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The benefits of stress relieving treatment in a Healing Forest Program: A pilot project at Ranca Upas, Ciwidey, West Java

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Abstract. Due to the COVID-19 pandemic, the new normal has prioritized health and well-being among others through nature-based healing as offered by Perum Perhutani, a state-owned enterprise that manages forests in Java and Madura. Healing Forest or forest therapy is an activity to relieve stress, both physically and mentally, combining nature-based healing media and stress relieving activities. Due to the importance, one of the destinations managed by Perum Perhutani, namely Ranca Upas, was chosen as the pilot project of the Healing Forest Program. This study was aimed at determining healing treatments for relieving stress by utilizing the nature-based healing media through natural forest characteristic indicators. Data collection techniques were carried out through Focus Group Discussion (FGD) with a psychiatrist as determinants of treatments and also through modeling and direct simulations to acquire the results. The program focused on two main indicators: forest characteristics and stress relieving treatments for 10 participants. The simulation results show significant improvements in participants' oxygen level absorption, blood pressure, and heart rate from pre-test until post-test. There were three base treatments used in the simulation. Those treatments decreased the blood pressure for the average 6.1% (there were 3 participants out of 10 experiencing a change from high-normal to normal blood pressure), decreased the heart rate per minute for the average 13.2% (with the result of post-test were good and very good heart rated) and increased the oxygen level for the average 3.1% (there were 4 participants out of 10 experiencing a change from mild hypoxemia to normal oxygen level). These findings provide healing treatments for relieving stress and anxiety by utilizing the nature-based healing media through natural forest characteristic indicators.

1. Introduction
The Covid-19 pandemic has occurred worldwide since the end of 2019, including in Indonesia. Since then, the pandemic has been affecting various business sectors, one of which is the tourism industry. Tourist arrival in Indonesia has been decreasing significantly because of closing departure on every entrance gate to Indonesia, international departure, and domestic departure (in some places). Therefore, it has been impacting the revenue as well.Indonesia Joint Forum Discussion on theindonesianinstitute.com has predicted the impact of covid-19 on the tourism industry in 2020, which included destination, arts, food, and beverage service, tourist transportation service, MICE, culinary, etc.

It shows that tourism destinations would experience the high exposure of Covid-19. For that matter, it means that tourism destinations would experience a bad moment in terms of visitor number. Despite that fact, Ranca Upas has experienced an increase in visitor visits since 2019 by 119%, which means the previous predictions have not always been correct for the natural attraction / ecotourism.

The government planned this situation in 2020 and declared that the world would experience a new phase after the Covid-19 pandemic, known as the "New Normal" stage. The new normal stage in the tourism sector has several characteristics that emphasize and prioritize health and safety. According to the discussion of The Indonesia Forum in 2019, there would be disruption in tourist behavior since the pandemic; they emphasize and prioritize safety and hygiene. Another fact has risen in this stage: the increased stress level that has been accumulating since the beginning of the covid-19 period. At the beginning of covid-19, the societies must have themselves isolated and quarantined or at the very least reduced the mobility of going out from home. People who experience isolation and quarantine experience significant changes in the level of anxiety, anger, confusion, and stress [1]). Vacation or tourism journey is needed to relieve their mind and recharge their soul. Therefore, there are two characteristics of tourism in a new normal stage in the eye of tourists; 1) prioritizes safety and hygiene and 2) relieves stress and anxiety. This pilot project focused on two main indicators, which were forest characteristics and stress relieving treatments. This program collaborates the wellness of natural forest and stress relieving treatment into a healing treatment program to improve physical and mental human health.

Healing Forest or forest therapy is an activity to relieve stress, both physically and mentally. Several types of research showed that healing forest is an activity of forest bathing. Song [2] said that forest bathing is an activity that allows the participant to feel and take the benefit of nature without any exertions. Qing Li [3] also stated that nature's sounds, smells, and sights are the important factors in fighting diseases of the body and mind even without walking and just staying in. However, Kim [4] stated that a forest healing program composed of activities could enhance immunity and restore physical and mental health. Based on those statements, this pilot project was conducted with the main objective to determine healing treatments for relieving stress by utilizing the nature-based healing media through natural forest biophysical characteristic indicators.

2. Methods
The method used for this research is simulation since it is suitable to be conducted with respect to the nature of data collection. Simulation research is a form of research that aims to find an overview through a scalable system wherein the model will be conducted manipulation or control to see its effect [5]. Data collection techniques were carried out through literature review to determine the natural forest characteristics and Focus Group Discussion (FGD) with a psychiatrist as determinants of stress relieving treatment. The simulation involved 10 participants who represented the age group above 20 years old, 30 years old, 40, and 50 years old, respectively. Those participants had filled the informed consent before the simulation. The indicators were measured by Pulse Meter and Digital Oxy Meter from pre-test until post-test to observe the level of the significant change of blood pressure, heart rate, and oxygen level's enhancements in line with the reduction of the respondents' stress level.

2.1. Determining natural forest characteristics for Healing Forest Program
It is important to determine the bio-physical characteristics of forest relieving stress program which combined into one tourism package. Ranca Upas, the location for this pilot project, has been categorized as *Hutan Lindung* (protected forest) managed by Perum Perhutani, famous for its camping area and deer breeding conservation. Ranca upas is divided into blocks based on its function as a tourism attraction. This pilot project is located on Healing Forest Block, as shown in figure 1.

Figure1. Guide map Ranca Upas.

According to figure 1, Healing Forest Program is located on number 7, known as *Leuweung Tengah* (Middle Forest). The characteristics of forest for stress relieving treatment should fulfill the potential of hydrogen (pH) conditions of 4.5 – 6.0, air temperature of 18ºC - 22ºC, air humidity of 65 – 70% [2], slope steepness flat to gentle (98.26 Ha – 28.125 Ha), noise level under 40 decibels [2], the vegetation density is 70 – 100% [2], and vegetation types are heterogeneous, diversity of fauna sounds, and hydrology.

2.2. Determining stress relieving treatment for healing forest program
Focus Group Discussion (FGD) with psychiatrists and Ranca Upas tourism coordinators was used to specify the treatments, track course, and candidates before simulation was conducted. Psychiatrists were appointed to discuss and choose the treatment to relieve stress, while Ranca Upas tourism coordinators were appointed to discuss and choose the tracking course and candidates.

After the discussion and adjusting the time of the tracking course from base to base, several types of stress relieving treatments were decided as follows; 1) Emotional Freedom Technique Therapy, 2) Art Therapy, 3) Yoga Therapy, 4) Emotional Wrapping. Each treatment positively affected stress and anxiety levels based on the psychiatrist's experience by measuring reduced blood pressure, heart rate normalization, and reduced hypoxemia degree. The research of Emotional Freedom Technique Therapy was conducted and showed that this treatment has reduced anxiety by 40%, depression by 35%, and post traumatic disorder by 32% [6] . Visnola [7] has also tested that Art Therapy reduced salivary cortisol levels by 8.79 ± 3.16 on their respondents. Finally, Yoga Therapy and Emotional Wrapping have the effectiveness to reduce systolic blood pressure for 32.48%, diastolic blood pressure for 35%, pulse pressure for 33.83%, and mean arterial pressure for 35.52% for the average session seven times [8] .

The simulation was conducted to measure the effectiveness of the Healing Forest Program for relieving stress and anxiety from 10 participants. Those measurements were conducted by determining their systolic blood pressure, heart rate, and oxygen level (SpO$_2$) from first base to another. The

classifications of each indicator were taken from literature and listed in table 1, table 2, and table 3, along with the explanation from each number's category.

Table 1. Classification of hypertension based on Office Blood Pressure (BP) Measurement [9]

Rate	Systolic (mmHg)
Normal BP	<130
High-normal BP	130 – 139
Grade 1 hypertension	140 – 159
Grade 2 hypertension	≥160

Table 2. Indicators of human heart rate [10] .

	Amount of heart rate / minute			
Age	Less	Enough	Good	Very Good
20 – 29	<60	60 – 69	70 – 85	>85
30 – 39	<64	65 – 71	72 – 87	>87
40 – 49	<66	66 – 73	72 – 89	>89
>50	<68	68 – 75	79 – 91	>91

Table 3. The degree of hypoxemia is based on the SpO2 [11].

Hypoxemia degree	SpO2 (%)
Normal	95 – 97
Normal Range	>94
Mild Hypoxemia	90 – 94
Moderate Hypoxemia	75 – 89
Severe Hypoxemia	<75

3. Results and discussion

Empirical evidence was found as one of the reasons for conducting this research. As Indonesia Joint Forum Discussion on theindonesianinstitute.com in 2020 predicted that destination would experience the high exposure of covid-19, this is not in line with the fact that Ranca Upas tourism destination actually experienced a significant increase in tourist visits.

Figure 2. Prediction of covid-19 impact on the tourism industry in Indonesia.

Figure 2 shows that the tourism destination is in the red zone, which means it would experience a high exposure of covid-19. However, we can see from table 4 the opposite fact from figure 2.

Table 4. Data on tourist visits of Ranca Upas since the Covid-19 pandemic.

Year	Domestic tourist	International tourist
2019	100.166	1.117
2020	205.583	189
Until May 2021	114.003	1

Ranca Upas has experienced an increase in visitor visits since 2019 by 119%. According to that fact, it means that those predictions have not been appropriate in the natural attraction/ecotourism, especially in Ranca Upas.

Simulation of Healing Forest Program at Ranca Upas was conducted from April to May 2021, involving 10 participants. The simulation ran well, that all of the participants felt better after the program activities. In total, the simulation was carried out for 3 hours. Looking back to the main focus of this research, there are two main indicators; 1) forest biophysical characteristics, 2) stress relieving treatment. The characteristics of the forest for the program were achieved. The simulation results showed significant improvements in participants' oxygen level absorption, blood pressure, and heart rate from pre-test until post-test. Three base treatments were used in the simulation; 1) Emotional Freedom Technique, 2) Art Therapy, 3) Mindfulness Yoga and Wrapping Emotion. Combination of benefits of the forest and a series of treatments under the supervision of psychiatrists and tourism coordinators were proven to have succeeded in reducing stress levels for 10 participants, as evidenced by a decrease in blood pressure by an average of 6.1%, an increase in heart rate by an average of 13.2%, and increased oxygen levels by an average of 3.1%.

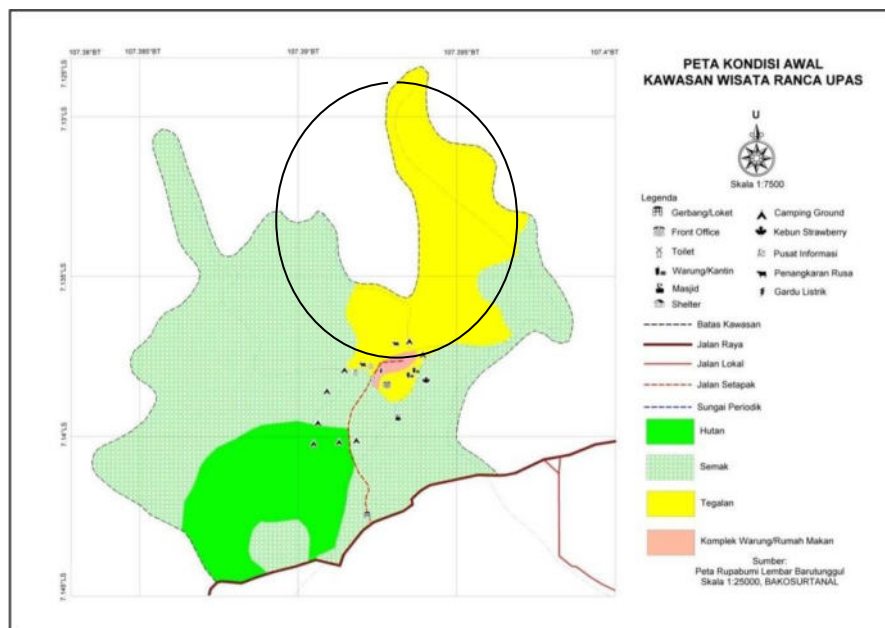*3.1. Forest biophysical characteristics for Healing Forest Program*
Ranca Upas is located in West Java, Indonesia with 46.8 km from the central city, Bandung (see figure 3). Ranca Upas is classified as *Hutan Lindung* (protected forest) with various types of flora and fauna, managed by Ecotourism Business Unit, Perum Perhutani of West Java, famous for its camping ground and deer breeding area. *Leuweung Tengah*, now called Healing Forest Block in Ranca Upas Ecotourism

Attraction, was chosen to be the pilot project of Healing Forest. The location is quite far from the main attraction in Ranca Upas and people also rarely knew this potential location.
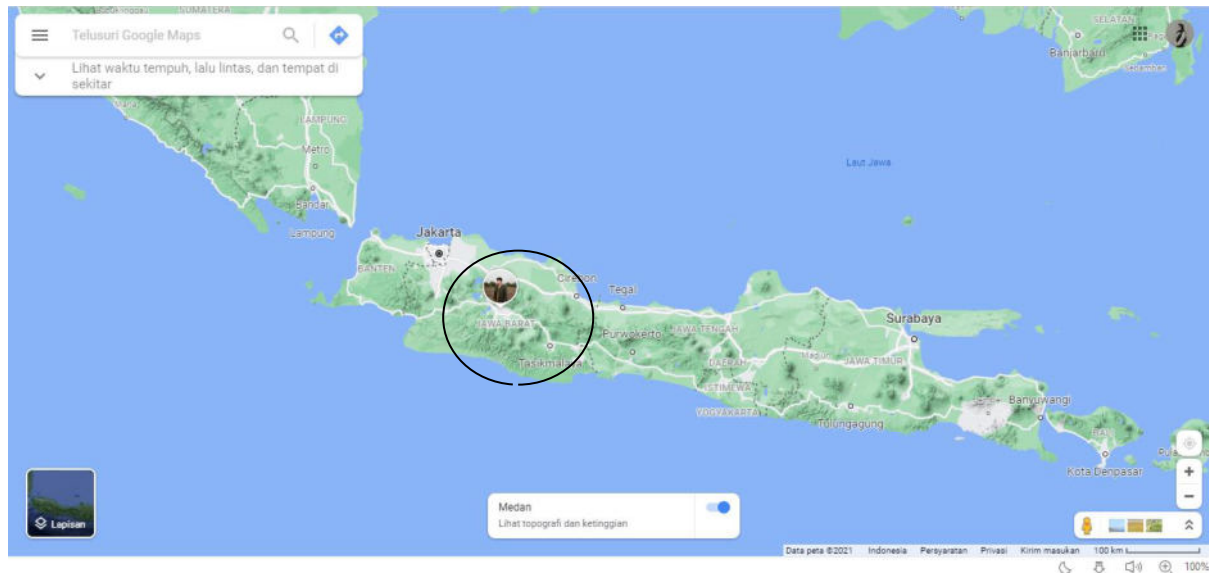
Figure 3. Location map of the study area.

Figure 4. Map of the initial condition of Ranca Upas Ecotourism Area.

Figure 5. *Leuweung Tengah*, Ranca Upas.

Several measurements were done to determine the forest biophysical characteristics for this program. The indicators are as follows; 1) soil, 2) air temperature, 3) altitude, 4) slope steepness, 5) noise level, 6) flora and fauna, 7) hydrology. Furthermore, the detailed measurements will be shown in the next section.

3.1.1. Soil. Type of soil in Ranca Upas are alluvial and andosol. Alluvial soil is soil derived from silt that is carried through rivers. This soil is fertile and appropriate for agricultural materials, especially for food ingredients. Alluvial sedimentary material is a very potential soil-forming material for the material is the result of deposition, is generally located in a flat area and close to water sources [12]. Andosol is the type of new or young soil, is black or dark brown, crumbly, and has high organic matter content. This soil is also fertile and appropriate for dryland agriculture and mixed gardens.

Figure 6. Soil condition of *Leuweung Tengah*, Ranca Upas.

3.1.2. Air temperature. The suitable air temperature for relieving treatment is inside a microclimate condition with a temperature of 18^0c - 22^0c.
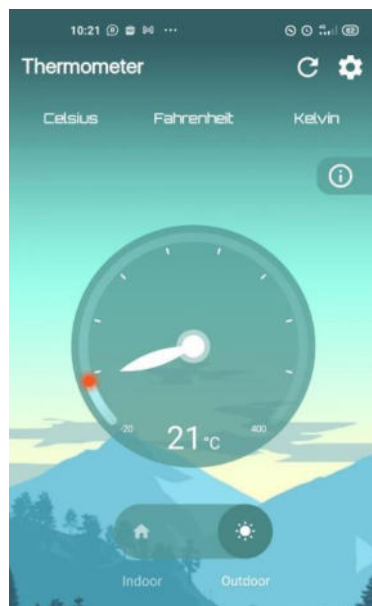
Figure 7. Result of air temperature. The measurement of air temperature took from the simulation at 10.21 a.m in *Leuweung Tengah*, Ranca Upas, and the result is 21^0c. It was indicated that the pilot project's location can fulfill the qualification of air temperature for relieving treatment.

3.1.3. Altitude. Leuweung Tengah, Ranca Upas has a scenic landscape with an altitude of 1.700 masl and is classified as a mild climate zone. According to Junghun, the climate is divided into four zones: hot climate zone, moderate climate zone, mild climate zone, and cold climate zone. Mild climate zone has an altitude of 1.500 – 2.500 masl [13]. The altitude of 1.700 masl is classified into a mild climate zone.

3.1.4. Slope class. Slope steepness or gradient from flat to gentle is one of the forest characteristics that must be achieved for relieving treatment. The slope for the whole Ranca Upas area has been classified into four slope classes and shown in table 5.

Table 5. Slope gradient class of Ranca Upas area.

| Class	Class	Area (Ha)
1	Flat	98,26
2	Gentle	28,125
3	Moderate steep	10,355
4	Steep	1,627

Based on table 5, Ranca Upas has various topography, ranging from flat to steep, dominantly located on a flat slope of 98,26 Ha. The gentle slope has an area of 28,125 Ha, while the steep slope is 1,627 Ha for the slope of Pasir Cadas Panjang. The highest point is at an altitude of 1,830 masl on the slopes of Pasir Cadas Panjang, while the lowest point is at an altitude of 1,740 masl on the slopes of Pasir Punceling.
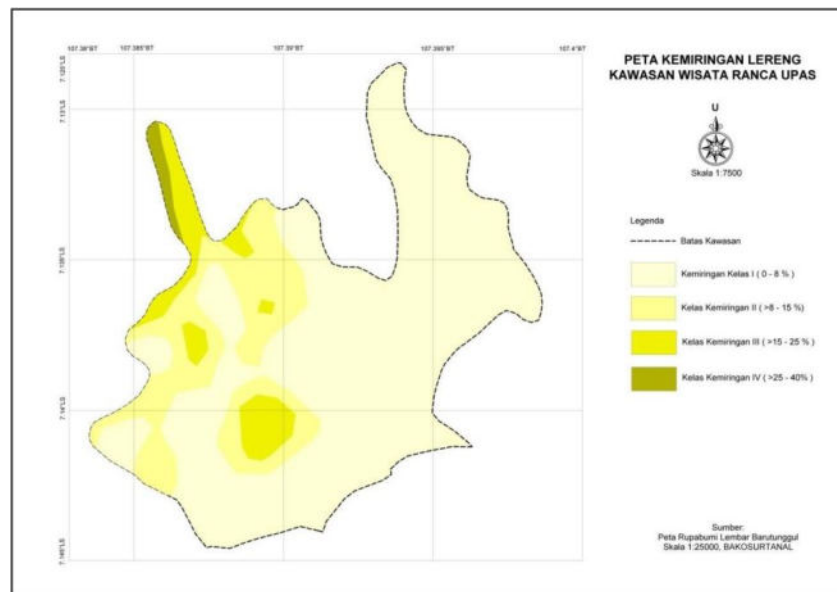
Figure 8. Slope map of Ranca Upas Ecotourism Area.

Leweung Tengah, as the area used for this pilot project, is located in Class 1. This result is located in the flat area and appropriate to be used for relieving treatment.

3.1.5. Noise level. This indicator is one of the important things considered for conducting relieving treatment. Moreover, Ranca Upas is a tourism area that has visitors each time. According to this situation, *Leweung Tengah* was chosen because it is quite far from the main area, and not everyone knows it. Several measurements of noise level were conducted in every point of Healing Forest tracking, and the result is shown in figure 9.
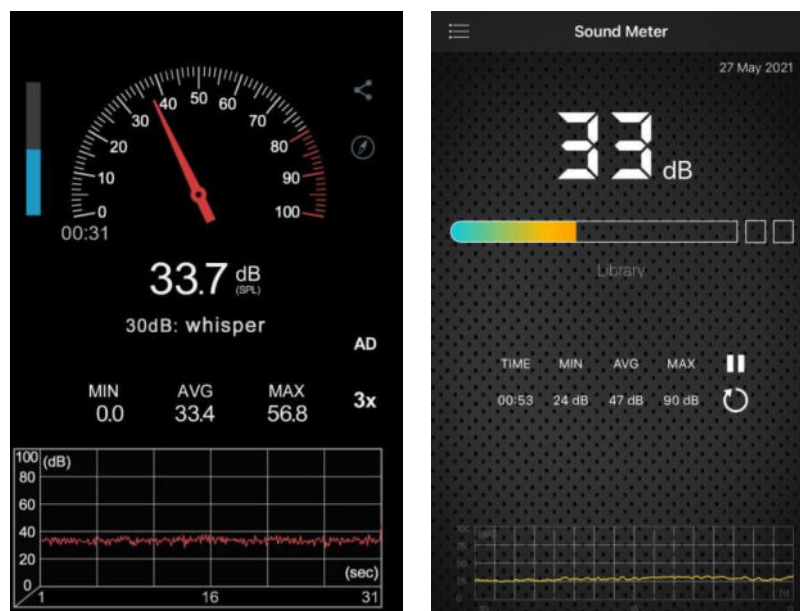
Figure 9. Measurement of the noise level.

According to the qualification of relieving treatment, the noise level is under 40 decibels (dB). As shown in figure 9, *Leuweung Tengah* has 33 – 33.7 dB, which means that the qualification is achieved.

3.1.6. Flora and fauna

3.1.6.1. Vegetation / flora. Flora in Ranca Upas Ecotourism includes the following species, namely Puspa trees *(schima walichii),* Jamuju *(Podocarpus nerrifolia)*, Huru, Kitambang, Kihujan, Hamirung, Kurai, and Pasang, while the rest are grass, ferns, and shrubs [14]

Figure 10. Vegetation of Ranca Upas.

Besides the heterogeneous flora, vegetation density is also considered to fulfill the requirements of biophysical characteristics for relieving treatment. The vegetation density's requirement reaches 70% - 100%. The measurement is shown in figure 11 when conducted the simulation.
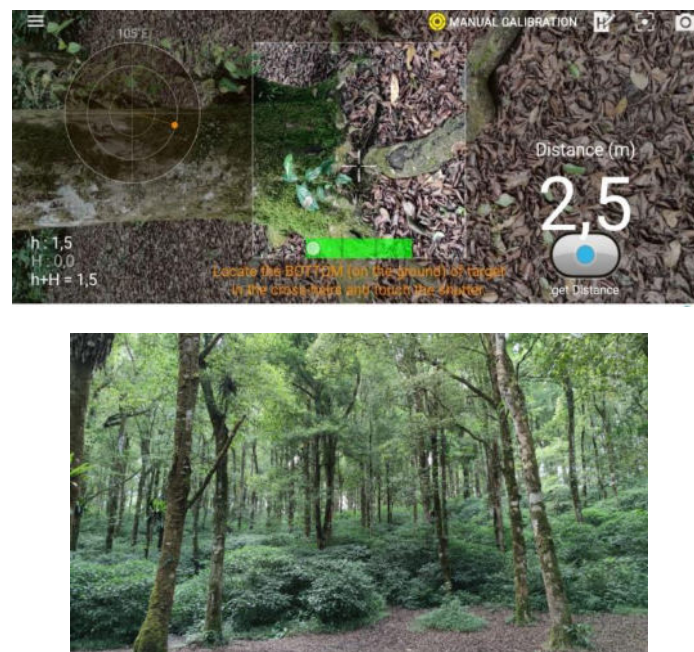
Figure 11. Vegetation density of *Leuweung Tengah.*

Figure 10 and figure 11 shows that the flora of *Leuweung Tengah*, Ranca Upas is heterogeneous, and the vegetation density has reached 70% – 100% [15].

3.1.6.2. Fauna. Ranca Upas, besides being an area of the camping ground, is also used as a deer breeding area and has a special area for deer breeding area. Other faunas in Ranca Upas are turtledoves, crows, eagles, *surili,* monkeys, and tigers.

Figure 12. Deer breeding area of Ranca Upas.

When doing the simulation, the sound of animals was heard, such as cicadas and birds. The natural sounds of animals, especially birds, have a beneficial impact on human health. The impact can directly be felt to improve mood, cognitive performance, decrease pain and decrease heart rate [16]. It means that there is a diversity of fauna sounds in *Leuweung Tengah*.

3.1.7 Hydrology. The hydrological characteristics of an area are determined by its geological and geographical conditions, and climate has an important role in determining these characteristics. The river flow that flows in Ranca Upas comes from *Ci Karancang* and distributes for camping activities such as bathing, soaking, and drinking. Ranca Upas also has natural hot springs, and some of them are used as a tourism attraction, called Onsen Ranca Upas.
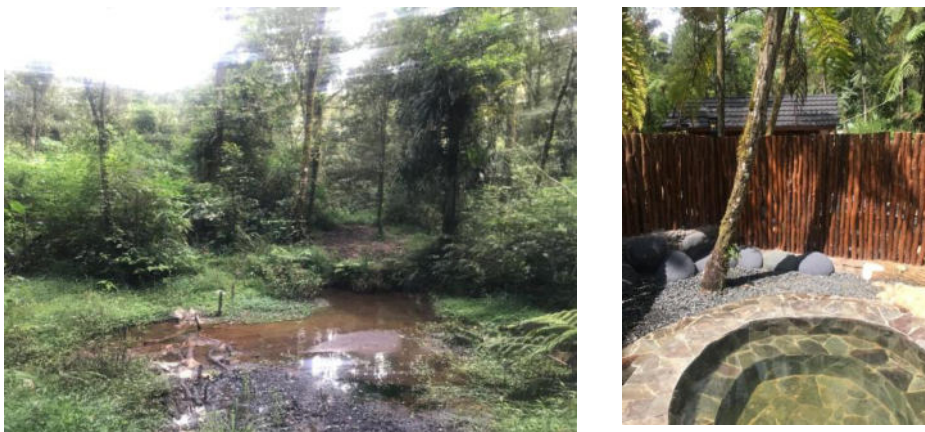
Figure 13. Water sources in Ranca Upas.

The simulation was conducted calmly with the combination of fauna sounds and river flows. The natural hot springs were included in the Healing Forest package at the end of the treatments. The summary of natural forest characteristics that have been achieved to conduct the Healing Forest Program in Ranca Upas is in table 6.

Table 6. Indicators of natural forest characteristics.

Indicators	Explanation	Classification	Achieved (A) / Not Achieved (NA)
Soil	Alluvial and andosol	Fertile soil	A
Air temperature	18^0c - 22^0c	Mild climate zone	A
Altitude	1.700 masl	Mild climate zone	A
Sloop steepness	98.26 Ha	Flat to gentle	A
Noise level	33 – 33.7 decibel	Under 40 decibel	A
Flora	Puspa, Jamuju, Huru, Kitambang, Kihujan, Hamirung, Kurai, Pasang and type of grass, fern plants and shrubs	Heterogeneous	A
Fauna	Deer breeding area, turtledoves, crows, eagles, Surili, monkeys, tiger, cicadas, birds	Heterogeneous animal sounds	A
Hydrology	Ci Karancang river flow and hot spring	River flow sound	A

3.2. Stress relieving treatment for healing forest program

This simulation took 10 participants representing the age above 20 years old, 30 years old, 40 years old, and 50 years old, respectively. The method used is qualitative research by simulation approach. Data collection techniques were carried out through Focus Group Discussion (FGD) with a psychiatrist as determinants of treatments and also through modeling and direct simulations to acquire the results. Focus Group Discussion (FGD) resulted in the required types of treatment and a pre-determined flow of activities for the simulation of the Healing Forest Program.

Figure 14. Focus Group Discussion (FGD) with psychiatrist team.

3.2.1. Types of stress relieving treatment. As explained before, the psychiatrists were invited to be a determinant of stress relieving treatment on the psychological health side. The effectiveness of distance

and time estimation among bases was also taken into consideration. Finally, it came up with the treatment results, including; 1) Emotional Freedom Technique, 2) Art Therapy, 3) Mindfulness Yoga, and 4) Wrapping Emotion. The benefits of those treatments are explained in table 7.

Table 7. Types and benefits of stress relieving treatment

Stress relieving treatment	Definition	Benefit
Emotional Freedom Technique (EFT)	Stimulating the body's meridian points by tapping the main meridian using fingers.	Relieve stress, reduce anxiety and improve the relationship between body and mind.
Art therapy	Participants are focused, calm down and feel relaxed when drawing and coloring and helps them to express and explore their potential.	Improve mental, physical, and emotional health. Furthermore, participants can develop their stress coping skills.
Mindfulness Yoga	Deep relaxation through yoga movements.	Improve the endocrine glands (hormonal) function in the body and increase blood circulation to all body cells and brain.

3.2.2 Flow of activities of HF simulation. There are three bases of the simulation, starting from medical checkup until finish base. Those activities are determined by considering the time distance and condition for each base location. A detailed explanation is in table 8. In order to give an appreciation to the participants, the certificate with the result was given to each participant.

Table 8. The base of HF simulation

Base	Program	Activity
First base	Medical check up	Collecting participant's identity data by form, checking body temperature, checking blood pressure, heart rate, and oxygen level, and taking a short interview to find out the real condition of participants.
	Caraka Alam *(forest bathing)*	Hike through the tracking course by maximizing the power of the five senses. Participants are not allowed to talk to each other and walk in the distance with other participants. They also are not allowed to use a smartphone or other electronic devices while doing the simulation.
Second base	Art therapy	Participants were given picture and painting tools then they started to paint the picture using whatever color they wanted.

|		Participants are allowed to express their creativity by choosing a color.
	Caraka Alam *(forest bathing)*	Tracking down the road by maximizing the power of five senses. Participants are not allowed to talk to others and are given the distance between participants. They also are not allowed to use a smartphone or other electronic device while doing the simulation.
Third base	Yoga therapy	Mindfulness yoga guided by a yoga instructor was conducted. Each participant was given a mattress, so they could focus on their selves along with the treatment.
	Emotional wrapping	This is the additional treatment to give participants the opportunity to reflect and experience the process of their life journey through the drawing process. Finally, the participants can be more grateful for life.
	Finish	Participants are re-examined regarding their physical and psychological condition after doing those treatments and activities. They were conducting post-medical check-ups to measure their blood pressure, heart rate, and oxygen level. Participants also filled out the activity evaluation sheet.
	Relaxation	This is the reward given to participants after doing the whole activities from pre-test until post-test. The form of relaxation is by doing foot bath in hot spring of Onsen, Ranca Upas.

3.3. The combination between natural forest and stress relieving treatment on HF program
The measurement tool used to conduct the simulation is Pulse Meter and Digital Oxy Meter from pretest until post-test to observe the significantly decreased level of blood pressure, heart rate, and oxygen level's enhancements in line with the reduction of the respondents' stress level. The detailed result of measurement is shown in figure 15, figure 16, and figure 17.
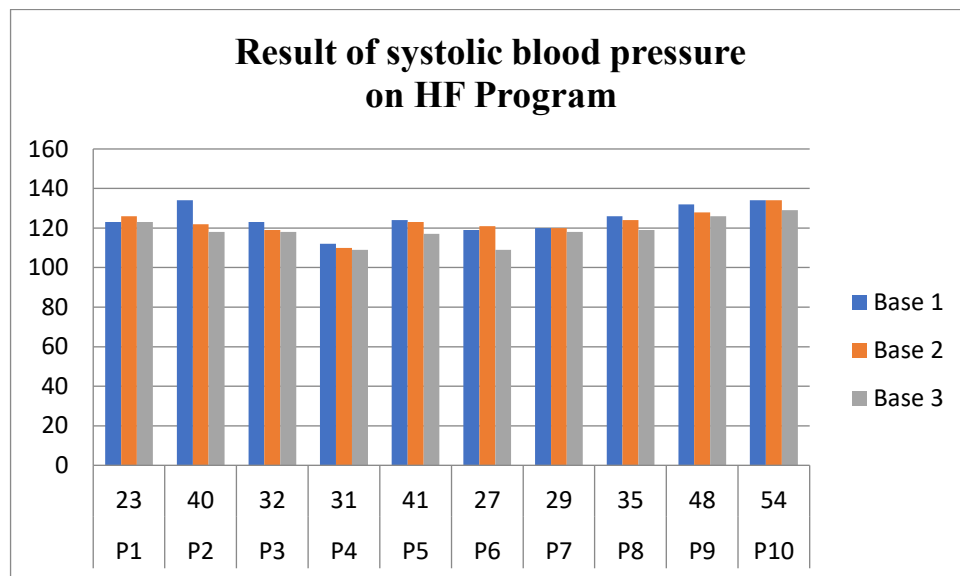
Figure 15. Changes result of systolic blood pressures on HF program.

The simulation influenced the decrease of blood pressure for an average of 6.1%. There were 3 participants out of 10 experiencing a change from high-normal to normal blood pressure.
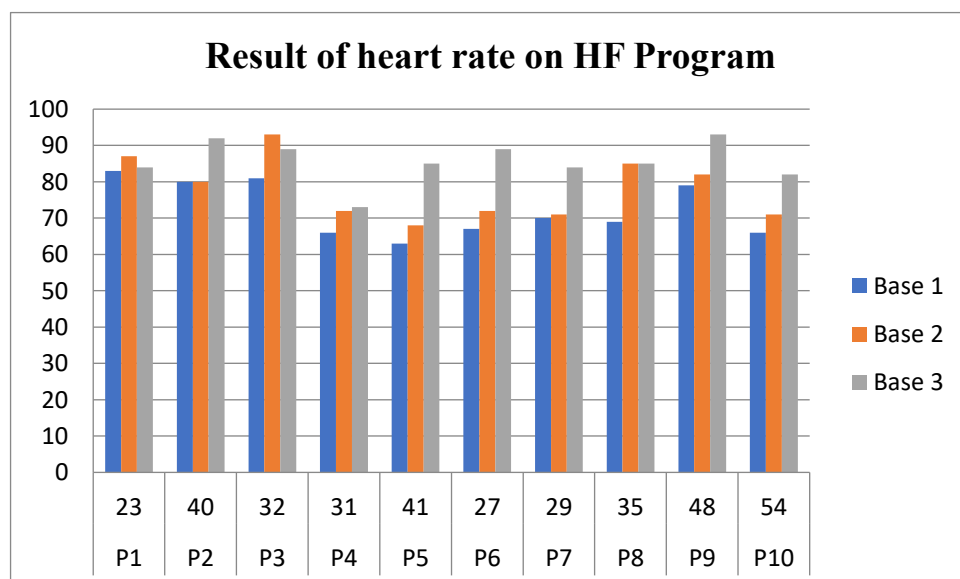
Figure 16. Changes result of heart rate on HF program.

The simulation produces an increased heart rate per minute for an average of 13.2%, with the result of the posttest being good and a very good heart rate based on each participant's age. The simulation produces an increase in oxygen level for an average of 3.1%. There were 4 participants out of 10 experiencing a change from mild hypoxemia to normal oxygen level.
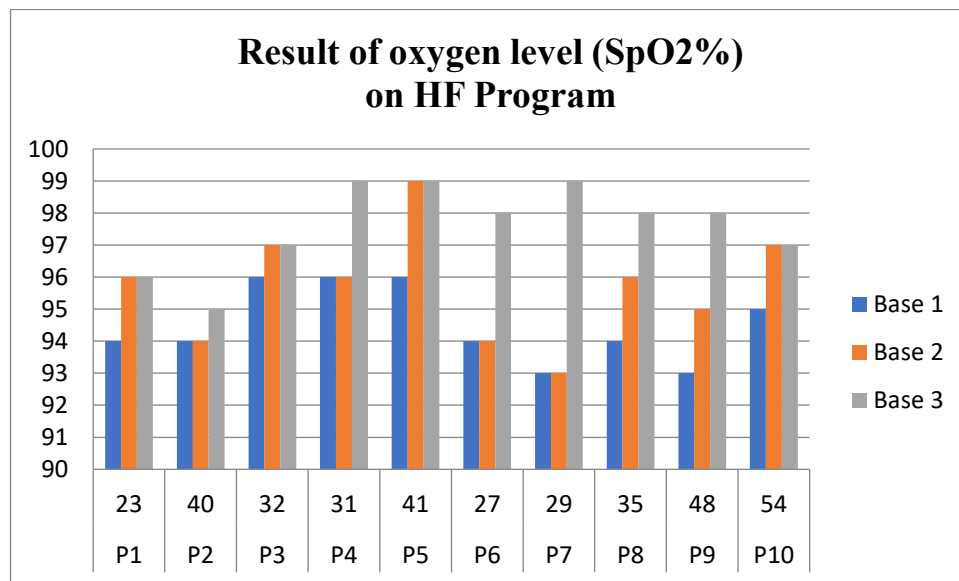
Figure 17. Changes result of oxygen level (SpO2%) on HF program.

4. Conclusions

The simulation showed that there are significant impacts of forest biophysical characteristics and stress relieving treatments on the participants. Three benefits were determined on this research; the first is environmental benefits, the second is mind and body wellness, and the third is business purpose. These findings suggested that the treatments are suitable to be applied during the recommended healing activities in the forests with their natural characteristics. The cost of the activities was also not spending a lot of money. Therefore, it can be applied in other nature tourism destinations as a promising tour package and also considering and introducing the forest therapist profession in Indonesia. Furthermore, the participants may perform a preventive measure to understand their stress condition, manage their anxiety, know their self-potential, and improve their quality of life.

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