



# Environmental perception and learning experience in nature trail of national park visitors

Chawaporn Suksri, Noppawan Tanakanjana Phongkhieo\*, Dachanee Emphandhu

Department of Conservation, Faculty of Forestry, Kasetsart University, Bangkok 10900, Thailand

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## Abstract

This study has three objectives: (1) to study the physical environment of nature trails and the characteristics of trail users; (2) to study the environmental perception and learning experiences that trail users gained from nature walk activities; (3) to test the influence of the physical environment and characteristics of trail users on users' environmental perception and learning experience. The data were collected by surveying the physical environment of nature trails and using a set of questionnaires on 500 trail users. The site survey data was analysed using qualitative analysis method and the questionnaire data was analysed with descriptive statistics, factor analysis and path analysis. The study results showed that environmental perception had a direct effect on learning experience in 2 aspects: environmental knowledge and nature appreciation. Motivation and attention were the characteristics of trail users that affected environmental perception and learning experience. The physical environment element that affect environmental perception the most was landscape features followed by spatial characteristic. The spatial characteristics also had an effect on learning experience in all aspects. The study suggested that park manager should focus on motivation and attention of trail users. Trail designers should understand landscape features and spatial characteristics that affect the interests and impressions of the trail users and should incorporate those factors into design of park trails.

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## Introduction

Nature trail is one of the significant basic tools for nature study in natural conservation areas. It plays an important role in promoting nature learning to visitors. It is also the most effective way to disseminate basic knowledge concerning outdoor environmental education and interpretation, which provides the trail users with a first-time natural experience as well as enhancing their awareness of nature. There are several methods of nature interpretation on nature trails, starting from interpreting by tour guides to utilizing media such as booklets, brochures, interpretative signs including the use of natural

environment and landscape of the trails themselves as a learning medium and a tool for creating a high-quality experience (Bell, 1997; Heimlich, 1993; Hughes & Saunders, 2002; Kaymaz, 2012; Lakanawarakul, 2002). Such experiences are the result of the trail users' environmental perception.

Environmental perception refers to the processes where an individual chooses, organizes and interprets environmental information so that he/she will understand and can respond to the environment he/she immediately perceives or feels. Moreover, environmental perception also plays an important role in creating a learning experience for the trail users as a process of learning. Such learning experiences are not only the environmental knowledge, but also environmental awareness and nature appreciation. The trail users will be able to perceive environmental characteristics and receive different learning experiences according to individual characteristics and the physical environment of nature trails (Bell, 2001; Brody,

\* Corresponding author.

E-mail address: [ffornwt@ku.ac.th](mailto:ffornwt@ku.ac.th) (N. T. Phongkhieo).

2005; Dorwart, Moore & Leung, 2009; Emmons, 1997; Heimlich, 1993; Horayangkura, Settaworakit & Klinmalai, 2011; Srisawat, 2015). Therefore, the understanding of environmental perception and its relationship with learning experiences that trail users gain from nature walk, including the characteristics of trail user and the physical environment that affect the learning experience of trail users is important information. It will lead to suggestions for managing and designing a nature trail that encourages trail users to have appropriate learning experiences.

The nature trail landscape is an important element that affects environmental perception and nature learning process. Most research on visitors' environmental perception in nature trails focused on factors affecting perceptions, assessment of the trail quality and the impact of the tourism activity on the trail (Dorwart et al., 2009; Hughes & Saunders, 2002; Gundersen & Vistad, 2016; Oku & Katsue, 2006). Only a few studies focused on the relationship between visitors' environmental perception and learning and physical environment of nature trail. This study aimed to fill that knowledge gap in the context of Thailand's national park trail management. There were three specific objectives: (1) to study the physical environment of nature trail and characteristics of trail users; (2) to study the environmental perception and learning experiences that users gained from nature walks along the nature trails in the national park; (3) to test the influence of physical environmental factors and characteristics of trail user factors on users' environmental perception and learning experience.

## Literature Review

Environmental perception is the process in which an individual receives information or stimuli from the surrounding environment through the five senses of perception. This complex information will be selected, arranged and interpreted from experience or the accumulated data collected previously. It influences human's overt and covert behavior such as emotion, feelings, attitude, etc. The environmental stimuli do not only refer to plants, animals, human beings, various objects or landscapes perceived by sight, but also to smell, sound and the surrounding atmosphere that stimulate an individual's feelings (Bell, 2001; Hedblom et al., 2017; Horayangkura et al, 2011; Ittelson, 1976; Kaplan & Kaplan, 1989; Kaymaz, 2012). Along a nature trail, visitors can perceive both positive and negative environmental elements. This kind of perception varies according to the factors which consist of: (1) personal characteristic factors; namely, experience and former knowledge, expectation, and motivation including some background data that resulted in tourist categorization, for instance, place of residence and social and cultural background, and (2) physical environmental factors which emphasize landscape characteristics and environmental features or landscape elements, and spatial characteristics and landscape diversity or ecological diversity and naturalness (Bell, 2001; Brody, 2005; Dorwart et al., 2009; Emmons, 1997; Heimlich, 1993; Horayangkura et al., 2011; Jarupakorn & Lertvich, 2008; Srisawat, 2015). The elements of a nature trail environment that affect users' experiences can be grouped

as follows: (1) the details of nature or various objects on the trails; (2) valuable scenery; (3) the influence of area management; (4) tracks of groups of other individuals and co-travellers; (5) improper behaviour; (6) environmental impacts on the trails; (7) activities on the trails (Oku & Katsue, 2006; Dorwart et al., 2009).

"Learning" is the process in which an individual acquires knowledge and skills including the relationship of the learner and a variety of things through studying, experiencing and practicing or through teaching. This also covers awareness of things through information or observation, that continually occur in daily life. Learning will lead to understanding and accepting new concepts, which guide individuals to do or not to do something in the future and cause changes in behaviour (Brody, 2005; Hall, 2005; Horayangkura et al., 2011; Srisawat, 2015). Learning in natural areas does not only generate knowledge with the content related to various aspects of natural science or environmental science, but also provides opportunities for the learners to acquire knowledge, which means new experiences, practice skills and development. This also includes developing the learners' awareness or increasing their understanding of conservation of the environment and other living things. The learning activities on nature trails focus on the learners' exposure to direct experience, thus leading to cognition, enabling the activity participants, together socially, to acquire what they want to learn, develop their emotions and thinking and have a long enough amount of time for learning. The knowledge acquired from nature walk may be different depending on the following important factors: (1) individual differences in terms of each individual's previous experiences, attitude, expectation, attention and motivation; (2) social condition, which means those groups of individuals who participate in the program together; (3) the natural environmental condition, which is related to perception, and (4) the period of time (Brody, 2005; Emmons, 1997; Hall, 2005; Heimlich, 1993; Jarupakorn & Lertvich, 2008; Srisawat, 2015).

## Methodology

An integrated qualitative and quantitative research method was applied in this study. Kew Mae Pan nature trail, Phadokesiew-Ban Mae Klang Luang nature trail, Dong Tiew – Nong Pak Chi nature trail, Namtok Phlio nature trail and Karom Waterfall nature trail were selected as the study sites (Figure 1). They represented the guided trails or nature trails with no interpretive signs and self-guided trails with interpretive signs. Moreover, they displayed a variety of differences in the ecosystem of each national park. The study population were both Thai and foreign trail users, whose age was not lower than 15 years. The sample size was calculated with W.G. Cochran's formula while certain population proportion size is unknown (Vanichbuncha, 2016). The calculation results suggested 385 as the minimum number of samples. However, this research collected data from 500 samples, 100 from each site. The questionnaires for assessing environmental perception and learning experience of trail users consisted of closed-ended and open-ended questions, and photo-questionnaire. The trail users' environmental perception was measured by the levels of perception and interpretation of

sense experience through seeing, hearing, smelling and touching in 12 items. They consisted of statements about the perception of atmosphere, plants, water sources, wildlife and other groups of visitors on the trails. The trail users' learning experience was measured by their level of natural and environmental knowledge, 15 items of environmental awareness and 12 items of nature appreciation. The validity of the questionnaire was evaluated by 5 experts. The results indicated that the Index-Objective Congruence (IOC) score for verbal questionnaire and photo-questionnaire were 0.77 and 0.93, respectively. Both of the scores matched the standard (IOC > 0.75) (Turner & Carlson, 2002). After that, the modified questionnaire was tried out with 30 samples. The data from questionnaire were calculated to assess Cronbach's alpha reliability coefficient ( $\alpha$  Coefficient). The reliability coefficient for the measurement items of all variables in the questionnaire ranged from 0.74 to 0.91 ( $\alpha$  Coefficient > 0.70) (Nunnally & Bernstein, 1994). The developed Thai language questionnaire was translated into English and was proof read by an English expert, before being used to survey foreign sample data. As for the surveying of physical and environmental characteristics of nature trails, the data were collected by taking pictures and capturing GPS coordinates at the points of interest along each trail. The data analysis of this study was divided into 2 main parts: (1) The site survey data was analysed by the qualitative method. Such data and photographs were used to classify the landscape types along the nature trail based on physical environmental factors, including spatial characteristics (the three dimensional quality of landscape or the space in the landscape), landscape features (physical elements which make up the specific landscape characteristics) and landscape characteristics and diversity (the arrangement of landscape features that vary

in intensity and diversity and cause different types of landscape). (2) The questionnaire data were analysed with descriptive statistics to describe the characteristics of all variables in the research framework and the path analysis explained the relationships, including direct and indirect influences of physical environmental factors and characteristics of trail user factors on environmental perception and learning experience.

## Results and Discussion

### *The Nature Trails' Physical Environmental Characteristics*

The field surveys showed that the five nature trails had different physical characteristics. When analyzing the study area by classifying the landscape within the nature trails based on the physical environmental factors, it was found that all the nature trails have different spatial characteristics, landscape features, and landscape characteristics and diversity as described in Table 1 and as shown in Figure 2.

### *Characteristics of Trail Users, Their Environmental Perception and the Influential Factors*

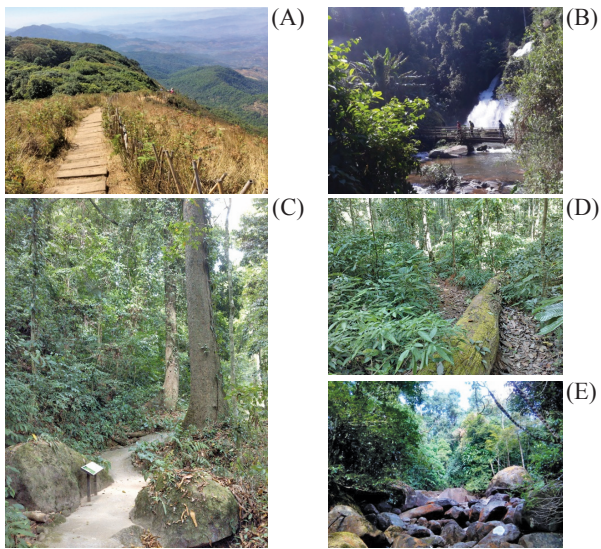
The results of 500 trail users' demographic analysis showed that 84.80 percent of trail users were Thais, the rest were foreigners of various races. The majority of users, or about 56 percent, were female. The average age was 30.73 ( $SD = 10.93$ ). Most of them, that is 56.70 percent, graduated with a bachelor's degree. According to an analysis of trail users' characteristics factors on their previous experience, prior knowledge, expectation and attention on nature study, 78.80 percent of trail users had never done nature walk activities in the study areas before. The average number doing the activities on the route was 0.51 times ( $SD = 1.44$ ). The trail users had prior knowledge about nature and environment at a moderate level (Mean = 3.58,  $SD = 0.76$ ). They expected a high level of appreciation doing the activities on this nature trail (Mean = 3.79,  $SD = 0.84$ ), and expected a moderate level of knowledge from the activities (Mean = 3.55,  $SD = 0.88$ ). Overall, the trail users had high expectations to gain learning experience from nature walk activities. (Mean = 3.67,  $SD = 0.75$ ). They had a high level of attention in what they perceived along the trail (Mean = 4.18,  $SD = 0.75$ ) and had a high level of motivation to visit the area (Mean = 4.20,  $SD = 0.53$ ). Besides, it was found that the trail users' impression on physical environment including landscape characteristics and diversity, spatial characteristics and landscape features were high, with mean scores of 4.18 ( $SD = 0.62$ ), 4.15 ( $SD = 0.64$ ) and 4.12 ( $SD = 0.60$ ) respectively. The trail users thought that the trails were very natural (Mean = 4.33,  $SD = 0.67$ ) and their overall environmental perception level was high (Mean = 4.00,  $SD = 0.54$ ). The average distance that trail users walked was 2.95 kilometres. ( $SD = 1.31$ ). As for users' learning experience, which was measured in user's environmental knowledge scale and nature appreciation scale, it was found that the trail users gained the environmental knowledge in a moderate level (Mean = 3.65,  $SD = 1.06$ ) and had a high level of appreciation of nature (Mean = 3.95,  $SD = 0.62$ ).



**Figure 1** A map showing the location of the study sites.  
*Note:* Adapted from “National Parks in Thailand.” by Department of National Parks wildlife and plant conservation (2015)

**Table 1** Nature trails' physical environmental characteristics

Nature trails	Physical characteristics	Landscape characteristics and diversity	Landscape features	Spatial characteristics
Kew Mae Pan, Doi Inthanon National Park, Chiang Mai Province	<ul style="list-style-type: none"> <li>- The trail starts at 'Km. 42 Jomthong – Yod Doi Inthanon Road.</li> <li>- Located about 2,200 meters above sea level</li> <li>- About 3.2 kilometers long</li> <li>- About a 3 hour walk</li> <li>- A guided trail with interpretive signs</li> <li>- A loop form trail</li> <li>- About 0.60-2.00 meters wide.</li> <li>- The slope up average is about 17 percent and the slope down average is 29 percent.</li> </ul>	<ul style="list-style-type: none"> <li>- The trail is a slope leading alternately up a hill, and down the valley through a moderately dense hill evergreen forest.</li> <li>- In the middle part of the trail, the path leads through semi-alpine meadows and ridges.</li> </ul>	<ul style="list-style-type: none"> <li>- Waterfall, stream and rock outcrop</li> <li>- Plants that grow well in cold weather such as <i>Fagaceae</i> spp. or oak, <i>Rhododendron</i>, Bracket fern</li> <li>- Stairs, railings, bridges, terraces at viewing spot, rest areas, information center and 21 interpretive signs</li> </ul>	<ul style="list-style-type: none"> <li>- Canopied landscape is found at the beginning and the last part of the trail.</li> <li>- Focal landscape, panoramic landscape and feature landscape are found in the middle part of the trail.</li> </ul>
Phadokiesiew-Ban Mae Klang Luang, Doi Inthanon National Park, Chiang Mai Province	<ul style="list-style-type: none"> <li>- The trail starts at the roadside number 1009 road and ends at Ban Mae Klang Luang community.</li> <li>- Located about 1,280 meters above sea level</li> <li>- About 3.5 kilometers long</li> <li>- About a 3 hour walk</li> <li>- A guided trail without interpretive signs</li> <li>- A linear form trail</li> <li>- About 0.60-1.20 meters wide.</li> <li>- The slope up average is about 17 percent and the slope down average is 22 percent.</li> </ul>	<ul style="list-style-type: none"> <li>- The trail is a downhill route passing through a hill evergreen forest mixed with some pine forest, Pha Dok Siew waterfall and agricultural areas.</li> </ul>	<ul style="list-style-type: none"> <li>- Waterfall</li> <li>- Vegetation, such as <i>Schinus molle</i> (DC.) Korth., oak, <i>Betula alnoides</i>, Bamboo, Shampoo ginger (<i>Zingiber zerumbet</i>) and agricultural areas including paddy fields, flower field and strawberry plantation</li> <li>- Cultural landscape elements, wood stairs, railing and bamboo bridges</li> </ul>	<ul style="list-style-type: none"> <li>- Enclosed landscape is found in most areas of the trail</li> <li>- Focal landscape is found along the stream of the waterfall and the areas where the trail is flanked by tall trees.</li> </ul>
Dong Tiew -Nong Pak Chi wildlife watching tower, Khao Yai National Park, Nakhon Nayok Province	<ul style="list-style-type: none"> <li>- The trail starts opposite the tourist information center</li> <li>- Located about 760 meters above sea level</li> <li>- About 5 kilometers long</li> <li>- About a 3 hour walk</li> <li>- A guided trail without interpretive signs</li> <li>- A loop form trail starting and ending in different areas</li> <li>- About 0.60-0.80 meters wide.</li> <li>- The slope up average is about 9 percent and the slope down average is 13 percent.</li> </ul>	<ul style="list-style-type: none"> <li>- The trail runs on flat areas, crossing over small creeks and going up slightly sloping hills from time to time. It is surrounded by highly dense dry evergreen forest. Groups of rattan are found along the creeks and valleys.</li> <li>- Along the last part are grassland and the Nong Pak Chi wildlife watching tower.</li> </ul>	<ul style="list-style-type: none"> <li>- Streams and natural salt lick.</li> <li>- Vegetation, such as Baing, Eagle wood, <i>Cinnamomum glaucescens</i> Drury, Banyan tree (<i>Ficus L.</i>), <i>Kriemia angustifolia</i> (Roxb), and <i>Polyalthia parviflora</i> Ridl</li> <li>- Traces of wild animals, such as animal footprint, bear claw marks, scratches of elephant on trees.</li> <li>- Trailhead signs, distance signs, name labels of trees.</li> </ul>	<ul style="list-style-type: none"> <li>- Enclose landscape is found in most areas.</li> <li>- Focal landscape is found in the areas where rows of trees on both sides act as picture frame leading eyesight.</li> <li>- Panoramic landscape is found in the last part of the trail, through the grassland.</li> </ul>
Namtok Phlio, Namtok Phlio National Park, Chanthaburi Province	<ul style="list-style-type: none"> <li>- The trail starts opposite the national park office building</li> <li>- Located about 60 meters above sea level</li> <li>- About 1.2 kilometers long</li> <li>- About a 0.45 hour walk</li> <li>- Self- guided trail with interpretive signs and brochures</li> <li>- Loop form trail starting and ending in different areas</li> <li>- About 0.80-1.00 meters wide.</li> <li>- The slope up average is about 19 percent and the slope down average is 38 percent</li> </ul>	<ul style="list-style-type: none"> <li>- The trail runs up and down the terrain of different heights throughout the route. Some areas are steep slope and some run across the stream of waterfall.</li> <li>- The plant communities in this area are moderately to highly dense evergreen forest.</li> <li>- The first part of the trail is surrounded by groups of bamboo</li> </ul>	<ul style="list-style-type: none"> <li>- Waterfall and stream</li> <li>- Vegetation, such as wild almond, Mesawa tree, Banyan tree (<i>Ficus L.</i>)</li> <li>- Trailhead signs, trail end signs, a bridge, railings, rest areas, ropes for climbing the steep slopes, 11 interpretive signs, Alongkorn pagoda and Queen Sunandha Kumarratana's monument.</li> </ul>	<ul style="list-style-type: none"> <li>- Enclosed landscape and canopied landscape are found in most areas.</li> <li>- Focal landscape is found in some areas, where rows of trees and light shining from tree canopy gap serve as tools for leading eyesight.</li> </ul>
Karom Waterfall, Khao Luang National Park, Nakhon Si Thammarat Province	<ul style="list-style-type: none"> <li>- The trail starts at the park's headquarters.</li> <li>- Located about 250 meters above sea level</li> <li>- About 2 kilometers long</li> <li>- About a 1 hour walk.</li> <li>- Self- guided trail with interpretive signs and brochures</li> <li>- Linear form trail</li> <li>- About 1.20 meters wide.</li> <li>- The slope up average is about 12.90 percent and the slope down average is 57.40 percent.</li> </ul>	<ul style="list-style-type: none"> <li>- The trails lead up along steep slope, flat area and a stream of waterfall. Some areas are stone terraces.</li> <li>- Dense evergreen forest with dense mid-story trees and ground cover are found along this trail.</li> </ul>	<ul style="list-style-type: none"> <li>- Waterfall and stream</li> <li>- Vegetation, such as tree ferns, Green Egg (<i>Parashorea siellata</i> Kurz), Pandanus palm</li> <li>- Trailhead signs, 18 interpretive signs, stairs with railing, bridges, pavilion and toilets</li> </ul>	<ul style="list-style-type: none"> <li>- Most areas are enclosed landscape.</li> <li>- Canopied landscapes are found in some areas, where canopies of tree spread overhead</li> <li>- Focal landscapes are found in the areas, where the trail runs along the stream.</li> </ul>



**Figure 2** Example of nature trails’ physical environmental characteristics: (A) Kew Mae Pan nature trail, (B) Phadokesiew-Ban Mae Klang Luang nature trail, (C) Karom waterfall nature trail, (D) Dong Tiew -Nong Pak Chi wildlife watching tower nature trail, (E) Namtok Phlio nature trail

*Testing the Influence of the Physical Environmental Factors and Characteristics of Trail User Factors on Trail Users’ Environmental Perception and Learning Experience*

The path analysis was used to analyze the causal relationship between physical environmental factors and the trail users’ learning experience. The results indicated that the analysis was consistent with the empirical data. The acceptable goodness of fit indices including Chi-square ( $\chi^2$ ) value, Relative Chi-square ( $\chi^2/df$ ) value, Goodness of Fit Index (GFI) value, Adjust Goodness of Fit Index (AGFI) value, Normed fit index (NFI) value, Root mean square error of approximation (RMSEA) value are presented in Table 2.

Environmental perception had a positive direct effect on environmental knowledge (DE = 0.61,  $p < .01$ ) and nature appreciation (DE = 0.76,  $p < .01$ ). The physical environment that had positive direct effect on environmental perception, sequencing from the most to least influential factors is as follows: (1) landscape features (DE = 0.18,  $p < .01$ ); (2) spatial characteristics (DE = 0.11,  $p < .05$ ); (3) naturalness (DE = .08,  $p < .05$ ); and (4) distance (DE = 0.05,  $p < .01$ ). All of these factors indirectly affect environmental knowledge and nature appreciation through environmental perception. The characteristic of trail users that had positive direct effect on environmental perception, sequencing from the most to least influential factors is as follows: (1) motivation (DE = 0.20,  $p < .01$ ); (2) attention (DE = 0.10,  $p < .01$ ); (3) prior knowledge (DE = 0.06,  $p < .05$ ). All of these factors indirectly affect environmental knowledge and nature appreciation through environmental perception. Moreover, expectation had a positive direct effect on nature appreciation. The effect size was .07 ( $p < .01$ ). However, environmental awareness was not affected by environmental perception. It was directly affected by motivation, attention, spatial characteristics, distance and expectation. The effect sizes were .24 ( $p < .01$ ); .06 ( $p < .05$ ); .06 ( $p < .05$ ); .03 ( $p < .05$ ) and -.06 ( $p < .05$ ) respectively. The squared multiple correlations ( $R^2$ ) value showed that physical environment and characteristics of trail users variables could together explain the variances in environmental perception at approximately 39 percent. All independent variables could together explain the variances in the level of environmental knowledge at approximately 30 percent and explain variances in environmental awareness at approximately 13 percent, as well as, explain variances in the nature appreciation at approximately 70 percent (Table 2).

Much literature mentioned learning experience is the result of perception and information interpretation that the trail users gain from participating in nature walk activities. Learning in natural areas creates both natural science knowledge or knowledge of life in nature and environment, and nature appreciation. The information mentioned here is not only the content of knowledge from interpretive signs or nature interpreters, but also the physical environment as a learning source that affects learning activities and

**Table 2** Factors influencing trail users’ environmental perception and learning experience

Independent variables	Dependent variables											
	Environmental perception			Natural and environmental knowledge			Environmental awareness			Nature appreciation		
	DE	IE	TE	DE	IE	TE	DE	IE	TE	DE	IE	TE
Spatial characteristics	0.11*	-	0.11*	0.30**	0.07*	0.37**	0.06*	-	0.06*	-	0.08*	0.08*
Landscape features	0.18**	-	0.18**	-	0.11**	0.11**	-	-	-	-	0.14**	0.14**
Landscape characteristic and diversity	-	-	-	-0.33**	-	-0.33**	-	-	-	0.14**	-	0.14**
Naturalness	0.08*	-	0.08*	-	0.05*	0.05*	-	-	-	0.10*	0.06*	0.16**
Distance	0.05**	-	0.05**	0.13**	0.03**	0.16**	0.03*	-	0.03*	-	0.04**	0.04**
Previous experience	-	-	-	-	-	-	-	-	-	-0.03*	0.02	-0.01
Prior knowledge	0.06*	-	0.06*	0.14*	0.04	0.18**	-	-	-	-	0.05*	0.05*
Motivation	0.20**	-	0.20**	0.43**	0.12**	0.55**	0.24**	-	0.24**	0.13**	0.15**	0.28**
Expectation	-	-	-	-	-	-	-0.06*	-	-0.06*	0.07**	-	0.07**
Attention	0.10**	-	0.10**	-	0.06**	0.06**	0.06*	-	0.06*	-	0.07**	0.07**
Environmental perception	-	-	-	0.61**	-	0.61**	-	-	-	0.76**	-	0.76**
$R^2$	0.39			0.30			0.13			0.70		

$\chi^2 = 26.44$ ,  $df = 20$ ,  $p = 0.15$ ,  $GFI = 0.99$ ,  $AGFI = 0.96$ ,  $RMSEA = 0.03$ ,  $NFI = 0.99$

Note: DE = Direct effect; IE = Indirect effect; TE = Total effect.

\* $p < .05$ . \*\* $p < .01$ .

trail users' mind. The interpretation of information that trail users notice varies depending on each individual's characteristics (Brody, 2005; Dorwart et al., 2009; Emmons, 1997; Heimlich, 1993; Jarupakorn & Lertvich, 2008; Srisawat, 2015). Besides, the spatial characteristics affect the trail users' emotions and understanding about the trail environment and landscape features influence the environmental perception, which affects appreciation in nature (Kaplan & Kaplan, 1989). The environmental awareness consists of an affection element, which is a perception component and a cognitive element, which is a knowledge-based component. Perception is just a process of learning that allows the trail users to understand the reasoning that should take into account the importance of the environment, while cognition leads to previous knowledge processing combined with new knowledge, which results in creating new ideas about man's environmental concern and friendliness. Moreover, there are other factors that together have an effect on environmental awareness such as motivation, knowledge, values, attitude, locus of control, responsibilities and priorities (Apichatibutarapong, 2018; Brody, 2005; Emmons, 1997; Kalkan & Demirbas, 2017; Kollmuss & Agyeman, 2002). Therefore, environmental perception does not have a direct effect on environmental awareness, as shown in this study.

## Conclusion and Recommendation

It can be concluded that environmental perception had a direct effect on learning experience in two aspects: environmental knowledge and nature appreciation. *However, environmental awareness* was not affected by environmental perception, but was directly affected by spatial characteristics, distance, trail users' motivation, expectation and attention. Motivation and attention were the characteristics of trail users that affected environmental perception and learning experience the most in top ranking. The physical environment that affected environmental perception the most was landscape features followed by spatial characteristic. In addition, the spatial characteristics also had an effect on learning experience in all aspects. Therefore, trail managers and designers should pay more attention to the physical environment and characteristics of trail users mentioned above. They have to understand the landscape features and spatial characteristics that will affect the interests and impressions of the trail users, which leads to perception motivation encouraging the trail users to try to understand and learn what they experience on the nature trails. The content, interpretive methods, or trail components should be designed to attract visitors' interest and create effective learning experience. The management or the landscape design should encourage users to perceive and learn about the unique landscape features of the trails that are important and are the highlight of the trails. The trail should have a variety of landscape features and spatial characteristics, as well as be long enough to be able to create a sense of fun, excitement, adventurous experience, and relaxation in the midst of nature. The trail elements should guide the trail users to see interesting things, and help them feel safer. All of the above trail design approaches and management will impress trail users, leaving them with a memorable experience, which affects motivation, interest in learning and, thus, will lead to trail users' environmental perception enhancement.

## Conflict of Interest

There is no conflict of interest.

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