

Assessing site suitability of recreational forests in Jeli, Kelantan for *Shinrin-yoku* practice

Wan Ammar Zikri Wan Mohd Di¹, Noor Janatun Naim Jemali^{1*}, Nur Kyariatul Syafinie Abdul Majid¹, Nazahatul Anis Amaludin¹, Mohd Sukahiri Mat Rasat¹, Azita Ahmad Zawawi² and Siti Susanti³

¹Faculty of Earth Science, Universiti Malaysia Kelantan, 17600 Jeli Kelantan, Malaysia

²Faculty of Forestry and Environment, Universiti Putra Malaysia 43400 Selangor, Malaysia

³Faculty of Animal Husbandry and Agriculture, Diponegoro University, Semarang Indonesia

ARTICLE HISTORY

Received : 9 October 2025

Accepted : 15 December 2025

Online : 30 September 2026

KEYWORDS

site assessment,
forest therapy,
Shinrin-yoku,
Jeli

✉ * CORRESPONDING AUTHOR

Noor Janatun Naim Jemali
Faculty of Earth Science, Universiti
Malaysia Kelantan
Email: janatunnaim@umk.edu.my

ABSTRACT

In an era of increasing urban stress and mental fatigue, the restorative power of nature has gained global attention particularly through the practice of *Shinrin-yoku*, or forest bathing. Originating in Japan, this nature-based therapy emphasizes mindfulness immersion in forest environments to enhance physical and psychological well-being. This study explores the potential of four forest recreational sites in Jeli, Kelantan namely Lata Janggut, Lata Keding, Lata Renyok, and Bukit Salor as suitable locations for forest bathing experiences. A total of 154 respondents, largely familiar with these sites, provided feedback through structured questionnaires focused in assessing awareness, biodiversity, serenity, and overall environmental quality. The study shows that forest recreational areas in Jeli positively affect visitors' well-being, with 88.3% feeling refreshed, 90.9% emotionally stable, and 89.6% experiencing an improved mood after their visit. Hence, 95.5% of visitors perceived that the selected sites are suitable for *Shinrin-yoku*, with biodiversity and tranquility emerging as the most valued attributes. The results highlight the therapeutic potential of forest landscapes in Jeli, offering a framework for integrating nature therapy into local ecotourism and wellness strategies. This study provides practical insights for policymakers and planners to promote sustainable forest use while enhancing community health and fostering deeper human-nature connections.

© 2026 UMK Publisher. All rights reserved.

1. INTRODUCTION

The rapid pace of urbanisation and digitalisation has intensified human disconnection from the natural world, giving rise to a range of physical and psychological health challenges globally. Chronic stress, anxiety, and depression are increasingly recognised as public health concerns, particularly in urban populations where contact with green spaces is minimal (Bratman et al., 2019; Frumkin et al., 2017). This growing health burden has prompted researchers and health practitioners to explore non-pharmacological and nature-based solutions to promote human well-being.

The concept of *Shinrin-yoku*, or 'forest bathing,' has gained international recognition for its therapeutic potential. This concept originated in Japan in the 1980s and involves mindful immersion in forest environments to enhance physical, emotional, and mental wellness (Li, 2018; Hansen et al., 2017; Oh et al., 2017; Antonelli et al., 2022). Unlike conventional recreational activities, forest bathing is rooted in sensory engagement, encouraging individuals to experience the forest's sights, sounds, scents and textures. Scientific

evidence supports the effectiveness of *Shinrin-yoku* in reducing stress-related biomarkers such as cortisol, blood pressure, and heart rate, while improving immune function and mood (Park et al., 2010; Song et al., 2019; Li et al., 2016; Periyasamy et al., 2024). Countries with abundant natural landscapes, including those in Southeast Asia, are beginning to adopt this approach as part of their environmental and wellness strategies. There are several mechanisms that underlie the physiological effects of forest bathing, including phytoncide exposure, volatile organic compounds released by trees that enhance natural killer cell activity and activation of the parasympathetic nervous system (Li, 2010). The multisensory environment of forests, characterised by natural sights, sounds and smells, also contributes to mood stabilisation and attention restoration (Kaplan & Kaplan, 1989).

In Malaysia, although the country is endowed with extensive tropical rainforests, the application of *Shinrin-yoku* as a wellness practice remains limited and under-researched. The general public is still largely unfamiliar with the term and its benefits, while few structured programs or scientific

assessments have been conducted locally (Teng, 2019; Quek & Ng, 2023). Kelantan stands out as one of the states that is rich in forest resources and natural recreational areas in the northeastern region of Peninsular Malaysia, which has attracted both local and regional visitors. These natural settings present valuable opportunities for introducing and evaluating *Shinrin-yoku* in a tropical Malaysian environment.

Despite growing global interest in *Shinrin-yoku*, most existing studies have been conducted in temperate regions such as Japan, South Korea, and parts of Europe, focusing on physiological and psychological outcomes under controlled or guided conditions. In Malaysia and other tropical contexts, research remains limited, particularly in assessing forest bathing suitability based on visitors' perceptions and site-specific environmental characteristics. The uniqueness of Malaysia's tropical biodiversity includes dense canopy layers, endemic flora, and continuously humid conditions. It may offer a distinct experiential dimension to forest bathing, different from the temperate forests of Japan and Korea. Exploring such regional differences can provide valuable insights into how ecological, cultural, and climatic factors influence forest therapy practices and outcomes. This study, therefore, aims to assess the suitability and potential of selected sites, specifically in Jeli, Kelantan, as forest bathing destinations based on environmental characteristics of the sites and visitor perceptions. Through this localised assessment, the study aims to contribute to the broader national discourse on incorporating nature-based wellness approaches into public health, environmental education, and sustainable ecotourism development.

2. MATERIALS AND METHODS

2.1. Study area

This study was conducted at four selected forest recreational sites within the Jeli District of Kelantan, namely Bukit Salor, Lata Janggut, Lata Keding, and Lata Renyok (Figure 1). These locations were chosen due to their accessibility, ecological features, and popularity among local visitors (Ahmad & Fadzil, 2016; Teng, 2019). Site selection was further guided by preliminary consultations with local tourism stakeholders and forest rangers, during which they identified these areas as having high visitor appeal, ecological distinctiveness, and potential for nature-based activities. The choice of study locations was informed by several specific attributes such as ecological factors that consider diverse vegetation types, varying canopy structures, and well-preserved habitats that support rich biodiversity. Adding to this, the areas offer distinctive visual, auditory, and olfactory experiences such as the sound of flowing streams, fresh forest aromas and panoramic views. Each site represents a different

micro-ecosystem, ranging from mossy streams to hilltop cloud forests, thereby enriching the comparative landscape suitability analysis.



Figure 1: Location for four selected sites in assessing the suitability area for forest bathing sites

All selected sites fall within protected or managed zones under the jurisdiction of the Kelantan State Forestry Department and local municipal authorities, ensuring a baseline level of environmental regulation. This legal protection enhances their sustainability as long-term ecotherapy sites. Furthermore, the selection criteria considered not only ecological assets but also cultural and experiential values expressed by local communities. These include oral histories, traditional therapy practices, and recreational customs associated with the forest landscape, which have been factors that enhance the emotional and symbolic dimensions of forest bathing.

Accessibility to these sites varies slightly, with Bukit Salor reachable via paved roads and short forest trails, while Lata Keding and Lata Renyok require modest trekking through semi-dense jungle. Lata Janggut, due to its proximity to several villages and settlements, is regularly frequented by both villagers and eco-tourists. Bukit Salor is characterised by gentle slope hills with diverse vegetation area including forest trees, rubber plantations, ferns and orchids that contribute to the ecological value of the area (Zainudin, 2018). Lata Keding and Lata Renyok are both prominent waterfall sites surrounded by tropical rainforests, which offer rich biodiversity and easy public access (Ahmad & Fadzil, 2016; Zainudin, 2018). Meanwhile, the Lata Janggut area is known for its cascading streams and moss-covered rocks that create a tranquil setting that reflects the visual and sensory qualities valued in forest bathing (Teng, 2019). Thus, this study is

based on a perception-based assessment of visitor experiences within the selected forest sites.

The surrounding communities in these areas are largely rural, engaged in agriculture, eco-tourism, and forest-based livelihoods. Seasonal changes such as the monsoon and precipitation were also taken into account when evaluating physical accessibility, including water safety and ambient conditions, which influence the sensory experience central to *Shinrin-yoku*.

2.2. Materials and methods

Data were collected using direct site observation and a questionnaire survey method. Observations focused on capturing environmental features and the overall environment of the sites to assess their physical and sensory suitability for forest bathing (Ahmad & Fadzil, 2016). These observations were complemented by the questionnaire, which served as the primary tool for evaluating visitor perceptions following Lee & So (2021).

Standard observational process was employed with a structured field observation checklist. This checklist included parameters such as forest canopy cover, soundscape (natural vs. anthropogenic noise), water presence (streams or waterfalls), cleanliness, biodiversity indicators, accessibility, and overall tranquility were sensibly observed (Girard & Cohn, 2016). Observers used descriptive notes, photographs, and an environmental ratings scale to capture qualitative and quantitative data. Observations were conducted during both weekdays and weekends, and at different times of the day (morning and afternoon) to account for temporal variations in environmental quality and visitor activity.

The questionnaire instrument was systematically structured to evaluate multiple dimensions relevant to forest bathing experiences, grounded in both environmental psychology and ecotourism research frameworks. It encompassed four major domains: (1) demographic information, which included variables such as age, gender, ethnicity, education level, and frequency of visits to the sites; (2) knowledge and awareness, aimed at assessing respondents' understanding of forest-based therapy practices, particularly the concept of *Shinrin-yoku*, and their familiarity with its benefits and principles; (3) aesthetic perceptions, which captured visitors' sensory experiences related to visual scenery, olfactory cues, soundscape, and perceived biodiversity richness; and (4) spiritual values, which explored the emotional and existential connections respondents felt with the forest environment, including feelings of serenity, reflection, and appreciation of nature's intrinsic value.

The inclusion of these parameters was informed by

previous studies emphasising the multisensory and holistic nature of forest bathing experiences (Li, 2018; Hansen et al., 2017; Quek & Ng, 2023). Awareness-related items specifically evaluated whether respondents had prior knowledge of forest bathing as a therapeutic practice, as well as their willingness to participate in such activities in the future.

Each item was measured using a 5-point Likert scale ranging from "Strongly Disagree" (1) to "Strongly Agree" (5), a common psychometric method used in environmental perception and ecotourism studies to assess attitudinal and experiential dimensions (Teng, 2019; Pretty et al., 2007). This multi-dimensional approach enabled the researchers to assess not only immediate emotional responses to the forest environment but also deeper cognitive and spiritual interpretations of the landscape. A pilot test was conducted before the actual survey to ensure the reliability of the instrument, and the Cronbach's alpha coefficient was maintained above 0.7 to validate internal consistency (Teng, 2019). To ensure content validity, the survey instrument was reviewed by a panel of experts in environmental psychology, ecotourism, and forest science. A pilot test was conducted involving 25 participants to assess question clarity, with feedback used to revise ambiguous items. Internal consistency reliability was confirmed through Cronbach's alpha ($\alpha = 0.84$), indicating good reliability.

The final questionnaire was administered using both digital (Google Forms) and printed formats to maximise participation. A purposive sampling strategy was used to target respondents who had visited at least one of the selected sites within the past year. Survey administrators were stationed at site entrances and popular gathering areas (e.g., picnic spots, parking zones) to approach potential participants. Informed consent was obtained from all respondents, and participation was voluntary and anonymous. In total, data collection spanned a period of two months, from October to November 2024, allowing for the inclusion of both weekday and weekend visitors. Weather conditions, which can influence forest ambience and visitor perception, were noted during each site visit to help contextualise responses. The combination of multi-source data collection and triangulation between observer reports and visitor feedback added robustness to the overall site suitability analysis. Quantitative responses were analysed using descriptive statistics (mean, standard deviation), and comparisons were made across forest sites to identify differences in perceived suitability. For data analysis, responses on the 5-point Likert scale were collapsed into two categories: 'Agree' (combining "Agree" and "Strongly Agree") and 'Disagree' (combining "Disagree" and "Strongly Disagree"); neutral responses ("Neither Agree nor Disagree") were retained separately.

Instrument reliability was verified using Cronbach's alpha, ensuring internal consistency of the survey measures. The questionnaire was administered anonymously to ensure participant confidentiality. The study protocol was approved before the data collection period, and all participants provided informed consent prior to participation.

3. RESULT AND DISCUSSION

3.1. Respondent demographic

A total of 154 respondents participated in the survey, comprising 63.6% females and 36.4% males. The majority of participants identified as Malay (91.6%), while the remaining respondents were of Chinese, Hindu, Bidayuh, and other ethnic backgrounds. The demographic profile of respondents suggests a predominance of younger, educated individuals with a strong representation of university students and early-career professionals. This aligns with previous studies indicating that younger populations are more likely to seek immersive nature experiences for stress relief and mental clarity (Pretty et al., 2007; Yang et al., 2021). Respondents ranged in age from 13 to 64 years, with a mean age of 27 years. In terms of educational attainment, 62.7% held at least a bachelor's degree or higher (including master's and doctoral degrees), whereas 27.6% had completed pre-university qualifications such as STPM, diploma, foundation, or matriculation programmes. Among the four selected forest sites, Lata Janggut was the most frequently visited, with 48.1% of respondents having previously engaged in recreational activities there. This was followed by Lata Keding (25.3%), Lata Renyok (13.6%), and Bukit Salor (13.0%). On average, visitors reported spending approximately half a day at these sites, highlighting their potential for promoting prolonged engagement in nature-based wellness activities such as forest bathing.

3.2. Visitor perceptions by site and dimension

Results from the survey showed forest recreational areas in Jeli have a strong positive influence on visitors' well-being. A majority of respondents (88.3%) indicated that the forest visit made them feel refreshed, reflecting a positive psychological effect, such as reduced stress or renewed energy, after visiting the forest, while 11.7% did not report such an effect. Emotionally, 90.9% stated that their emotions became more stable post-visit, and 89.6% agreed that they experienced positive emotional effects after returning from the site. In line with this, 93.2% of respondents in this study reported feeling relaxed and relieved from daily stress, while 91.5% experienced a sense of tranquillity and openness during their visit. These findings are consistent with recent studies demonstrating that exposure to forest and natural environments is associated with feelings of refreshment,

emotional stabilisation, and positive affect, contributing to psychological restoration and enhanced subjective well-being (Bai et al., 2025; Antonelli et al., 2022; Bratman et al., 2019; Oh et al., 2017; Zhang et al., 2021).

Participants highlighted several aesthetic elements as contributing to their sense of well-being, including the forest aroma, natural views, and ambient sounds. Correlation analyses revealed that these sensory features were positively and significantly associated with the likelihood of reporting a refreshed state (soundscape quality: $r = 0.42$, $p = 0.001$; visual aesthetics: $r = 0.51$, $p < 0.001$; forest aroma: $r = 0.33$, $p = 0.008$), indicating that visitors' restorative experiences were strongly linked to specific environmental attributes rather than being generic responses. These natural sensory experiences enhanced their emotional state and contributed to stress reduction. As noted by Watts et al. (2016), the presence of natural sounds plays a significant role in inducing a state of calmness and promoting psychological restoration. Furthermore, the biodiversity of the sites, ranging from trees and shrubs to flowering plants, was perceived as having a meaningful emotional impact on visitors. Table 1 presents the overall percentage of agreement across all parameters used to evaluate nature-based therapy potential.

Table 1: Summary of agreement percentages across the parameters evaluated in the questionnaire survey (n=154).

Main Category	Item/indicator	Agree (%)	Disagree (%)
Health, Emotion & Feelings	Feeling fresh after the visit	88.3	11.7
	Emotionally stable after visits	90.9	9.1
	Feel more positive	89.6	10.4
	Experience a sense of tranquillity	91.5	8.5
Aesthetics	Aroma of the forest	90.9	9.1
	Refreshing effect from the forest view	92.1	7.9
	Calming nature sound in the forest	93.5	6.5
	Diverse flora and fauna	92.9	7.1
Knowledge & Understanding	Knowledge about nature therapy	52.3	47.7
	Feel connected with nature	67.5	32.5
	Prefer to be alone while enjoying the forest/nature	54.6	45.4
Spiritual	Close to nature	86.5	13.5
	Appreciate nature	89.6	10.4

Among the four forest recreational sites assessed, Lata Keding recorded the highest mean score (4.58) under the Health, Emotion, and Feeling (HEF) dimension, indicating that visitors experienced the most significant positive effects on their emotional and physical well-being at this location. The observed emotional stability and reduced stress among visitors align with biophilic design principles, which posit that human affinity for natural environments is biologically ingrained (Kellert & Calabrese, 2015). The immersive engagement with natural sights, sounds, and smells likely

triggered parasympathetic responses, fostering calmness and introspection. Although Lata Renyok received the lowest HEF score (4.33), the result still reflects a strong positive impact, reaffirming that all sites contribute meaningfully to enhancing visitors' psychological and physiological states.

In terms of aesthetic value, all locations were rated highly, with mean scores exceeding 4.3, demonstrating that each site offers visually satisfying and scenically attractive environments. The consistently high scores in aesthetic and spiritual dimensions across sites reflect the potential of these areas to support not only passive recreation but also mindful therapeutic engagement. These findings resonate with Frumkin et al. (2017), who emphasised the value of everyday nature in supporting mental well-being. Bukit Salor achieved the highest aesthetic score (4.59), positioning it as the most visually appealing site among those evaluated. This is consistent with its growing reputation as a prominent eco-tourism destination in Kelantan, particularly for visitors who enjoy light trekking while appreciating the natural landscape. Tourism Malaysia (2023) highlights Bukit Salor's unique scenic appeal, especially the phenomenon of a thick cloud layer commonly referred to as the *carpet-cloud* look, which blankets the view of Gunung Reng, creating a serene and immersive nature-based experience. This unique environmental setting explained the reasons why this site received the highest mean score (4.52) under the spiritual dimension. These elevated spiritual responses align with the tendency of many individuals to seek solitude in forested settings for personal reflection, emotional balance, and cognitive restoration. As observed by Yang et al. (2021), such motivations are often driven by an intrinsic psychological need for tranquillity, self-awareness, and problem-solving.

Table 2: Mean score for each parameter evaluated at each site.

Site	Health, Emotion & Feelings (HEF)	Aesthetics	Knowledge	Spiritual
Bukit Salor	4.45	4.59	3.68	4.52
Lata Janggut	4.53	4.55	3.38	4.42
Lata Keding	4.58	4.56	3.64	4.44
Lata Renyok	4.33	4.34	3.82	4.21

Despite these encouraging findings, the knowledge dimension consistently received lower mean scores across all sites, with Lata Janggut recording the lowest (3.38). This indicates a notable gap in visitor understanding of the deeper ecological, cultural, and therapeutic values associated with forest environments. In particular, knowledge related to the concept and benefits of forest bathing (*Shinrin-yoku*) appears to be limited among visitors. While participants demonstrated strong emotional, aesthetic, and spiritual responses to the sites, their awareness and comprehension of forest-based wellness practices remain underdeveloped. This finding aligns with previous studies (Li, 2010; Hansen et.al, 2017) that

emphasise the need for increased public education and outreach to foster a more informed appreciation of nature-based health interventions such as forest bathing. Table 2 displays the mean scores for each parameter by site.

Extensive research has shown that natural environments contribute significantly to human well-being. Hartig et al. (2014) demonstrated that exposure to nature reduces stress and enhances emotional health, while Kaplan and Kaplan (1989) emphasised the restorative effects of natural settings on both cognitive and emotional functioning. Similarly, Pretty et al. (2007) highlighted the mental health benefits of green exercise, noting that physical activity in natural environments fosters psychological well-being. As observed by Yang et al. (2021), individuals often turn to forested environments for emotional clarity, problem-solving, and self-awareness. The spiritual outcomes noted in this study support *Shinrin-yoku*'s concept to nourish not only the body and mind but also deeper aspects of human consciousness. The findings of the current study strengthen these perspectives, illustrating that forest recreational sites function as vital therapeutic landscapes that support emotional, physical, and spiritual health. Notably, 95.5% of respondents perceived the four selected sites as highly suitable for forest bathing, further underscoring the capacity of these environments to promote well-being, aesthetic appreciation, and spiritual connection.

The study also suggests broader opportunities for integrating *Shinrin-yoku* into regional wellness tourism strategies. Forest bathing could be incorporated into tourism packages that emphasise slow travel and ecotherapy, particularly in collaboration with local homestay operators, traditional healers, or environmental educators. School-based environmental programs and mental health outreach could also adopt *Shinrin-yoku* as a complementary pedagogical or therapeutic tool. Furthermore, establishing designated forest therapy trails with minimal infrastructural intervention, such as low-impact footpaths, resting zones, and interpretive points, can enhance the visitor experience while maintaining ecological integrity. These nature immersion experiences can be curated to serve diverse populations, including the elderly, youth, and individuals with psychological or physical health conditions. Incorporating mindfulness-based practices and guided reflection along the trails may further strengthen the restorative effects.

In addition, collaboration with public health agencies and NGOs can help position *Shinrin-yoku* as a non-clinical intervention within preventive healthcare strategies, especially in rural and semi-urban Malaysian communities. Such initiatives can complement conventional medical approaches while promoting awareness of ecosystem services that forests

provide. These interventions align with global best practices for sustainable ecotourism and biophilic design, supporting not only human wellness but also long-term forest conservation goals by reinforcing the intrinsic value of nature to society, especially for local authorities and ecotourism planners in Jeli.

4. CONCLUSION

This study indicates that the selected forest sites in Jeli, Kelantan, namely Lata Keding, Lata Janggut, Lata Renyok, and Bukit Salor, were acknowledged by visitors to support emotional, aesthetic, spiritual, and physical well-being, suggesting their suitability for forest bathing activities. Among the sites, Bukit Salor and Lata Keding were notable for their strong ratings for spiritual and emotional impacts, respectively. However, consistently lower scores on visitors' knowledge of forest bathing highlight limited public awareness of its principles and deeper values, underscoring the need for enhanced educational and interpretive efforts. To strengthen the implementation of forest therapy sites, local authorities could collaborate with academic institutions, tourism boards, and health agencies to develop a structured *Shinrin-yoku* program tailored to Malaysian forest environments. The methodology employed in this study is replicable and could be applied to other tropical forest settings, allowing for comparative analyses and potential generalisation to similar recreational forests in Malaysia and Southeast Asia. Future research should examine longitudinal effects of forest bathing on health and well-being, assess seasonal variability in visitor perceptions and evaluate accessibility for diverse populations, including older adults and individuals with disabilities. This study offers initial insights that our tropical forest environments in Jeli can serve not only for recreational purposes but also play a meaningful role in promoting holistic human wellness through nature-based experiences. It contributes empirical support for the integration of *Shinrin-yoku* into tropical ecotourism and public health strategies in Malaysia, particularly within forest recreational areas such as those in Jeli, Kelantan.

ACKNOWLEDGEMENT

The authors extend their sincere appreciation to Majlis Daerah Jeli for their firm support and logistical assistance throughout this study. Although no financial support or external funding was received, the cooperation and facilitation provided by the local authority were instrumental in ensuring the smooth execution of field activities and data collection.

REFERENCES

Ahmad, A., & Fadzil, A. F. M. (2016). Tourists' perception and satisfaction of ecotourism product in Penang National Park. *Journal of Tourism, Hospitality and Environment Management*, 1(1), 1–13.

- Antonelli M, Donelli D, Carlone L, Maggini V, Firenzuoli F, Bedeschi E. (2022). Effects of forest bathing (*shinrin-yoku*) on individual well-being: an umbrella review. *Int J Environ Health Res*. 32(8):1842-1867.
- Bai, Z., Zhang, S., He, H., & Xu M. (2025). Nature perception and positive emotions in urban forest parks enhance subjective well-being. *Sci Rep* 15, 31457. <https://doi.org/10.1038/s41598-025-15612-6>
- Bratman, G. N., Anderson, C. B., Berman, M. G., Cochran, B., de Vries, S., Flanders, J., Folke, C., Frumkin, H., Gross, J. J., Hartig, T., Kahn, P. H., Kuo, M., Lawler, J. J., Levin, P. S., Lindahl, T., Meyer-Lindenberg, A., Mitchell, R., Ouyang, Z., Roe, J., Scarlett, L., Smith, R. J., Van Den Bosch, M., Wheeler, B. W., White, M. P., Zheng, H., & Daily, G. C. (2019). Nature and mental health: An ecosystem service perspective. *Science Advances*, 5(7), eaax0903. <https://doi.org/10.1126/sciadv.aax0903>
- Frumkin, H., Bratman, G. N., Breslow, S. J., Cochran, B., Kahn, P. H., Lawler, J. J., Levin, P. S., Tandon, P. S., Varanasi, U., Wolf, K. L., & Wood, S. A. (2017). Nature contact and human health: A research agenda. *Environmental Health Perspectives*, 125(7), 075001. <https://doi.org/10.1289/EHP1663>
- Girard JM, Cohn JF. A 2016 Primer on Observational Measurement. *Assessment* 3(4):404-413. doi: 10.1177/1073191116635807.
- Gobster, P. H. (2025). Forest Therapy Trails: Development and Application of an Assessment Protocol. *International Journal of Environmental Research and Public Health*, 22(9), 1440.
- Hansen, M. M., Jones, R., & Tocchini, K. (2017). *Shinrin-yoku* (forest bathing) and nature therapy: A state-of-the-art review. *International Journal of Environmental Research and Public Health*, 14(8), 851. <https://doi.org/10.3390/ijerph14080851>
- Hartig, T., Mitchell, R., de Vries, S., & Frumkin, H. (2014). Nature and health. *Annual Review of Public Health*, 35, 207–228. <https://doi.org/10.1146/annurev-publhealth-032013-182443>
- Kaplan, R., & Kaplan, S. (1989). The experience of nature: A psychological perspective. Cambridge University Press.
- Kellert, S. R., & Calabrese, E. F. (2015). The practice of biophilic design. *Terrapin Bright Green*.
- Koo, M., & Yang, S.-W. (2025). Likert-Type Scale. *Encyclopedia*, 5(1), 18.
- Lee, E., & So, S. (2021). Population research: Convenience sampling strategies. *Prehospital and Disaster Medicine*, 36(6), 624–626.
- Li, Q. (2007). Effect of forest bathing trips on human immune function. *Environmental Health and Preventive Medicine*, 11(1), 27–34. <https://doi.org/10.1007/BF02897301>
- Li, Q. (2008). Forest bathing: A review of the physiological effects of *Shinrin-yoku*. *Environmental Health and Preventive Medicine*, 15(1), 27–35. <https://doi.org/10.1007/s12199-008-0069-2>
- Li, Q. (2010). Effect of forest bathing trips on human immune function. *Environmental Health and Preventive Medicine*, 15(1), 9–17.
- Li, Q. (2018). Forest bathing: How trees can help you find health and happiness. Thorndike Press.
- Li, Q., Morimoto, K., Nakadai, A., Inagaki, H., Katsumata, M., Shimizu, T., ... & Miyazaki, Y. (2016). A forest bathing trip increases human natural killer activity and expression of anti-cancer proteins in female subjects. *Journal of Biological Regulators and Homeostatic Agents*, 30(2), 203–211.
- Oh, B., Lee, K.J., Zaslawski, C. et al. (2017). Health and well-being benefits of spending time in forests: systematic review. *Environ Health Prev Med* 22, 71. <https://doi.org/10.1186/s12199-017-0677-9>
- Park, B. J., Tsunetsugu, Y., Kasetani, T., Kagawa, T., & Miyazaki, Y. (2010). The physiological effects of *Shinrin-yoku* (taking in the forest atmosphere or forest bathing): Evidence from field experiments in 24 forests across Japan. *Environmental Health and Preventive Medicine*, 15(1), 18–26. <https://doi.org/10.1007/s12199-009-0086-9>
- Periyasamy, M., Puvanendran, S., & Pannan, S. (2024). Forest therapy research in Europe: A scoping review of the scientific literature. *Forests*, 15(5), 848.
- Pretty, J., Peacock, J., Sellens, M., & Griffin, M. (2007). The mental and physical health outcomes of green exercise. *International Journal of Environmental Health Research*, 15(5), 319–337. <https://doi.org/10.1080/09603120500155963>
- Quek, G., & Ng, Y. C. (2023). Mindful trekking: A study of nature immersion and psychological well-being in Malaysian recreational forests. *Malaysian Journal of Psychology*, 39(1), 23–35.
- Song, C., Ikei, H., Kobayashi, M., Miura, T., Li, Q., Kagawa, T., & Miyazaki, Y. (2019). Effects of forest bathing on cardiovascular and metabolic parameters in

- middle-aged males. Evidence-Based Complementary and Alternative Medicine, 2019, 1–8. <https://doi.org/10.1155/2019/8763620>
- Teng, P. K. (2019). Ecotourism and environmental interpretation: A study in Taman Negara. *Journal of Tourism and Environment*, 11(2), 44–53.
- Tourism Malaysia. (2023). Kelantan Eco-tourism Attractions. Retrieved from <https://www.malaysia.travel>
- Watts, G. R., Khan, A., & Pheasant, R. J. (2016). Influence of soundscape and interior design on anxiety and perceived tranquillity of patients in a healthcare setting. *Applied Acoustics*, 104, 135–141. <https://doi.org/10.1016/j.apacoust.2015.11.007>
- Yang, B., Yu, H., & Yu, Y. (2021). More experience, less loneliness? Exploring the effect of experiential purchases on the alleviation of loneliness. *Frontiers in Psychology*, 12, 651644. <https://doi.org/10.3389/fpsyg.2021.651644>
- Zainudin, A. (2018). Forest therapy and its potential in Malaysia. *Malaysian Journal of Forestry Science*, 32(1), 71–80.
- Zhang, Z., Zhang, J., & Li, S. (2021). Perceived restorativeness of natural environments and subjective well-being: A meta-analysis. *Journal of Environmental Psychology*, 76, 101641.