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Influence of Landscape Preference and Place Attachment on Responsible Environmental Behavior—A Study of Taipei's Guandu Nature Park Wetlands, Taiwan

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Abstract: Wetlands provide important ecological services and aesthetic value at the landscape level. A landscape that makes people feel or appreciate the beauty of nature and is ecologically healthy and aesthetically beautiful can elicit positive emotions for people that are exposed to such landscapes. This then translates into protective environmental behaviors. Despite the growing importance of wetland conservation and human sensitivities to landscapes, little is known about the relationship between wetland landscapes and responsible environmental behaviors (REBs). This study was conducted at the wetlands at Guandu Nature Park (GNP), Taipei, Taiwan, using a five-point Likert scale questionnaire. Partial least squares structural equation modeling was used to test three hypotheses aiming to examine the influence of (1) landscape preference on REBs, (2) landscape preference on place attachment, and (3) place attachment on REBs. The findings indicated individuals displayed environmentally friendly behaviors because of the healthy environmental conditions of GNP wetlands and that an individuals' sense of place attachment was influenced by the beauty of these wetlands. In addition, place attachment had a mediating effect on landscape preference and REBs. This study contributes to the limited resources associated regarding the effects of wetland landscapes on REBs and provides a basis for future comparative studies.

Keywords: landscape preference; place attachment; responsible environmental behaviors (REBs)

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1. Introduction

Over the last several decades, the world's ecosystems have been changing to meet the ever-growing needs and demands for natural resources such as land, food, water, fuel, and minerals [1]. As a result, the world's ecosystems have been substantially and significantly damaged, remain overused, and their use can no longer be regarded as sustainable. This has led to the growing importance of conducting research on ecosystem services such as the benefits that humans derive from ecosystems that are critical for addressing sustainable development. Sustainability refers to the use of desired ecosystem services now and in the future, without creating short- and long-term declines in the natural resources and associated biodiversity [2]. Nature conservation and conservation management strategies are now being widely recognized, but the relationships and/or interactions between the environment and development are not well understood. Environmental strategies today require investment in the conservation, restoration, and sustainable use of ecosystems and their resources to provide substantial ecological, social, and economic benefits [2].

While many researchers have provided agendas for studying ecosystem services with the aim of promoting an understanding of the use and management of natural resources,

the ecosystem services provided by wetlands is one emerging field that has been widely recognized in recent years [3]. Despite global efforts in promoting wetland conservation since the signing of the Ramsar Convention on Wetlands in 1971, the area of the world's wetlands still decreased by 35% between 1970 and 2015, and approximately 12 million km^2 of wetlands remain in the world [4]. It is acknowledged that human sensitivities to the landscape have become an important element in the creation of wetland protection policies. A landscape that makes people feel the beauty of nature and has a healthy ecology can evoke many positive emotions and feelings in a person that then promote protective environmental behaviors [5]. Furthermore, individuals who demonstrate a strong sense of attachment to specific natural resources or sites are likely to exhibit REBs [6–8].

In Taiwan, the Wetland Law states that the sustainable and rational use of wetlands form the basis for the reasonable use of wetland ecosystem services [9]. This law is generally regarded as being vague or hard to understand because as written, it allows for different interpretations to be made, which then contribute to uncertainty and a lack of understanding of the intent of the law by the public [10]. However, the priorities that are considered important in wetland conservation areas are largely dependent on a stakeholder's position regarding matters that they consider important at the time [11]. In addition, wetlands that do not receive much public attention are often unregulated, forgotten, and likely to become degraded. Our emotions toward wetlands and associated environmental behaviors have a profound impact on the status of wetland management and quality of the wetland resources. Hence, it is important to understand the factors that connect the public's preferences towards wetlands and how their attention towards site conservation can be affected.

Therefore, we sought to explore the relationships between landscape preference, place attachment, and REBs for the wetlands at GNP.

1.1. Responsible Environmental Behavior

Environmentally responsible behavior promotes the sustainable use of natural resources [12] and has been called pro-environmental behavior in other studies [13–16]. People can demonstrate environmentally responsible actions at the individual [12,17] or public level [17], or a person can either be actively committed to protecting the environment by being directly involved in environmental organizations or, indirectly, by contributing to environmental policies [17]. REBs can either be individual or collective actions supporting environmental policies [18]. Furthermore, REBs can be a general intent to protect the environment or targeted towards specific environmental issues [13]. Environmentalism at the individual level tends to be more specific and involves the use of environmentally friendly products for personal or household use [17]. People are more likely to engage in REBs at the individual rather than a more openly public level [19].

Environmentally responsible behaviors are generally affected by a number of key factors such as environmental sensitivity [20], conservation commitment [21], attitude [14], altruistic values [22], belief [23], and awareness [22]. Environmental sensitivity is a precursor to environmental ownership and empowerment that lead to environmental citizenship [24]. Without being sensitive towards the environment, one is less likely to have a desire or action to protect the environment. Environmental sensitivity is the predisposition for driving one's interests towards learning about the environment or being concerned about it, taking actions that preserve the environment, and forming experiences that may become habits [20]. Commitment to conservation and pro-environmental attitude directly influence REBs [14,21]. When people are environmentally sensitive, they are more likely to be attached to a place and demonstrate REBs [25]. Environmental sensitivity is augmented with increased knowledge about the environment [25]. People that interact with the natural environment regularly are more likely to exhibit a conservationist attitude [14]. Furthermore, such regular interactions with the environment can potentially increase a person's awareness of environmental disasters and their consequences; subsequently, this positively influences pro-environmental behaviors [22].

Study results have shown that people can develop a strong bond with the place where they live [26,27], and this can be an important factor in determining how people will react in response to the environmental concerns of a specific place [13,28–30]. The extent of bonding with a place will affect how people negotiate with other stakeholders regarding the use of the resources in that landscape [28]. However, it is important to note that the bonding relationship with a place is dynamic because it changes in response to other environmental, economic, and social changes [27,31]. Thus, this has a significant influence on a person's landscape choice [27]. Therefore, the following hypothesis is proposed:

Hypothesis 1. *Landscape preference will positively influence REBs.*

1.2. Landscape Preference

Landscape preference (LP) is a feeling produced by the continuous interaction between people and a landscape. It begins to become established through landscape perception, gradually develops into landscape cognition, and eventually generates preferences for different types of landscapes through subjective evaluation. In addition, LP involves having a long-term social or individual belief in the same value [32]. In previous studies, the preference of people towards different types of landscapes [33,34]; floras [33]; site moisture conditions [27,33]; demographic characteristics, including family size and education [27,33], gender, and land value [35,36]; and social factors such as the history and forms of past agricultural practices have been examined [34]. A study related to river landscapes showed that they were highly correlated with landscape preference [37]. Landscape preference is an important field of environmental psychology. The better an observer perceives the naturalness of a landscape, then the closer a natural landscape will be to what the observer believes its natural state is [38].

People have a greater preference for advertisements using landscapes with a natural background rather than urban landscapes [33]. Research findings also reveal that humans are predisposed towards natural settings with green landscapes and water features compared to artificial settings. This predisposition towards natural settings probably developed over time as humans evolved with nature in natural settings. Greener areas tend to be rich sources of water and food, and, from an evolutionary standpoint, humans are predisposed towards preferring green spaces [39]. However, this contradicts the findings of other studies that suggest people that lived for extended periods of time in dry landscapes still prefer green landscapes [40]. Alternatively, it has been claimed that people have negative preferences towards landscapes similar to those where they grew up [27].

Although green mesic landscapes and savannas consume more water than xeric landscapes, people still prefer high- compared to low-water use landscapes [27]. *Savanna*-type landscapes appear to be a universally preferred landscape across many cultures. They are characterized by grasslands interspersed with trees growing sparsely or in large clusters [33,41]. While education is a key to environmental sensitivity [25], it does not appear to enhance an individual's preference towards xeric low-water-use landscapes. On the other hand, it has been discovered that people prefer water-wise rather than high-water-use designs [42]. Furthermore, males prefer landscapes that are drought tolerant and low maintenance [35,36,40]. Studies [43] also revealed that landscape preference influences place attachment; for example, remote sensing techniques could potentially provide additional data on characterizing wetland landscapes that influence human perceptions and behaviors [44]. Hence, the following hypothesis is proposed to investigate this phenomenon:

Hypothesis 2. *Landscape preference will positively and substantially affect place attachment.*

1.3. Place Attachment

The concept of place attachment (PA) explains the connection between an individual and a specific place [45]. Other researchers [46–50] suggest place attachment can be any

positive or negative relationship that a person developed with a location that creates an emotional bond with that place. Furthermore, place attachment can also be regarded as an individual's experiences or memories that are associated with people, environment, and the land where those experiences occurred [51].

Place attachment is a multidimensional construct that involves the interaction of people, processes, and places [50]. From a person's perspective, place attachment often can occur at individual and group levels. It involves psychological processes that relate a person's affective, cognitive, and behavioral components to a place or places [50]. Place aspect relates to the nature and specific elements of the place that have become objects of the attachment formed between a person and a place.

There are four key sub-dimensions of place attachment, which include place identity [52–54], place affect [52,55], place social bonding [56,57], and place dependence [53,58]. Place identity refers to a symbolic or affective attachment to a place that a person has developed over time and that may lead to a sense of belonging and/or purpose that gives meaning to someone's life. As such, place identity can be described as a component of self-identity [59] that enhances self-esteem [60] and increases the feelings of belonging to a community and/or specific environment [45,61]. The effect of place affect is the emotional bonding with a place that can play a vital role in how individuals practice natural resource management and politics [50,62]. People typically use places to protect and enhance their self-identity [59], and they may conceptualize a resource in different ways depending on how they define themselves.

Place social bonding refers to the experiences derived from the social interactions at a certain place, which helps foster a sense of group belonging [51]. Individuals develop social bonds with other people through place interaction, and it is this natural environment that leads to higher levels of attachment [46,57]. Place dependence is related to the functionality of a place that reflects the importance of a resource providing amenities necessary for desired recreational activities [63]. This functional attachment is embodied in an area's physical characteristics and, therefore, has an ongoing relationship with a particular setting. A history of repeat visitation enhances place dependence, which may lead to place identity [64].

Research on place attachment has been growing, especially in the environmental psychology, natural resource management, environmental education, and tourism sectors [8,13,46,57], and considerable theoretical and methodological advancements have been made regarding place attachment [46]. Furthermore, a measurement profile for place attachment, which includes place dependence, place identity, and lifestyle constructs has been established [58,65]. In a number of studies [29,30,66–68], the effects of place attachment on REBs were examined. In some studies [66,69], place attachment was used as a single general construct, while others [57,67,68] considered place attachment as a multidimensional construct and used place identity [30,67,68], place dependence [67,68], and social bonding [29,57] as place attachment sub-dimensions. Furthermore, there was evidence indicating the need for a better understanding on conservation efforts and pro-environmental behaviors in regard to neglected wetlands [70].

Weak and negative or null relationships between place identity and pro-environmental behaviors have been revealed [29,30]. These results indicate that more attachment to a place can potentially lead to a low level of pro-environmental behavior. However, others argue that place identity can influence pro-environmental behavioral intentions [67,68]. Environmentally responsible behaviors have been characterized as being low or high effort, and place dependence was shown to be negatively related to high-effort pro-environmental behavioral intentions [29]. In contrast, a significant and positive relationship between place dependence and intentions to preserve the environment has been shown [67]. Although these studies considered short-term visitors as research participants, one study is based on a small sample size from a regional Australian town [29], whereas another considered a densely populated tourist area in Taiwan. It is still not clear what caused these different

relationships between place dependence and pro-environmental behaviors among tourists in these very different locations [67].

Similarly, place effect is another dimension of place attachment that has been used for testing the relationship between place attachment and REBs. Place effect had a significant relationship with both low- and high-effort pro-environmental behaviors [29]. This suggests that emotional attachment is the only construct which has a significant and positive relationship with pro-environmental behaviors, indicating that when people are emotionally attached to a place, they are ready to be engaged at any level of pro-environmental behavior. A strong positive relationship between place social bonding and high-effort pro-environmental behaviors has been shown [29], but the data are negatively related to low-effort pro-environmental behavioral intentions. Given that the findings in these studies are inconclusive, we cannot ascertain or generalize whether and how place identity, place dependence, place effect, and place social bonding would influence pro-environmental behaviors. Thus, further investigation is needed to gain insight into this domain.

Specifically, in the field of tourism research, place attachment is often conceptualized as the degree of value and identification an individual feels with a particular natural place, including the emotion of the place and the meaning and feeling that the place provides to the individual [64,71]. Several tourism scholars have approached place attachment as an antecedent to REBs [8] or pro-environmental behaviors [13]. In prior studies, the effects of place attachment on REBs among young hikers that participated in a natural resource work program and visitors to national parks were investigated; however, no studies have been conducted to address these issues specifically with wetland tourists. Hence, the present study seeks to fill this research gap by examining these relationships among wetland tourists, and we propose the following hypothesis:

Hypothesis 3. *Place attachment will positively influence REBs.*

1.4. Proposed Framework and Hypotheses

In this study, we adopted partial least squares structural equation modeling (SEM; Smart PLS v. 4.0) to examine the correlations between three key variables, namely, landscape preference, place attachment, and REBs (Figure 1). The goal of focusing on specific path relationships between these variables was to provide more clarity and a better understanding of such a complex phenomenon.

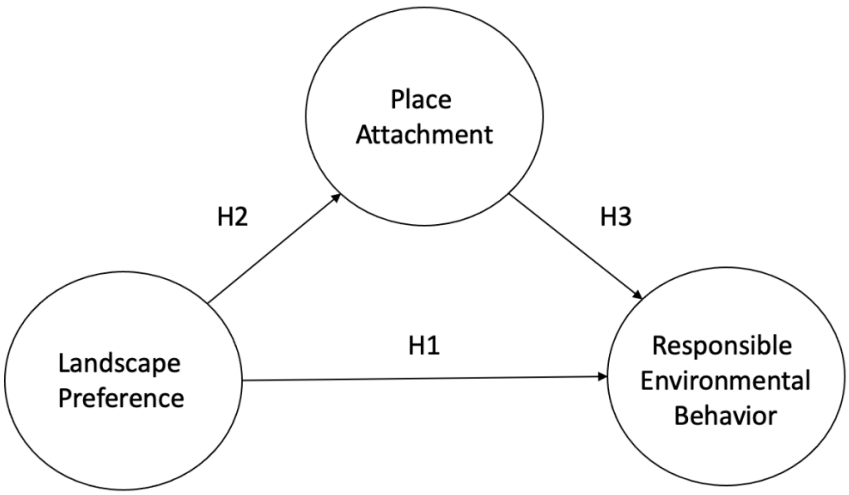

Figure 1. Proposed framework and hypotheses.

2. Materials and Methods

2.1. Study Site

This study was conducted at GNP, which is located adjacent to the Danshuei River Estuary, Taipei, Taiwan (Figure 2). GNP is located in a highly developed urban area and is the only nature park under closed management. The park is accessible only during specified hours and through designated entrances, with fees imposed on visitors except for volunteers and local residents. GNP is comprised of several aquatic and terrestrial compartments, as well as freshwater and saltwater wetlands. The landscape is rich with tidal creeks and pools, reed marshes, mangroves, and aquatic and terrestrial fauna and flora (Figure 3). Furthermore, GNP is a renowned bird area in Taiwan because it is a destination in the world's major East Asia–Australia migration route (flyway) for many migratory shorebirds and waterfowl [72]. In 2011, the Environmental Education Act of Taiwan certified GNP as an important environmental education site. Since then, it has gradually become the most important location for environmental education in the Danshuei River basin and a place of attraction for many tourists [73]. GNP is not only an important stopover for migratory birds that follow the flyway, but it also possesses different types of important bird habitats [72]. Since 2001, GNP has been managed by the Taipei Wild Bird Society, which has considerable experience offering environmental education activities [74]. In 2014, GNP was selected as a model of the World Wetland Centre by the Secretariat of the Ramsar Convention on Wetlands [75]. The average number of visitors to GNP between 2015 and 2022 was 130,000 people per year.

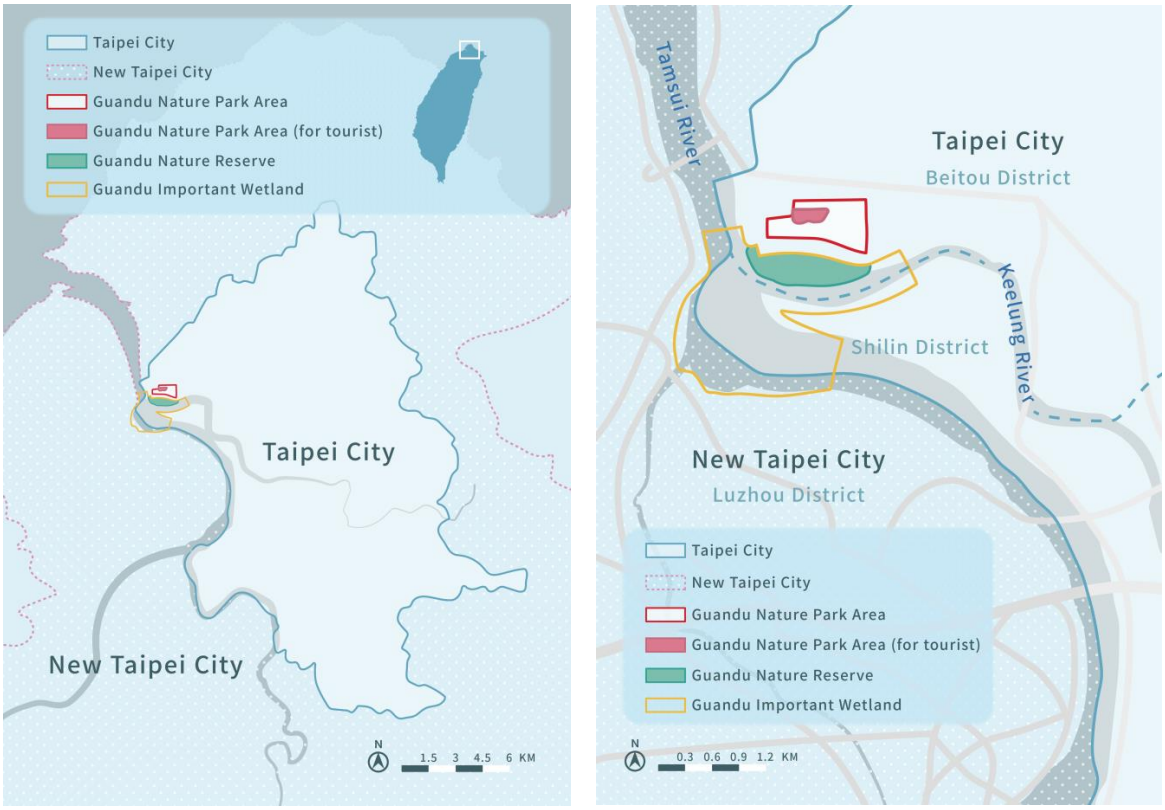

Figure 2. Location of the study area.

Figure 3. A bird's eye view of the study area. The prominent dashed red outline on the left is the primary area visited by GNP visitors. However, it should be noted that visitors can enjoy panoramic views of the entire area using a number of viewing areas.

2.2. Respondents and Data Collection

We adopted a non-probability sampling technique in which respondents were approached at the exit to participate in a questionnaire after their visit to GNP between October 2019 and March 2020. A total of 622 questionnaires were administered over 27 weeks at GNP and 525 responses were valid and analyzed. The valid response rate of 84% could be attributed to the questionnaire survey being conducted face to face, which tends to have a higher response rate. Furthermore, respondents were a special interest group for wetland and environmental education, which GNP is well-known for, and, thus, they were more willing and motivated to complete the questionnaire. PLS-SEM was used to test the three proposed hypotheses. According to the National Taiwan Normal University Research Ethics Committee, this research study was not considered to be within the scope of the Human Subjects Research Act. Therefore, the committee approved the study protocol (201912HS001) and agreed that informed consent was obtained when the respondents completed the questionnaire. All data were collected in accordance with the relevant guidelines in the study protocol and handled with strict confidentiality, whereby the respondents remained anonymous and could not be identified.

2.3. Questionnaire Design and Measures

Twenty-four (24) questions related to the three key variables—landscape preference, place attachment, and REBs—were adapted from the literature. Eight (8) landscape preference questions extracted from the literature [76,77] were related to four key dimensions: (1) consistency, (2) complexity, (3) legibility, and (4) mystery. Eight (8) questions focused on place dependence and place identity in the place attachment variable [78] and eight (8) questions in the general behavior and special behavior categories were selected for the REB variable [9]. The questionnaire was initially reviewed by three experts in related fields of wetlands, tourism, and environmental education. The review resulted in some minor revisions made to the semantic meaning, and some wordings were simplified to ensure more colloquial and clear terms were used to enable the respondents to better

understand questions in the local context. The revised questionnaire was subsequently used for the actual conduct of the survey.

2.4. Validity and Reliability of the Questionnaire

Statistical analysis was conducted using the Statistical Package for Social Sciences (SPSS v.23). Frequency analysis was used to help determine the number of occurrences, the mean and standard deviation (SD) scores for the demographic questions, and items in the landscape preference, place attachment, and REBs variables. The Pearson correlation technique was applied to measure the strength and direction of the relationship between these key variables, and a multiple regression analysis was used to help predict the influence of landscape preference, place attachment, and REBs. A five-point Likert scale that ranged from 1 = "Strongly disagree" to 5 = "Strongly agree" was used as a measurement tool in this study. A reliability analysis was conducted to confirm that the questionnaire achieved the appropriate Cronbach's α values for landscape preference, place attachment, and REBs.

3. Results

3.1. Descriptive Findings

A total of 525 questionnaires were valid and analyzed, which represents an 84% valid response rate. The majority (54.86%) of the respondents were female, with the remaining 45.14% being male. More than half of the respondents had a college (undergraduate) degree (51.43%), and this was followed by master's degree and above (31.62%), high school (10.86%), and junior high school and below (6.10%). Most respondents (26.86%) were between 31 and 40 years old, and those who were older than 61 years accounted for approximately 2.48% of the respondents. Tables 1 and 2 provide an overview of these data.

Table 1. Educational background of the respondents.

Gender	Junior High School and Below	High School	College	Master's Degree and Above	Total
Male	16 (6.75%)	21 (8.86%)	109 (45.99%)	91 (38.40%)	237
Female	16 (5.56%)	36 (12.50%)	161 (55.90%)	75 (26.04%)	288
Total	32 (6.10%)	57 (10.86%)	270 (51.43%)	166 (31.62%)	525

Table 2. Age group of the respondents.

Gender	Under 20 Years	21–30 Years	31–40 Years	41–50 Years	51–60 Years	61–70 Years	Older than 71 Years	Total
Male	22 (9.28%)	44 (18.57%)	64 (27.00%)	52 (21.94%)	23 (9.70%)	25 (10.55%)	7 (2.95%)	237
Female	31 (10.76%)	57 (19.79%)	77 (26.74%)	66 (22.92%)	25 (8.68%)	26 (9.03%)	6 (2.08%)	288
Total	53 (10.10%)	101 (19.24%)	141 (26.86%)	118 (22.48%)	48 (9.14%)	51 (9.71%)	13 (2.48%)	525

Eight questions on the questionnaire that were related to landscape preference are presented in Table 3. The Cronbach's α values for landscape preference (0.890), place attachment (0.910), and REBs (0.879) all indicated a high level of internal consistency because the Cronbach's α value for each variable was higher than 0.7.

Eight items related to place attachment are shown in Table 4. The internal consistency for the place attachment-related items was high, with a Cronbach's α value of 0.908.

Eight items related to REBs are shown in Table 5, and the Cronbach's α value was 0.878, which indicates a high level of internal consistency for the REB-related items.

3.2. Measurement Model Assessment

We adopted a two-stage process using SEM to examine the proposed framework and hypotheses shown in Figure 1. Stage one focused on the results of the model, which consisted of internal consistency, index reliability, convergent validity, and discriminant validity analyses [79]. Accordingly, items LP-5, LP-6, PA-5, PA-7, REB-7, and REB-8

had outer loadings lower than 0.7 and were removed from the analysis. The combined reliability (rho_a) of the internal consistency for items related to landscape preference, place attachment, and REBs were 0.908, 0.902, and 0.822, respectively (Table 6). The outer loading of the index reliability for these related items attained values that ranged between 0.749 and 0.859 (Table 6), which showed a reliability index greater than 0.7 [79]. The average variance extracted (AVE) values for items in landscape preference, place attachment, and REBs were 0.664, 0.666, and 0.623, respectively; thus, a convergent validity greater than 0.5 was achieved [80]. The discriminant validity for landscape preference, place attachment, and responsible environmental behavior had AVE square roots that were greater than the correlation coefficients among other constructs (Table 7), which indicated that these three constructs had achieved discriminant validity [80].

3.3. Structural Model Assessment

Stage two was focused on testing the proposed hypotheses, using SEM with bootstrapping to determine relationships between landscape preference, place attachment, and responsible environmental behavior. The results showed that landscape preference had a significant impact (t-value 4.260) on REBs, and landscape preference had a positive impact (t-value 25.471) on place attachment. Furthermore, place attachment also had a positive impact (t-value 9.787) on responsible environmental behavior. Our findings revealed that the f^2 values for H1, H2, and H3 were 0.037, 0.788, and 0.207, respectively, indicating a significant effect between the variables [81]. The path coefficients for the three proposed hypotheses were 0.200 (H1), 0.664 (H2), and 0.475 (H3), and all were significant (Table 8). The relationships between these three paths were established, whereby the R^2 values (0.391 and 0.441) were greater than 0.2 (Figure 4), indicating a certain explanatory power [79]. The indices of the goodness of fit for the SEM model were within the acceptable thresholds of less than 0.08 for the standardized root mean square residual (SRMR) and greater than 0.8 for the normed fit index (NFI) [82]. In addition, there was no indication of a collinearity issue in this study since the value of variance inflation factors (VIFs) were all less than five [79]. Tables 8 and 9 briefly outline the hypothesis testing and collinearity assessment results.

Table 3. Descriptive statistics for landscape preference items.

Landscape Preference (LP)	Mean	SD
LP-1 The environmental landscape and ecology of GNP have continuity.	3.78	0.70
LP-2 The environmental landscape and ecology of GNP are harmonious.	3.82	0.68
LP-3 The landscape of GNP has diverse elements and features.	3.63	0.78
LP-4 The environment of GNP makes me feel the changing seasons and landscapes, which rates high in environmental complexity.	3.45	0.86
LP-5 It was easy for me to find my way to and around GNP.	3.41	0.90
LP-6 The environment of GNP has obvious landmarks.	3.38	0.86
LP-7 GNP can arouse my interest in learning about the environment.	3.60	0.79
LP-8 The environment of GNP makes me want to explore further.	3.57	0.83

Table 4. Descriptive statistics for place attachment items.

Place Attachment (PA)	Mean	SD
PA-1 I am more satisfied in GNP than in other similar places.	3.29	0.77
PA-2 I think leisure is more important in GNP than in other places.	3.21	0.86
PA-3 When I am engaged in leisure activities, there is no other place that can replace GNP.	2.71	0.97
PA-4 When I want to engage in my favorite leisure activities, GNP is the best place.	3.00	0.93
PA-5 I strongly agree that GNP is an important ecological place.	3.81	0.73
PA-6 GNP elicits strong emotions for me.	2.98	0.92
PA-7 I have a strong sense of belonging to GNP.	2.88	0.92
PA-8 GNP is of great significance to me.	3.01	0.95

Table 5. Descriptive statistics for responsible environmental behavior items.

Responsible Environmental Behaviors	Mean	SD
REB-1 I will read the reports or books about the wetland.	2.99	0.82
REB-2 I will discuss with people the issues of environmental protection on the wetland.	2.94	0.83
REB-3 I will try to learn how to solve environmental problems in GNP.	3.04	0.83
REB-4 I will try to convince partners to protect the natural environment of GNP.	3.27	0.79
REB-5 If there are cleaning activities on the wetlands, I would like to attend.	3.10	0.80
REB-6 I will donate to help the operation of GNP.	3.02	0.81
REB-7 I will follow the legal ways to stop the destruction of the environment of GNP.	3.47	0.79
REB-8 When I see others engaged in the destruction of the environment in GNP, I will report it to the relevant units.	3.62	0.74

Table 6. Convergent validity for landscape preference, place attachment, and REBs.

Construct	Item	Outer Loadings	Cronbach's Alpha	Combination Reliability (rho_a)	Average Variance Extracted (AVE)
Landscape preference (LP)	LP-1	0.786	0.899	0.908	0.664
	LP-2	0.768			
	LP-3	0.829			
	LP-4	0.796			
	LP-7	0.846			
	LP-8	0.859			
Place attachment (PA)	PA-1	0.798	0.90	0.902	0.666
	PA-2	0.784			
	PA-3	0.820			
	PA-4	0.847			
	PA-6	0.820			
	PA-8	0.825			
Responsible environmental behaviors	REB-1	0.749	0.879	0.822	0.623
	REB-2	0.801			
	REB-3	0.838			
	REB-4	0.819			
	REB-5	0.777			
	REB-6	0.749			

Table 7. Discriminant validity for landscape preference, place attachment, and REBs.

	LP	PA	REB
LP	0.815		
PA	0.664	0.816	
REB	0.515	0.607	0.789

Table 8. Hypothesis testing with effect size (*** $p < 0.001$).

Hypothesis	Path Coefficients	T Statistics >3.29, *** $p < 0.001$	Result	f^2	Model Fit
H1: LP → REB	0.200	4.260	Accepted	0.037	SRMR = 0.068
H2: LP → PA	0.664	25.471	Accepted	0.788	<0.08
H3:PA → REB	0.475	9.787	Accepted	0.207	NFI = 0.863 > 0.8

Table 9. Collinearity assessment (VIF) inner model.

	LP	PA	REB
LP		1.000	1.788
PA			1.788
REB			

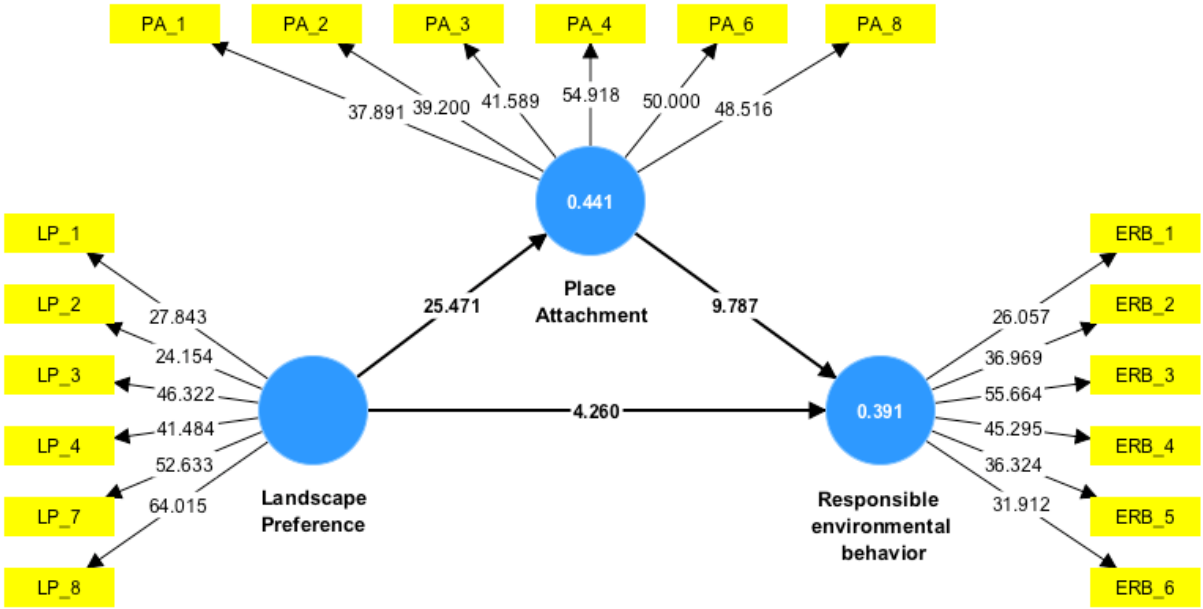

Figure 4. Bootstrapping results of the structural equation model.

3.4. Mediation Analysis

If the VAF value is less than 0.20, then there is no mediation effect [79]. However, a partial mediation effect exists if the value is between 0.20 and 0.8, whereas a value greater than 0.80 indicates a full mediation effect. In this study, the VAF value was computed using the following:

$$\text{VAF} = \frac{\text{Indirect effect}}{\text{Total effect}} = \frac{a * b}{a * b + c} \quad (1)$$

As such, a VAF value ($0.664 \times 0.4750/0.664 \times 0.4750 + 0.2$) of 0.612 was attained and place attachment had a partial mediation effect on the relationship between landscape preference and responsible environmental behavior.

4. Discussion

In this study, we investigated the relationships between landscape preference, place attachment, and REBs. In particular, we sought to determine the influence of landscape preference on REBs, regarding which there has been limited and inconclusive evidence in the literature. Results of the SEM analysis revealed support and acceptance for the three proposed hypotheses, and significant positive direct relationships exist between the variables examined. Furthermore, place attachment is considered to have a partial mediating effect on the relationship between landscape preference and REBs.

Previous research on the influence of landscape preference on REBs is limited. The findings in this study indicate landscape preference will positively and significantly influence REBs (H1). Promoting or exhibiting environmentally friendly behavior to ensure good quality habitat in wetland environments such as GNP is not only critical to landscape preference, but it helps explain the ecological aesthetics of wetlands. This is in good alignment with studies on water, wetlands, and landscape preferences [83–85]. Furthermore, landscape preference for an environmentally friendly natural setting can positively reinforce visitor REBs [86]. GNP is a human-managed wetland nature park that has well established environmental education activities, which not only enhances visitor landscape preference but also promotes REBs.

The results revealed that landscape preference will positively and significantly affect place attachment (H2), and this is consistent with the related theory of landscape preference and place attachment. When the environment provides the functions that individuals are

seeking and that agree with their perceived beauty of the landscape, then a sense of identity and attachment with the place will be established in people [87,88]. Furthermore, the naturalness and wilderness of wetlands are also positively correlated with place attachment. In the case of this study, GNP is located in a highly developed urban area and is the only nature park in Taipei under closed management. That is, the park is accessible only during specified hours, access is through designated entrances, and fees are imposed on visitors, except for volunteers and local residents. Although GNP is located in Taipei, it exhibits a degree of wildness that may have instigated visitor emotions and further influenced their sense of place attachment.

This study confirmed place attachment will positively and significantly influence REBs (H3), which is supported by other studies that focused on the impact of place attachment on REBs [6,7]. Other studies that focused on national parks [13,57], tourism and recreation [22,64], local natural resources [8], wetlands [89], and urban and rural settings [90,91] support our conclusions. GNP was established because of wetland conservation movements in Taiwan and, since then, it has become a critically important site for delivering and promoting wetland environmental education. It is a highly regarded resource that signifies the importance of environmental protection in Taiwan.

In addition to the proposed hypotheses, our findings revealed that landscape preference partially mediates the effect of landscape on REBs, indicating that place attachment has a critical mediating role. This could be explained by the fact that the majority (52%) of respondents in our survey had visited GNP more than once, which requires an entry fee to be paid. This repeated fee-paying behavior from the respondents could have further enhanced the role that place attachment plays in mediating the relationship between landscape preference on REBs.

5. Conclusions

The findings in this study supported the hypotheses, namely, that significant direct positive relationships exist between landscape preference, place attachment, and REBs. In terms of the positive direct influence of landscape preference on REBs (H1), it has been noted that individuals who display environmentally friendly behaviors are conscious about ensuring good quality habitat in wetland environments such as GNP, which is also a key element for landscape preferences. With respect to the positive impact of landscape preference on place attachment (H2), the results showed that GNP exhibits the beauty of a natural wetland wildness, and this could have aroused an individual's emotions and influenced their sense of place attachment. As for place attachment's positive influence on REBs (H3), our findings indicated that GNP has been recognized as a place of interest and attachment that is affiliated with the importance of environmental protection. Furthermore, the repeated fee-paying visits by the respondents highlight the important role that GNP plays, as a place of attachment, in mediating the relationship between landscape preference and REBs.

Although this study highlighted that a good and well-managed wetland landscape can positively influence REBs, we did not test whether the types of landscape or how the abiotic and biotic composition of a complex and diverse wetland park influenced landscape preferences. Therefore, we recommend conducting further research into classifying the plethora of terrestrial and wetland landscapes to explore in detail how they affect landscape preferences. This can contribute to further insight into the relationships between wetland landscapes, landscape preferences, and REBs. In addition, an understanding of the relationship between wetland landscape preferences and the actual ecological quality of wetlands can also bring about better management practices using traditional ecological knowledge and indigenous science practices [92]. The use of remote sensing data is another aspect that can further contribute to enhance the understanding of wetland landscapes and their influence on human perceptions and environmental behaviors [44,70].

Given that this study was limited to GNP wetlands and consistent with the principles of sound science, replication studies can be extended to other wetland landscapes in Taiwan

and other countries so that the findings can be compared and contrasted, moving the science forward. Another limitation of this study was the sole use of quantitative survey data, which did not provide rich insight that qualitative data could have. Therefore, a mixed method approach involving both qualitative (e.g., in-depth interviews) and quantitative (e.g., survey) techniques will be valuable in attaining a more comprehensive understanding into the nuances, complexities, and context of the phenomenon investigated.

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