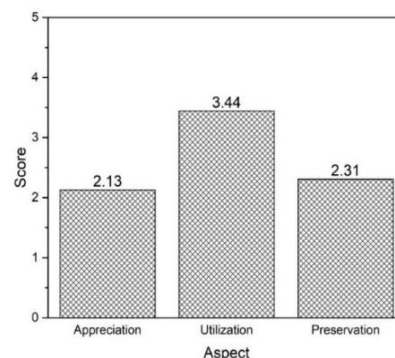

Figure 1. PEB scores for each aspect: appreciation, utilization, and preservation

The correlations between each aspect of PEB were subsequently analyzed and the results of the analysis are listed in Table 2. Appreciation correlates positively with preservation and utilization, while preservation correlates negatively with utilization. A negative correlation between utilization and appreciation was anticipated, since appreciation is a positive form of the use of nature, while utilization relates to exploitation of the environment. Students who appreciate nature tend to develop good environmental preservation preferences [27]. The analysis found the highest correlation between appreciation and preservation, since the correlation coefficient was closest to 1 [28]. However, the score was still lower than 0.3.

Table 2. Correlation among aspects of PEB

		Appreciation	Utilization	Preservation
Appreciation	Pearson correlation	1	0.171[*]	0.210[**]
	Sig. (2-tailed)		0.015	0.003
	N	200	200	200
Utilization	Pearson correlation	0.171[*]	1	-0.058
	Sig. (2-tailed)	0.015		0.411
	N	200	200	200
Preservation	Pearson correlation	0.210[**]	-0.058	1
	Sig. (2-tailed)	0.003	0.411	
	N	200	200	200

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

3.2. PEB by gender

This study investigated how gender influences PEB. Several researchers have highlighted the importance of taking gender into account when studying behavior toward the environment, because gender may influence attitudes, beliefs, values, and behavior in different ways [29]. From the gender perspective, the results showed that male and female students had very similar PEB scores, as depicted in Figure 2. Furthermore, Table 3 confirms that any differences in PEB scores between male and female students were insignificant, indicated by a sig. value lower than 0.05. Several researchers have found similar results, indicating that gender does not affect overall PEB [4], [30].
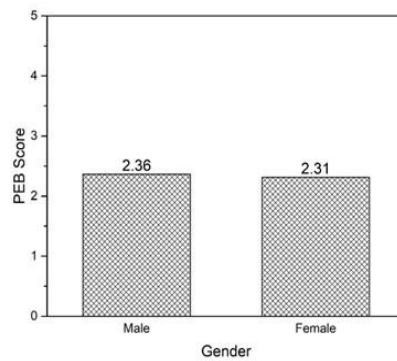

Figure 2. PEB score by gender

Table 3. T-test for equality of means

	Levene's test for equality of variances		t-test for equality of means			
	F	Sig.	t	df	Sig.(2-tailed)	Mean difference
Equal variances assumed	0.005	0.944	1.208	278	0.228	0.05086
Equal variances not assumed			1.198	221.393	0.232	0.05086

3.3. PEB by location

There are four buffer cities around the new capital city of Indonesia: Samarinda, Balikpapan, Kukar, and Paser-PPU. Figure 3 compares the PEB scores of students from the various buffer cities. Although we were unable to reach the same number of subjects in each location, the results show that students in Paser-PPU had the highest PEB score while students in Kukar had the lowest score. However, the scores in all buffer cities were lower than the hypothetical medium score of 2.5. It can be assumed that the students' sense of place was low since this sense is known to contribute to PEB [31]. Therefore, an education that fosters place attachment (strengthening students' attraction to places) and place meaning (the reason for their place attachment) is crucial, especially in Kukar.

The analysis of variance (ANOVA) for PEB of students in buffer cities is shown in Table 4. The table shows that the mean PEB scores differed significantly between the four cities (sig<0.05). The post-hoc test was further used to investigate the pair of cities that differed the most. The results from post-hoc tests indicating relationships between locations are listed in Table 5. The test indicated that Kukar was the most significantly different in PEB from the other locations.

Kukar includes the largest number of villages (193) and covers the most extensive area (27.263 km^2) compared to the other locations studied, together with having a complex topography [32]. These conditions

are believed to explain some of the inequalities in environmental education and the low level of environmental literacy in this area. Furthermore, various instances of natural resource exploitation exist in Kukar, such as coal mining [33], post-mining [34], logging, deforestation for oil palm plantations, while there is a gap between supply and demand for agricultural land [35]. These factors may all lead students to believe that exploitation of natural resources is common and beneficial.
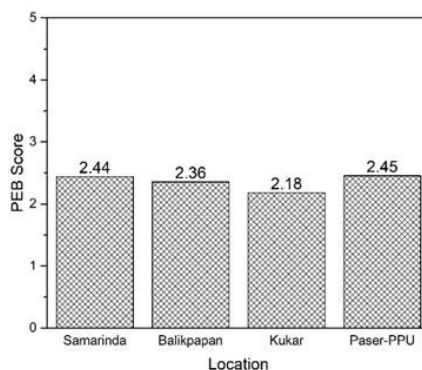

Figure 3. PEB Score by buffer cities

Table 4. Analysis of variance (ANOVA) for PEB

	Sum of squares	df	Mean square	F	Sig.
Between groups	4.302	3	1.434	13.848	0.000
Within groups	28.577	276	0.104		
Total	32.879	279			

Table 5. Post-hoc results of PEB by location

(I) Location	(J) Location	Mean difference (I-J)	Std. Error	Sig.
Samarinda	Balikpapan	0.08538	0.06483	0.553
	Kutai Kartanegara	0.26202*	0.04389	0.000
	Paser-PPU	-0.01207	0.06407	0.998
Balikpapan	Samarinda	-0.08538	0.06483	0.553
	Kutai Kartanegara	0.17664*	0.06476	0.034
	Paser-PPU	-0.09745	0.07983	0.614
Kutai Kartanegara	Samarinda	-0.26202*	0.04389	0.000
	Balikpapan	-0.17664*	0.06476	0.034
	Paser-PPU	-0.27409*	0.06400	0.000
Paser-PPU	Samarinda	0.01207	0.06407	0.998
	Balikpapan	0.09745	0.07983	0.614

*The mean difference is significant at the 0.05 level

4. CONCLUSION

Understanding PEB will be essential in supporting the new capital city of Indonesia. Among the aspects of PEB, Utilization had the highest score, while the highest correlation, between Appreciation and Preservation, was significant and positive. Despite this, the Junior High schools in all the buffer cities scored below the hypothetical medium of 2.5, highlighting the vital need for education that fosters PEB. Gender is not a variable that affects PEB. However, the location of cities was shown to be the factor that was accompanied by the most significant difference in the scores.

Our results can provide relevant insights for those designing environmental education to support Indonesia's new capital city. This study identified PEB by location as an important topic for further exploration; however, the instrument used did not explore the context of local environmental issues. Therefore, our ongoing research aims to explore PEB through a comparison of students living in urban and in rural areas in Kalimantan and their perspectives on issues relating to their local environments.

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