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The Concept of Healing Waterscapes in Public Open Spaces to Construct the Positive Psychology of Visitors

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ABSTRACT

Public open spaces contain various features that have psychological effects on human mental health. Water, as one of the key elements in landscape design, not only enhances aesthetics but also provides sensory stimulation, social interaction, and psychological benefits. It possesses therapeutic qualities that promote relaxation and reduce stress. Given the rising prevalence of mental health issues among adolescents in Bali, public open spaces incorporating waterscapes play a crucial role. The concept of a "healing waterscape" can be applied in such spaces, where environmental elements are strategically designed to improve mental well-being through psychological approaches. However, no clear criteria for healing waterscape design have been formulated, and it remains unclear whether such criteria are being applied in the waterscapes of public open spaces in Denpasar City and Klungkung Regency. This study aims to establish criteria for healing waterscape design in public open spaces and assess the extent to which these criteria are implemented in Denpasar City and Klungkung Regency. Using a mixed-methods data analysis with JMP software, the study identifies four key variables in healing waterscape design: social, behavioral, cognitive, and emotional factors. The design criteria that should be considered for public space waterscapes in Denpasar and Klungkung include activity diversity, site characteristics, spatial variety, acoustics, water shape, movement, flow, lighting and signage, and both biotic and abiotic components.
Keyword: Waterscape, Psychology, Public Open Space, Bali

ABSTRAK

Segala fitur yang terdapat pada ruang terbuka publik memiliki efek psikologis yang berkaitan dengan kesehatan mental manusia. Air sebagai salah satu elemen menarik pembentuk lansekap dengan unsur estetika, insentif sensorik, sosial, dan psikologis yang dimilikinya, memiliki fitur terapeutik untuk menciptakan efek relaksasi dan dapat mengurangi stres. Tingginya angka pengidap gangguan mental yang didera remaja di Bali membutuhkan peran *waterscape* ruang terbuka publik. Konsep *healing waterscape* dapat diimplementasikan pada ruang terbuka publik, dimana kesan yang ditimbulkan oleh unsur pembentuk lingkungan yang dikondisikan sedemikian rupa akan dapat meningkatkan kesehatan mental manusia melalui pendekatan psikologis. Namun belum ada penelitian yang dapat merumuskan kriteria desain *healing waterscape* dengan jelas serta belum dapat diidentifikasi apakah kriteria desain tersebut telah diterapkan pada *waterscape* ruang terbuka publik di Kota Denpasar dan Kabupaten Klungkung. Penelitian ini bertujuan untuk merumuskan kriteria desain *healing waterscape* pada ruang terbuka publik, dan menilai sejauh mana kriteria tersebut diterapkan pada *waterscape* ruang terbuka publik di Kota Denpasar dan Kabupaten Klungkung. Metode penelitian yang digunakan adalah *mixed methods,* analisis data dengan menggunakan perangkat lunak JMP. Hasil penelitian menyimpulkan bahwa terdapat empat variabel utama desain *healing waterscape*, diantaranya adalah sosial, behavioral, cognitif, dan emosional. Beberapa kriteria yang harus dipertimbangkan dalam mendesain *waterscape* khususnya pada ruang publik di

Kota Denpasar dan Klungkung adalah *variety of activity*, site characteristic, variety of space, *accoustic; water shape; movement; flow, lighting and signage*, dan *biotic and abiotic component*.
Kata Kunci: *Waterscape,* Psikologi, Ruang Terbuka Publik, Bali

1. Introduction

Public open spaces, as one of the elements of urban spatial planning, have a vital role because they are one of the indicators that determine city residents' quality of life. Grahn & Stigsdotter (2003) and Nielsen & Hansen (2007) have demonstrated that public open spaces not only serve as the city's lungs and hub of social interaction, but they also offer mental health benefits and enhance the psychological well-being of city residents. All features in public open spaces have psychological effects on human mental health. Studies have shown that observing biotic components like birds and fish in public open spaces can lower heart rate and muscle tone, thereby improving psychological health (Zhang et al., 2021). The presence of landscape components in the form of trees and shrubs with various diversifications (shape, size, color, and type) can reduce the effects of stress and reduce mental fatigue (Krasilnikova et. al., 2021; Malekinezhad et. al., 2020). The view of a beautiful landscape can relieve tension, stabilize blood pressure, relax muscles, and normalize heart activity (Krasilnikova et. al., 2021).

Studies have shown that facilities in public open spaces that stimulate activity patterns can lower an individual's level of depression. Spending time in public open spaces can strengthen human pro-social experiences that help support social health, such as reducing loneliness (Astell-Burt et. al., 2021). In this case, interactions that occur in public open spaces are considered to cause positive changes in various psychological parameters, including stress, concentration, depression, and aggression (Wilson et. al., 2009). In addition to the various features mentioned above, the water element is also an important component of open spaces. Water is an attractive element and is often used as the main component in forming landscape design. The therapeutic features of the water element create a relaxing effect and can reduce stress (Duzenli et. al., 2016). The aesthetic elements and sensory, social, and psychological incentives contained in the water element in public open spaces can attract attention and arouse visitors' curiosity.

Recent studies have shown that using water elements in public open-space waterscapes has many positive effects, particularly those related to psychological health, including restoration and stress reduction. Research by Zhang, X., et. al. (2021) concluded that landscapes with water elements in urban spaces have a therapeutic function with healing effects and can increase people's psychological and mental resilience. Water elements in public open space waterscapes provide positive impacts in the form of a sense of relaxation with a dominant influence on feelings of pleasure and peace, spectacularity with a dominant influence on the sense of interest, entertainment with a dominant influence on mental health and freshness, and environmental factors related to the environment (Langie, K., et. al., 2022). In waterscapes, elements such as sound, reflection, movement, color, and shape can contribute to creating a comfortable sensation and invite human senses to relieve emotions (Mahmoud, Khawola F., et al., 2022).

A waterscape is a man-made landscape with water as its main element (Azhari et al., 2022). Waterscape, as a landscape component, typically combines other artificial elements to enhance its aesthetics and functionality. Waterscapes in public open spaces can include water gardens, ponds, fountains, streams, waterfalls, swimming pools, reflecting pools, disappearing water, water walls, and bog gardens. Each constituent element of a waterscape possesses unique characteristics that engage the five human senses and offer diverse experiences for its users. Public open-space waterscapes play a crucial role in the psychological health of city residents. Given that there are currently 2.45 million teenagers in Indonesia suffering from mental disorders, according to the results of the Indonesia National Adolescent Mental Health survey, the importance of public open-space waterscapes cannot be overstated.

According to the Basic Health Research conducted by the Ministry of Health, Bali ranks fourth in Indonesia for the prevalence of severe mental health issues, following Aceh, South Sulawesi, and DI Yogyakarta (Tribunnews.com, 2018). Data from the Ministry of Health of the Republic of Indonesia (2018) show that Denpasar City (3,348 people), Badung Regency (2,346 people), and Buleleng Regency (2,276 people) have

the highest rates of depression among residents aged 15 and older in Bali, while Klungkung Regency (631 people) has the lowest prevalence. The role of waterscapes in public open spaces is crucial for improving the psychological well-being of visitors, which may contribute to reducing depression rates. However, it is unclear whether the public open space waterscapes in Denpasar City are not functioning optimally, leading to the high prevalence of depression, and whether, conversely, the waterscapes in Klungkung Regency contribute positively to visitors' mental health, thus correlating with the region's lower depression rates. There is a need to clearly formulate waterscape design criteria to serve as a reference or parameter for evaluating the elements of waterscapes in public open spaces.

The human need for relaxation, self-improvement, and enhanced quality of life, supporting both physical and mental health, necessitates the creation of healing landscapes, with water as a key component. The concept of a healing waterscape can be applied to public open spaces, where the strategic arrangement of environmental elements can improve mental health through a psychological approach (Aspirani et al., 2020). Healing waterscapes, guided by emotional, social, cognitive, and behavioral parameters, emphasize the connection between humans and nature, stimulating the senses and providing mental relaxation (Razmara et al., 2021). Implementing this concept in public open spaces can contribute to reducing the prevalence of depression in urban areas.

The lack of research that establishes comprehensive criteria design for healing waterscape, which contributes to positive psychological effects on visitors, and the absence of evidence as to whether public open space waterscapes in Bali, particularly in Denpasar City and Klungkung Regency have effectively implemented the healing waterscape concept, impacting the prevalence of depression, necessitates further investigation. Therefore, this study aims to enhance the mental well-being of visitors by formulating design criteria for healing waterscapes in public open spaces, assessing the extent to which these criteria are applied in the waterscapes of Denpasar City and Klungkung Regency, and providing recommendations on elements of waterscape design that need to be modified or incorporated to ensure the optimal adoption of the healing waterscape concept in these areas.

2. Method

This research is a descriptive study using a mixed-methods approach by applying qualitative and quantitative approaches. Quantitative data obtained from the results of the research team's assessment of the condition of the public open space waterscape in Denpasar City and Klungkung Regency was processed using JMP software so that it would produce conclusions on the design elements of the public open space waterscape that needed to be adjusted in order to better accommodate the healing waterscape concept. The research was carried out in cities or regencies with the highest and lowest prevalence rates of depression in Bali Province, namely Denpasar City and Klungkung Regency. In each city and regency, one of the most active public open spaces will be selected with a waterscape that attracts visitors. The public open space in Denpasar City that will be studied is Sewaka Dharma City Park with its waterscape, and the public open space in Klungkung Regency that will be studied is the Ida Dewa Agung Jambe Monument.

Based on data from the Ministry of Health of the Republic of Indonesia (2018), Denpasar has the highest prevalence of depression in Bali Province (3,348 people). For this reason, the city was selected as the research location. It would be interesting to investigate whether there is a correlation between the state of Denpasar's public open spaces' waterscape and the city's high prevalence of depression. The researcher wanted to compare whether the state of the waterscape of public open spaces in Klungkung has implemented the concept of healing waterscape, which has an impact on visitors' psychology and ultimately makes the number of people with depression in Klungkung Regency the lowest in Bali Province (631 people).

2.1 Research Stages

This study will generally conduct three stages of research, which include formulating the healing waterscape design criteria for public open spaces, evaluating the state of the public open space waterscape in Denpasar City and Klungkung Regency, and formulating conclusions about the design elements of the public open space waterscape that require adjustments or accommodations to better suit the healing waterscape concept.

a) Formulation of Healing Waterscape Design Criteria in Public Open Spaces
   At this stage, secondary data collection will be carried out in the form of research or studies that have been previously conducted and supporting literature related to the research title. Furthermore, the results of the

synthesis of these literature will inform the formulation of the healing waterscape design criteria. The formulation of these criteria is used as a reference in the assessment stage that will be carried out next.

b) Assessment of the Condition of the Public Open Space Waterscape
At this stage, an assessment was carried out on the condition of the waterscape of the public open space of Sewaka Dharma City Park and the Ida Dewa Agung Jambe Monument. The assessment was carried out by direct observation of the public space and interviews with visitors. The assessment team consists of five members: researchers specializing in urban design, researchers specializing in sustainable architecture, one psychiatrist, and two clinical psychologists. The Likert scale assessment was carried out by a five-person research team, with fields of urban design, sustainable architecture, and psychology (psychologists and psychiatrists). The assessment is conducted using a Likert scale with the following ratings: (1) very inappropriate, (2) inappropriate, (3) somewhat appropriate, (4) appropriate, and (5) very appropriate.

c) Making Inferences about Design Criteria That Require Modifications
At this stage, quantitative data analysis will be carried out with the help of JMP software. The results of the analysis will provide information related to the design elements of the public open space waterscape that need to be adjusted to better accommodate the healing waterscape concept. The results of the study can be used as input for relevant stakeholders to be able to make adaptations both physically and non-physically related to the design elements of the public open space waterscape that are more responsive to the psychological health needs of visitors.

2.2 Data Collection Methods

The study obtained the data through literature review, which included literature and studies related to public open space waterscapes, their relationship to psychological health, and the concept of healing waterscapes that can improve the psychological health of visitors. The synthesis of textual data will be used to formulate design criteria for healing waterscapes. Additionally, observations and interviews were conducted with visitors of public open spaces to facilitate the assessment process of public open space waterscape design elements based on the formulated healing waterscape design criteria.

2.3 Data Analysis Methods

The data analysis in this study is based on information obtained through literature reviews, observations, and interviews. Data from the literature review will be analyzed to produce text-based formulations of healing waterscape design criteria for public open spaces. Data collected through observations and interviews, in the form of assessments using a Likert scale to evaluate public open space design elements, will be analyzed using JMP software. This analysis will identify which design elements of public open space waterscapes need to be adjusted or incorporated to more effectively implement the healing waterscape concept.

3. Discussion

This section will describe the research results, including the formulation of the design criteria for healing waterscapes for public open spaces and the elements of waterscapes for public open spaces in Denpasar City and Klungkung Regency that need to be adjusted to better accommodate the healing waterscape design concept.

3.1 The Formulation of Healing Waterscape Design Criteria for Public Open Spaces

Based on the synthesis of theories and several studies related to public open space waterscapes, the relationship between public open space waterscapes and psychological health, the understanding of the concept of healing waterscapes, and various previous studies, the criteria for designing healing waterscapes in public open spaces that influence visitors' psychology include four main variables: social, behavioral, cognitive, and emotional variables. These four variables are a unity that cannot stand alone and must be met in the design of a healing waterscape in public open spaces in order to provide a positive influence on visitors' psychology. The four variables of healing waterscape design in public open spaces will be further reduced into several criteria, and each criterion will have sub-criteria. The sub-criteria obtained from the results of the synthesis of various theories and related studies will later be used as indicators for assessing the condition of the public space waterscape in Denpasar City and Klungkung Regency. Three criteria for social variables, two criteria for behavioral variables, three criteria for cognitive variables, and three criteria for emotional variables were obtained. Various criteria and sub-criteria for healing waterscape design in public open spaces can be seen in Table 1.

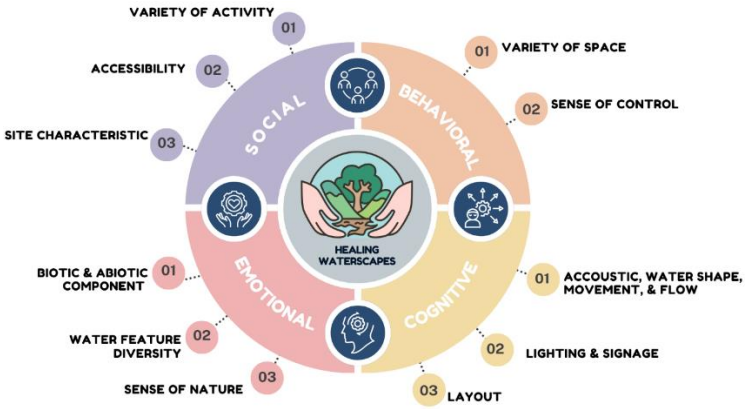

Figure1. the formulation of healing waterscape design criteria
Source: Prasandya, 2024

Table 1. Criteria dan Sub Criteria Healing Waterscape for Public Open Spaces

VARIABEL: SOCIAL			
No	Aspect	Criteria/ Indicator	Sources
1.	*Variety of Activity*	P1. Water features are entertaining, encouraging visitors to spend a lot of time around them, thus creating a lively activity.	(Duzenli, Tuğba., et.al., 2016) (Langie, K.,et.al., 2022) (Zhang, X., et.al., 2021) (Başdoğan, Gülçinay., et.al., 2014) (Krasilnikova, et.al., 2021) (Didem, Kara., Gülden, Demet Oruç, 2021) (Mina, Razmara., et.al., 2021) (Düzenlia, Tugba., et.al., 2014)
		P2. The environment and design of waterscape elements can encourage visitor activities to work in nature and experience nature (walking, exercise, relaxation, meditation, interaction)	
		P3. Water features are environmental in nature (have a dominant influence on environmental sustainability)	
		P4. There are various types of water features available, namely still water (flat, static, silent, motionless) & active water (flowing, falling, jet waters)	
2.	*Accessibility*	P5. The location is easy to reach, accessibility to the waterscape is good, so it can increase the frequency of waterscape use	(Goker, Paris., Kahveci, Hilal, 2020) (Zhang, X., et,al., 2021) (Didem, Kara., Gülden, Demet Oruç, 2021)
		P6. The design and dimensions of the path are suitable for visitors' daily use in their activities	
3.	*Site Characteristic*	P7. The site location is far from sources of noise and pollution that can be distracting, the topography does not make it difficult for users to move	(Zhang, X., et.al., 2021) (Goker, Paris., Kahveci, Hilal, 2020) (Sakici, Cigdem, 2015) (Mina, Razmara., et.al., 2021)
		P8. Offers beautiful open space views and visible from the entrance	
		P9. Offers natural site boundaries from plants/trees, reducing the feeling of confinement.	
		P10. The site has good biodiversity and contributes to psychological health.	
VARIABEL: BEHAVIORAL			
No	Aspect	Criteria/ Indicator	Sources
4.	*Variety of Space*	P11. There are active gardens (inviting visitors to participate in planting flowers/plants) and passive gardens (visitors can enjoy the garden by seeing, hearing and feeling)	(Goker, Paris., Kahveci, Hilal, 2020) (Zaki, Mahmoud Amed., et.al, 2020) (Langie, K.,et.al., 2022) (Zhang, X., et.al., 2021) (Kurkcougly, Eren., et.al, 2013) (Mina, Razmara., et.al., 2021)
		P12. There are various choices of rooms available that can be used individually or in groups and can provide visitors with a variety of experiences.	
		P13. Creating a variety of landscape elements, where visitors can see, hear, smell and touch all the elements of nature to increase positive emotions.	
		P14. Water elements can increase thermal comfort	

5.	*Sense of Control*	P15. The sound produced by the water element can act as an absorber of ambient noise.	(Goker, Paris., Kahveci, Hilal, 2020) (Krasilnikova, et.al., 2021) (Zhang, X., et.al., 2021) (Zhu, Guofeng., et.al, 2023) (Suarna, 2019) (Mahmoud, Khawola., et.al, 2022) (Kurkcougly, Eren., et.al, 2013) (Duzenli, Tuğba., et.al., 2016)
VARIABEL: COGNITIVE			
No	Aspect	Criteria/ Indicator	Sources
6.	*Accoustic, Water Shape, Movement & Flow*	P16. There are soundscapes such as the sound of trickling water from a pond, the sound of vegetation/leaves being blown by the wind, the sound of humans talking, the sound of birds/fauna.	(Goker, Paris., Kahveci, Hilal, 2020) (Krasilnikova, et.al., 2021) (Zhang, X., et.al., 2021) (Zhu, Guofeng., et.al, 2023) (Suarna, 2019) (Mahmoud, Khawola., et.al, 2022) (Kurkcougly, Eren., et.al, 2013) (Duzenli, Tuğba., et.al., 2016)
		P17. The flow rate of water is slow, a feature with a single point spill shape as a representation of a small spill volume to provide a calming, relaxing, happy impact	
		P18. The calm water surface can display its reflective features, the waves produced are smooth, the color and clarity of the water have a positive effect on visitors and create sensory perceptions for visitors.	
7.	*Lighting & Signage*	P19. The availability of attractive water lighting can provide visual and psychological comfort for visitors	(Langie, K.,et.al., 2022) (Mina, Razmara., et.al., 2021) (Goker, Paris., Kahveci, Hilal, 2020) (Zaki, Mahmoud Amed., et.al, 2020)
		P20. The use of signs, guides, proper navigation, which is consistent in style of communication components, including texture, material, color, contrast and text and placement that can be applied to achieve effective communication.	
8.	*Layout*	P21. *Path and space patterns (both design and organization) are well designed*	(Goker, Paris., Kahveci, Hilal, 2020) (Zaki, Mahmoud Amed., et.al, 2020) (Mina, Razmara., et.al., 2021) (Zhu, Guofeng., et.al, 2023)
		P22. Landscape spatial planning can make people feel relaxed	
		P23. The availability of visual elements such as trees, plants and water surfaces creates a restorative effect and influences psychophysiological recovery	

VARIABEL: EMOTIONAL			
No	Aspect	Criteria/ Indicator	Sources
9.	*Biotic & Abiotic Component*	P24. There is diversification of vegetation in terms of type (trees, herbs and shrubs), size, shape, texture, harmonious color, has a distinctive aroma, has various types and densities	(Başdoğan, et.al., 2016) (Krasilnikova, et.al., 2021) (Zaki, Mahmoud Amed., et.al, 2020) (Didem, Kara., Gülden, Demet Oruç, 2021) (Sakici, Cigdem, 2015) (Polat, Ahmet Tuğrul., et.al., 2017) (Langie, K.,et.al., 2022) (Zhang, X., et.al., 2021)
		P25. Vegetation of water elements is easy to maintain and contributes to the ecological cycle	
		P26. The composition of the waterscape is equipped with architectural elements (sculpture), plants, rocks, increasing the diversity of the display and can arouse the sense of visitors	
		P27. The availability of fauna such as fish, birds, insects and small animals in the park enhances the natural image and creates psychological comfort for visitors	
10.	*Water Feature Diversity*	P28. The availability of various water features, both in terms of speed and depth, still water and active water	(Duzenli, Tuğba., et.al., 2016) (Kurkcougly, Eren., et.al, 2013) (Mahmoud, Khawola., et.al, 2022) (Langie, K.,et.al., 2022)
		P29. The location and shape of water elements can be an attraction and the center of attention for visitors in open spaces	
		P30. Waterscape elements can create compositional uniqueness in open spaces	
11.	*Sense of Nature*	P31. The elements that form the landscape are dominated by natural materials	(Tambunan, Eva Kenny., et.al., 2021) (Krasilnikova, et.al., 2021) (Zaki, Mahmoud Amed., et.al, 2020) (Sakici, Cigdem, 2015) (Başdoğan, et.al., 2016) (Langie, K.,et.al., 2022) (Mahmoud, Khawola., et.al, 2022)
		P32. Vegetation elements (herbaceous, trees, bushes) as dominant elements that increase the attractiveness and enhance the natural impression.	
		P33. Visible amount of water/amount of water scale as part of the open space landscape elements can increase the imageability of visitors to the existence of the waterscape	
		P34. The shape of water is organic (taking natural forms) creating a relaxed impression so that it does not seem stiff or monotonous	
		P35. The artificial level of space is not dominant so it does not affect the level of space restoration	

Source: Prasandya, 2024

3.2 Waterscape Elements of Public Open Spaces in Denpasar and Klungkung that Need to be Adjusted

To find out the elements of the public open space waterscape in Denpasar and Klungkung that need to be adjusted to better accommodate the healing waterscape concept, researchers have assessed the condition of the public open space waterscape in the two places. The assessment of the elements of the public open space waterscape was carried out by a five-person assessment team including researchers (urban design), research members (sustainable design), and three mental health experts. The results of the assessment of the condition of the public open space waterscape in the two places are as follows.

Figure 2 presents the results of the assessment of dominant sub-criteria in social variables that are accommodated by both public open space waterscapes. Both waterscapes feature engaging water elements that encourage visitor interaction and promote prolonged stays. Additionally, their environmental designs foster a connection with nature, as each waterscape is easily accessible, features appropriately sized pathways, offers scenic views of open spaces, and is visible from the entrance. The waterscapes are also characterized by natural barriers created through vegetation and biodiversity, which contribute to the psychological well-being of visitors. These various sub-criteria highlight the potential of both public open space waterscapes to positively influence visitor psychology (Duzenli, Tugba, et al., 2016; Langie, K. et al., 2022; Goker, Paris & Kahveci, Hilal, 2020; Zhang, X., et al., 2021). Meanwhile, the dominant sub-criteria that were not accommodated in the two public open spaces include the limited contribution of the water features to environmental sustainability, the lack of variety in the water elements, and the inability of the waterscape locations to provide a sense of tranquility for visitors.

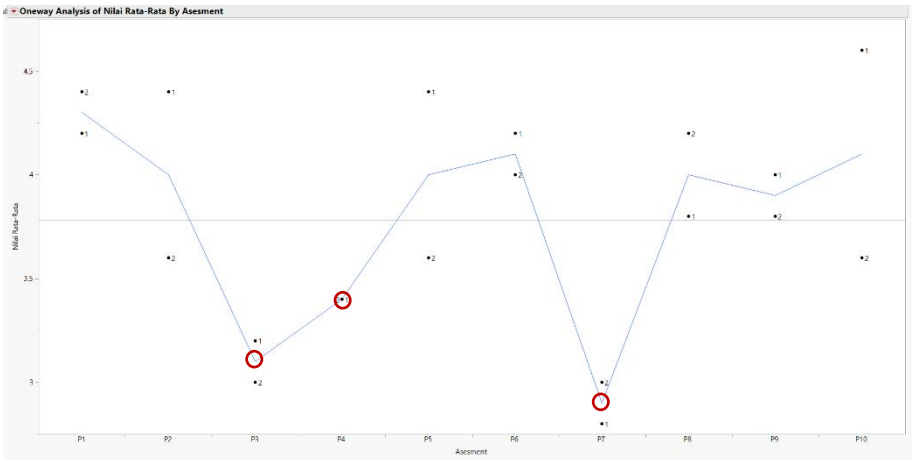

Figure 2. the results of bivariate analysis of social variable
Source: Prasandya, 2024

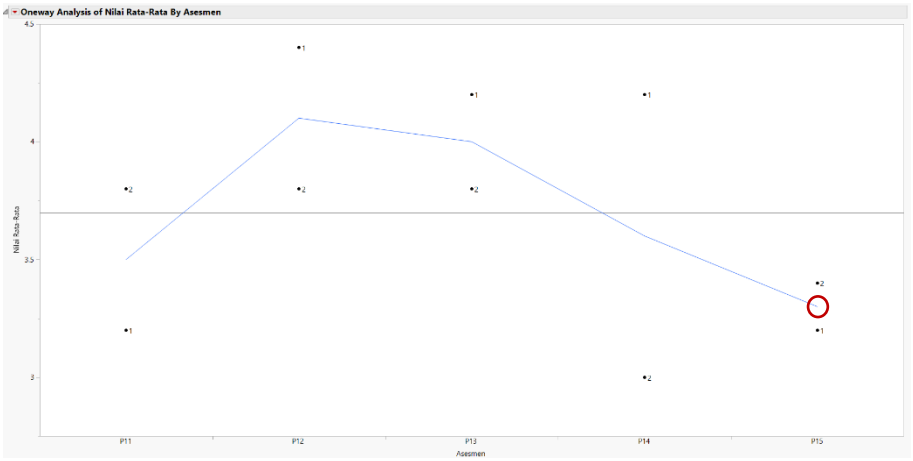

Figure 3. the results of bivariate analysis of behavioral variable
Source: Prasandya, 2024

Figure 3 presents the results of the assessment of the behavioral healing waterscape variable criteria. Both public open space waterscapes predominantly accommodate the diversity of space criteria, offering a variety of spatial options that provide different experiences for visitors and create landscapes that engage all five senses. However, a key criterion that is not met by both waterscapes is the sense of control, as the sound produced by the water features fails to serve as an effective noise buffer. This function is particularly important given the urban location of the waterscapes, where the surrounding city noise can impact the psychological comfort of visitors. The ability of the water element to act as a noise mask is therefore crucial (Krasilnikova, et al., 2021; Mahmoud, Khawola, et al., 2022; Duzenli, Tuğba, et al., 2016)..

Figure 4 presents the assessment results for the healing waterscape criteria related to cognitive variables. Both public open space waterscapes fulfill the sub-criteria for a calming, slow water flow rate. Additionally, both waterscapes feature attractive water lighting, well-organized pedestrian pathways, and spatial layouts designed to promote relaxation for visitors. However, the dominant sub-criteria that are not accommodated include the water surface lacking a calm, reflective quality and the absence of a clear signage system with attractive design. These sub-criteria are crucial for both public open space waterscapes, as they significantly contribute to positive visitor psychology by enhancing sensory perception and visual comfort (Kurkcougly, Eren, et al., 2013; Zaki, Mahmoud Amed, et al., 2020).

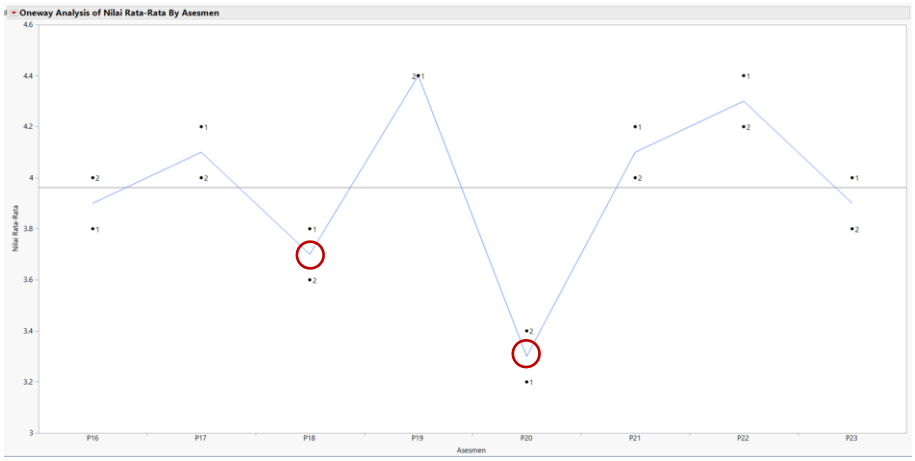

Figure 4. the results of bivariate analysis of cognitive variable
Source: Prasandya, 2024

Figure 5 presents the assessment results for the healing waterscape criteria concerning emotional variables. Both prominent public open space waterscapes meet the sub-criteria of featuring various types of fauna that enhance the area's natural aesthetic, water elements that are visually appealing and attract visitors, and unique compositions created by the integration of water features in the open spaces. The landscape is primarily composed of natural materials, and the space is largely dominated by vegetation, reinforcing the natural ambiance, with minimal presence of artificial elements. However, both waterscapes fail to meet the sub-criteria for incorporating water vegetation that contributes to the ecological cycle or integrating architectural elements into the waterscape composition. Addressing these sub-criteria would enhance the diversity of visual experiences and stimulate visitors' senses (Sakici, Cigdem, 2015; Polat, Ahmet Tuğrul, et al., 2017).

Figure 6 shows the results of the bivariate analysis of all variables (social, behavioral, cognitive, and emotional). From the social variable, it can be concluded that both public open space waterscapes that are used as study objects must pay more attention to the variety of activity criteria, especially related to the role of waterscape, which also plays an environmental role and has a dominant influence on environmental sustainability, and accommodate more varied water features, both still water (flat, static, silent, motionless) and active water (flowing, falling, jet waters). In terms of accessibility criteria, both public open space waterscapes that were used as study objects have well accommodated the design and d

imensions of paths that are suitable for visitors' daily use in their activities (walking, resting, and interaction). In terms of site characteristic criteria, both waterscapes have predominantly accommodated all existing sub-criteria, but there is one sub-criteria that has not been accommodated by both waterscapes, namely a calm and pollution-free environment, considering that both waterscapes are located in the city center with dense traffic conditions throughout the day. This needs to be solved properly through design so that vehicle noise and air pollution do not disturb the comfort and tranquility of visitors when doing activities in both waterscapes.

Regarding the variety of space criteria, both types of waterscapes have generally been successful in meeting all sub-criteria. However, one sub-criterion needs to be considered in the design, namely presenting an active garden (inviting visitors to participate in planting flowers or plants) and a passive garden (visitors can enjoy the garden by seeing, hearing, and sensation) in the area so that visitors can feel a different sensation from the open space. In terms of the sense of control criteria, both waterscapes have not been able to present the sound of water elements that can act as a disguise for surrounding noise. In terms of the acoustic criteria—water shape, movement, and flow—in general, both waterscapes have been good at accommodating all sub-criteria,

but one sub-criteria, namely a calm water surface that can display its reflective features, has not been accommodated by both waterscapes. This must be considered by relevant stakeholders in order to be able to present water elements that can provide a positive effect for visitors and create sensory perceptions for visitors.

In terms of lighting and signage criteria, both waterscapes that were used as study objects have not been able to accommodate the sign system in the area that was well designed. The existence of the area sign system is very minimal, so visitors often feel less informed about the area. In terms of layout criteria, both dominant waterscapes have accommodated all sub-criteria well. In terms of biotic and abiotic component criteria, both waterscapes have not been able to accommodate vegetation of water elements that are easy to maintain and contribute to the ecological cycle and the composition of the waterscape that is equipped with architectural elements (sculpture, plant, rocky) that can increase the diversity of appearance and can arouse visitors' senses. The sub-criteria of the location and shape of water elements that attract visitors and waterscape elements that can create composition uniqueness have been well accommodated by both waterscapes. In terms of the sense of nature criteria, both waterscapes have been good at accommodating landscape-forming elements dominated by natural materials, the availability of vegetation elements (herbaceous, tree, bush) as dominant elements that add to the attraction that enhances the natural impression, and the level of artificial space that is not dominant so that it does not affect the level of space restoration. The sub-criteria visible amount of water/amount of water scale as part of the open space landscape elements that can increase the imageability of visitors to the existence of the waterscape and the shape of the water is organic (taking the form of nature), creating a relaxed impression so that it does not seem stiff or monotonous needs to be improved to better accommodate the concept of healing waterscape.

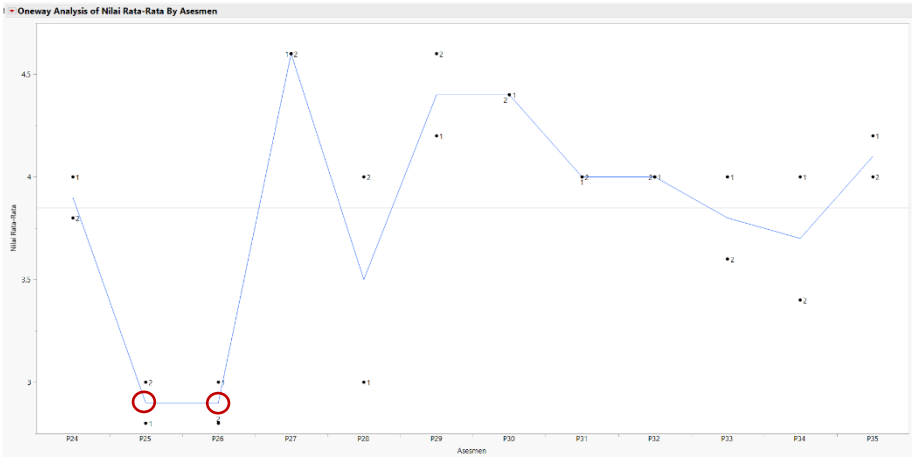

Figure 5. the results of bivariate analysis of emotional variable
Source: Prasandya, 2024

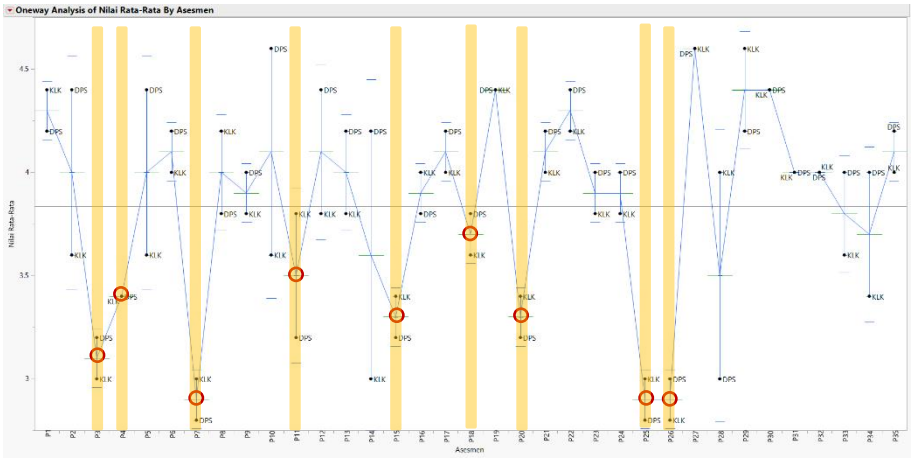

Figure 6. the results of bivariate analysis of all variables
Source: Prasandya, 2024

4. Conclussion

Based on the synthesis of various relevant literature and prior studies, four key variables have been identified as contributing to the concept of healing waterscapes: social variables (variety of activities, accessibility, site characteristics), behavioral variables (variety of spaces, sense of control), cognitive variables (acoustics, water shape, movement and flow, lighting and signage, layout), and emotional variables (biotic and abiotic components, water feature diversity, sense of nature). Each of these variables includes specific criteria or indicators that serve as references for assessing the elements of public open space waterscapes. The relationship between the elements of public open space waterscapes in Denpasar City and Klungkung Regency and the prevalence of depression has not yet been fully determined, as both locations present strengths and weaknesses when evaluated against the healing waterscape design criteria that have been successfully formulated. Based on the bivariate analysis, several sub-criteria must be addressed to optimize the implementation of the healing waterscape concept in both public open spaces. These include enhancing contributions to environmental sustainability, incorporating more diverse water features, creating calm and pollution-free open spaces through improved design, offering a balance between active and passive park areas, presenting calm water surfaces with reflective qualities, integrating well-designed signage systems, and accommodating low-maintenance vegetation around water elements that contribute to the ecological cycle.

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References

Aspirani, M., Hadiansyah, N., & Haristianti, V. (2020). Peran Healing Environment dalam Mencapai Kenyamanan Ruang Rawat Inap Ibu di RSIA. *Waca Cipta Ruang: Jurnal Ilmiah Desain Interior*, *6*(2), 61-70. DOI: 10.34010/wcr.v6i2

Astell-Burt, T., Hartig, T., Eckermann, S., et al. (2021). More green, less lonely? A longitudinal cohort study. *International journal of epidemiology, 51(1), 99-110.*

Azhari, A. A. G., Sjamsu, A. S., & Bahri, A. (2022). Penerapan *Waterscape* pada Perencanaan Pusat Olahraga Air di Kendari. Jurnal Garis Arsitektur Universitas Halu Oleo Vol 7 (1). Hal 242-252. ISSN: 2503-3344

Carmona, M.. (2003). *Public Space Urban Space: The Dimension of Urban Design.* London: Architectural Press

Duzenli, T., & Özkan, D. G. (2016). *Environmental Sustainability and Landscape Management. Sofia:* ST. Kliment Ohridski University Press

Erken, E. (2021). Design Guidelines for Therapeutic Gardens. Proceeding of International Exchange and Innovation Conference on Engineering & Sciences (IEICES) 7

Grahn, P., & Stigsdotter, U.A. (2003) Landscape Planning and Stress. Urban Forestry & Urban Greening, 2(1), 1-8. https://doi.org/10.1078/1618-8667-00019

Krasilnikova, E., et all. (2021). Creating Healing and Therapeutic Landscapes: Design Experience, *RUDN Journal of Agronomy and Animal Industries.* 16(3): 238-254. doi: 10.22363/2312-797X-2021-16-3-238-254

Kürkçüoğlu, E., & Akin, O. (2013). The effects of water elements in urban space perception: A case study in Üsküdar Municipality Square. *Journal A|Z ITU Journal of Faculty of Architecture* . Vol 10 (1). P 159-175

Langie, K., et.al. (2022). Principles of Designing Water Elements in Urban Public Spaces. *Journal Sustainability* Vol. 14. https:// doi.org/10.3390/su14116877

Mahmoud, K. F., et.al. (2022). Water as an Element of Architectural Space Design Study the Psychological Impact of Water on the Occupants of the Space. In Amer, Murad (Ed). Advances in Architecture, Engineering and Technology. Kairo: Sringler. DOI: 10.1007/978-3-030-86913-7_8

Malekinezhad, F., et.al. (2020). Investigating the Mental Health Impacts of University Campus Green Space Through Perceived Sensory Dimensions and the Mediation Effects of Perceived Restorativeness on Restoration Experience. *Journal Public Health* Vol 8:578241. doi: 10.3389/fpubh.2020.578241

Nielsen, T. S., & Hansen, K. B. (2007). Do green areas affect health? Results from a danish survey on the use of green areas and health indicators, Health & Place, 13(4), 839–850

Razmara, M., Asadpour., &Taghipour. (2021). Healing landscape: How healing parameters in different special organization could affect user's mental health?. A/Z ITU journal of Faculty of Architecture. Vol 18 (2). 269-283. DOI: 10.5505/itujfa.2021.32549

Sakici, C. (2015). Assessing Landscape Perceptions of Urban Waterscapes. *Journal Anthropologist,* 21(1): 182-196.

Wilson, N., Ross, M., Lafferty, K., & Jones, R. (2009). A review of ecotherapy as an adjunct form of treatment for those who use mental health services. Journal of Public Mental Health, 7(3), 23–35.

Zhang, X., Zhang., Y., Zhai, J., Wu, Y., & Mao, A. (2021). Waterscapes for Promoting Mental Health in the General Population. *International Journal of Environmental Research and Public Health* Vol 18. https://doi.org/10.3390/ijerph182211792

Zhu, G., et.al. (2023). Restorative effect of audio and visual elements in urban waterfront spaces. Journal Psychology Vol. 14:1113134. doi: 10.3389/fpsyg.2023.1113134