



# **Case Study of Sup-Chiyu(Forest Therapy) Activities for Urban People in Korea**

**Prof. Dr<sup>2</sup>. Bum-Jin Park**

Department of Environment and Forest Resources, Chungnam National University, Daejeon, South Korea

[bjpark@cnu.ac.kr](mailto:bjpark@cnu.ac.kr)/[bumjinpark.cnu@gmail.com](mailto:bumjinpark.cnu@gmail.com)

# Background and purpose

## Background

---

In the 1990s, the Republic of Korea began the distribution of forest recreation as one of the forest management methods.

In the early 2000s, forest recreation activities with the purpose of improving health was specially defined and distributed as forest healing.

Rapid urbanization is the trigger for forest healing in Korea.

Recently, artificial urban environments have become a significant source of stress for urban people.

This situation is causing health problems for urban people.

# Background and purpose

## Background

---

Megacities with high population density tend to generate more stressors because of their high population and advanced degree of urbanization.

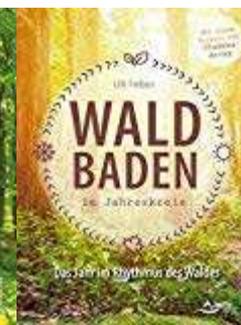
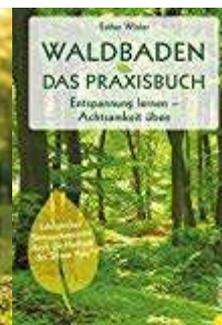
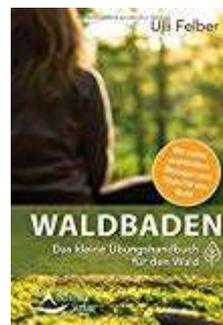
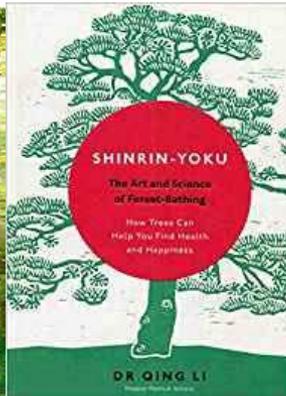
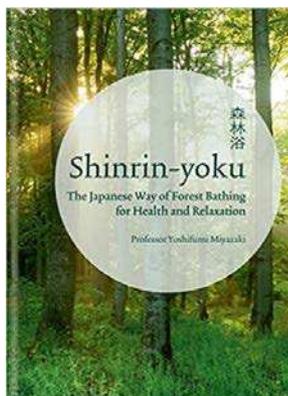
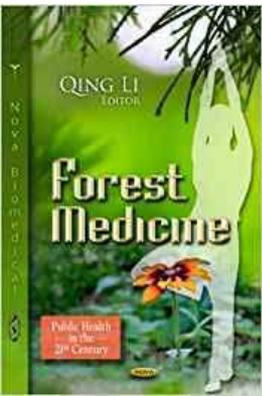
Seoul which is the capital city of Korea is a city especially vulnerable to stress due to the rapid and dynamic urban expansion process.

With this background, forest healing research began in the early 2000s in Korea.

Therefore, it is expected that Hong Kong will also need to introduce a method of actively utilizing forests for healthy cities.

# History of related terms

- Shinrin-yoku: 森林浴 (1982) by Akiyama
- Forest Environment & Human Health (2004) by EU COST
- Shinrin Therapy®: 森林セラピー® (2005) by Prof. MIYAZAKI
- Therapeutic effects of forest Interventions on human by Prof. MIYAZAKI
- Forest Healing (2005) by Korea Forest service
- Forest Therapy
- Forest Medicine (2013) by Prof. Li
- Wald Baden
- Forest Based Interventions (FoBI) (2019) by Prof. Park
- Sup-Chiyu(Forest Therapy) (2022) by Prof. Park



# My research fields

## Sup-Chiyu (Forest Environments and Human Health)

1

Physiological and psychological effect of a forest environment on human-being

2

Design of forest environments for Sup-Chiyu

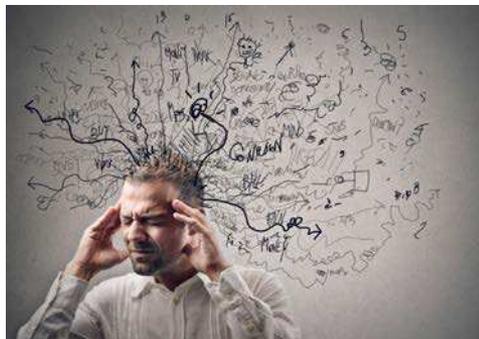
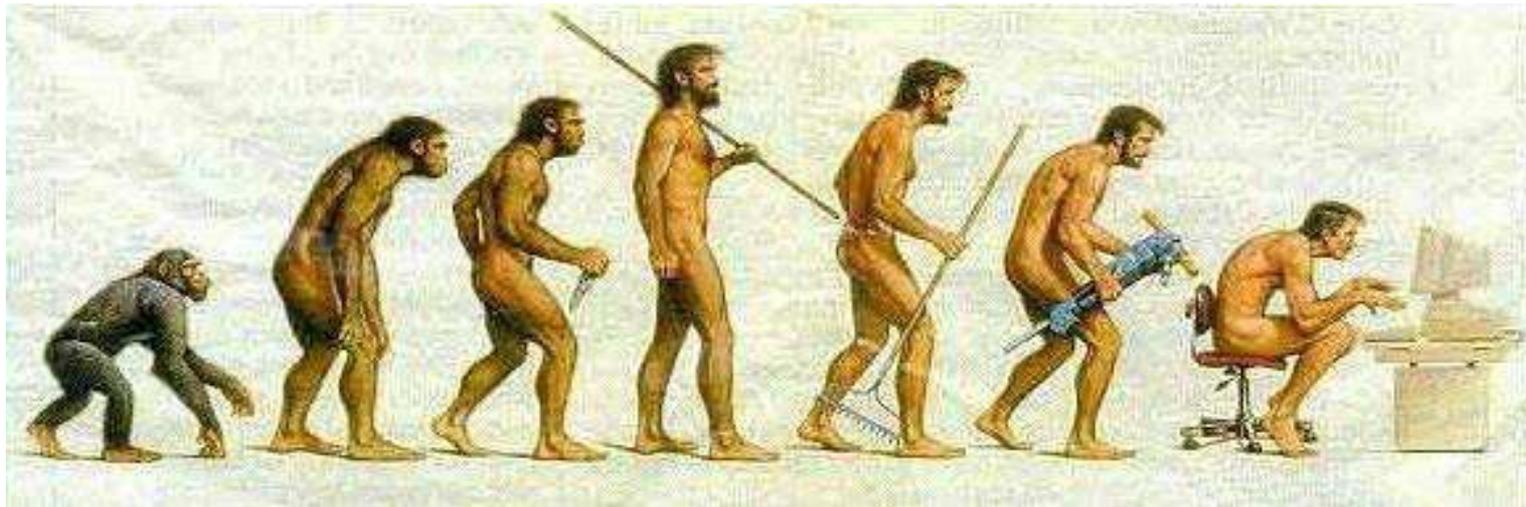
3

Planning of serious games in a forest environment

# Introduction

## Urbanization and urban people

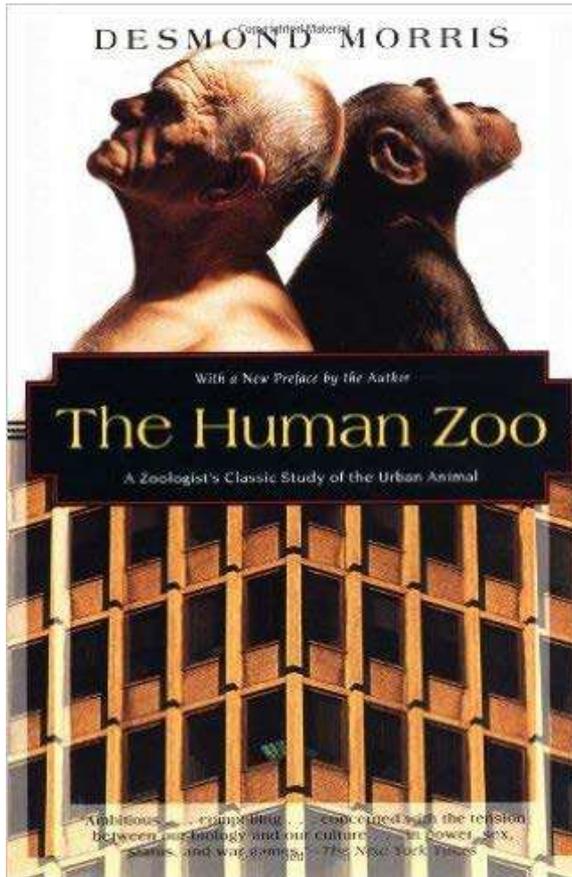
Life of urban people!



# Introduction

## Human and urban environments

### The Human Zoo: A Zoologist's Study of the Urban Animal



“Animals do not normally exhibit stress, random violence, and erratic behavior - until they are confined. Similarly, the human propensity toward antisocial and sociopathic behavior is intensified in today's cities.

Morris argues that we are biologically still tribal and ill-equipped to thrive in the impersonal urban sprawl.”

from the human zoo  
by Dr. Desmond Morrison

# Methods

## Measurements index

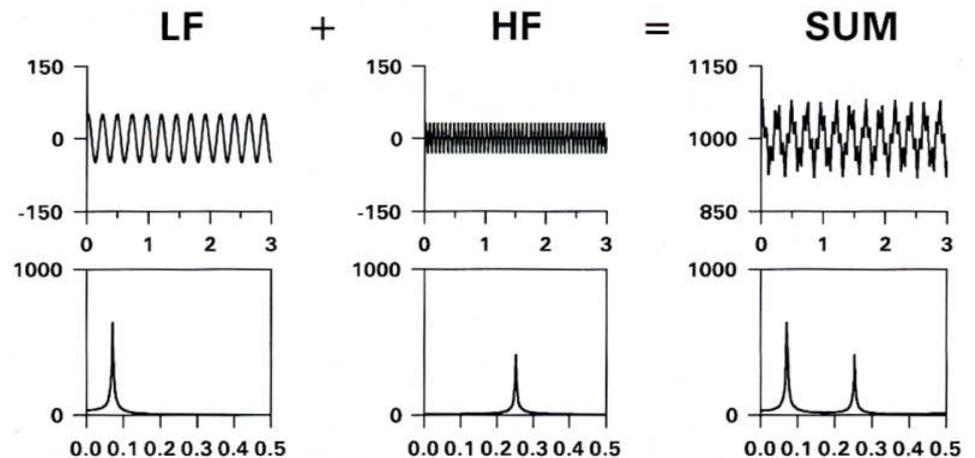
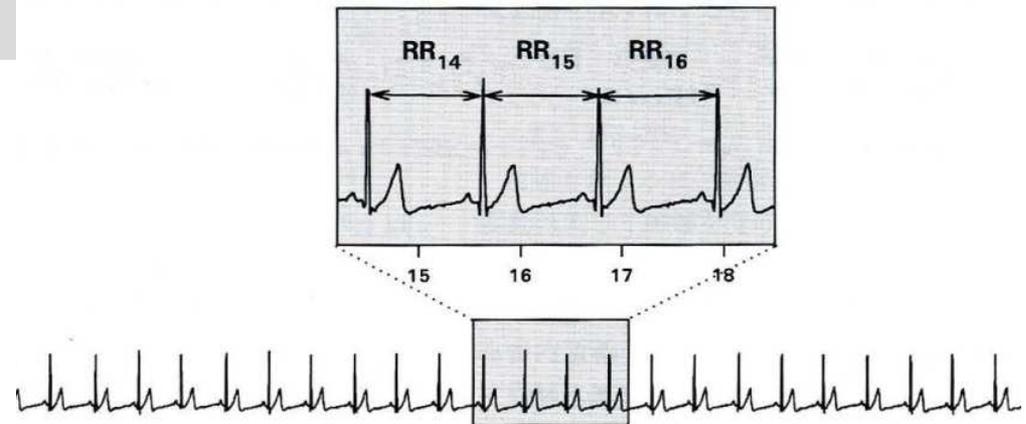
---

- ◆ Autonomic nervous activity  
HRV (Heart Rate Variability)
- ◆ Endocrine system  
Cortisol
- ◆ Self-esteem
- ◆ Thermal comfort  
Temperature Humidity, Wind speed, luminous intensity
- ◆ Phytoncide
- ◆ Fine dust(PM<sub>2.5</sub>)

# Methods

## Autonomic nervous activity

HRV : Heart Rate Variability



HF : parasympathetic nervous system

LF/HF : sympathetic nervous system

LF/(LF+HF) : sympathetic nervous system

# Methods

## Endocrine parameter

### Cortisol



# Design of forest environments for Forest Therapy

## Forest Environments(index)

Thermal comfort



(PMV, Predicted Mean Vote)

(PPD, Predicted Percentage of Dissatisfied)

# Design of forest environments for Forest Therapy

## Forest Environments(index)

Phytoncide

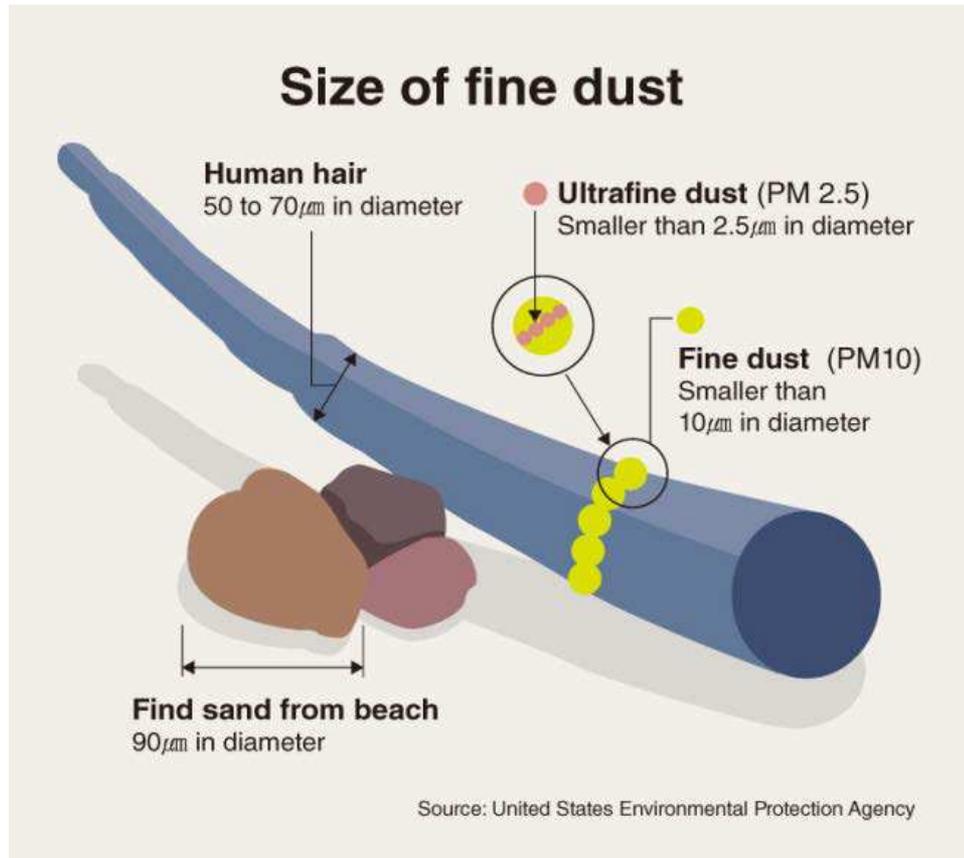


GC/MS

# Design of forest environments for Forest Therapy

## Forest Environments(index)

### Fine dust(PM<sub>2.5</sub>)



# Results

## Physiological and psychological effect of forest environment on human

1

Physiological and psychological effect of a forest environment on human-being

Design of forest environments for forest therapy

Planning of serious games in a forest environment

# Physiological and psychological effect of forest environment on human

## The Results of Field experiment

Experimental site



Site 1



Site 2



Site 3



Site 4



Site 5

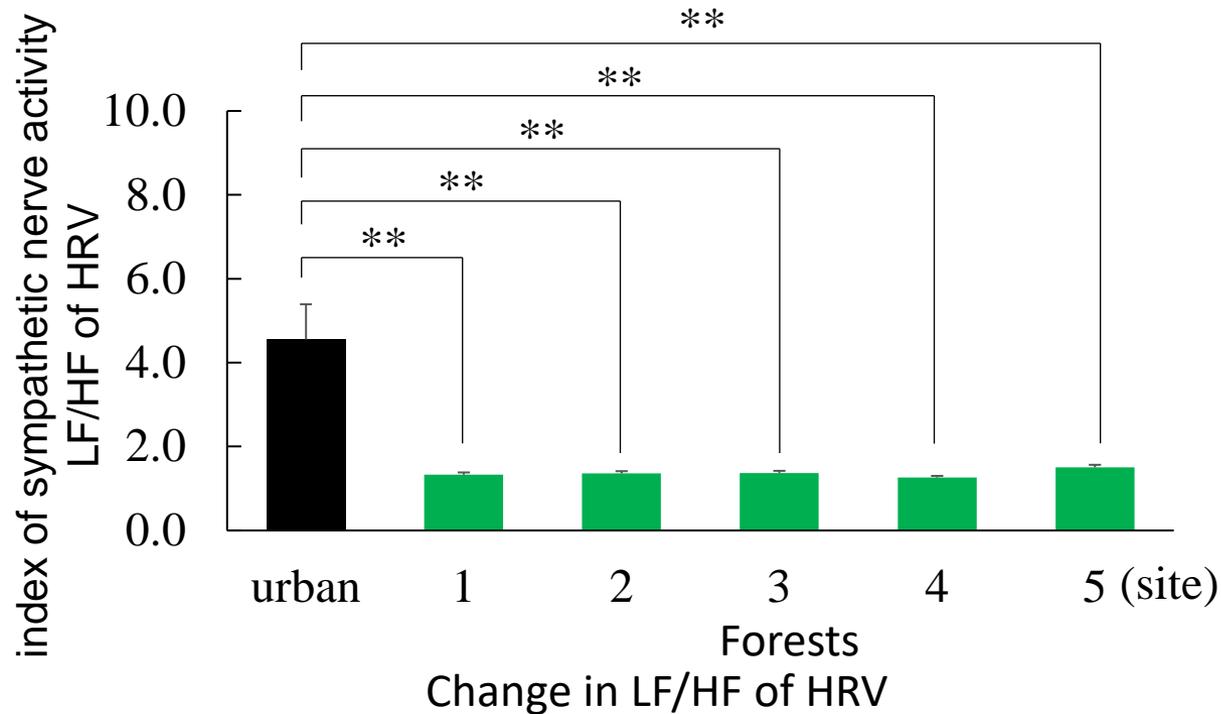


Urban

# Physiological and psychological effect of forest environment on human

## The Results of Field experiment

HRV

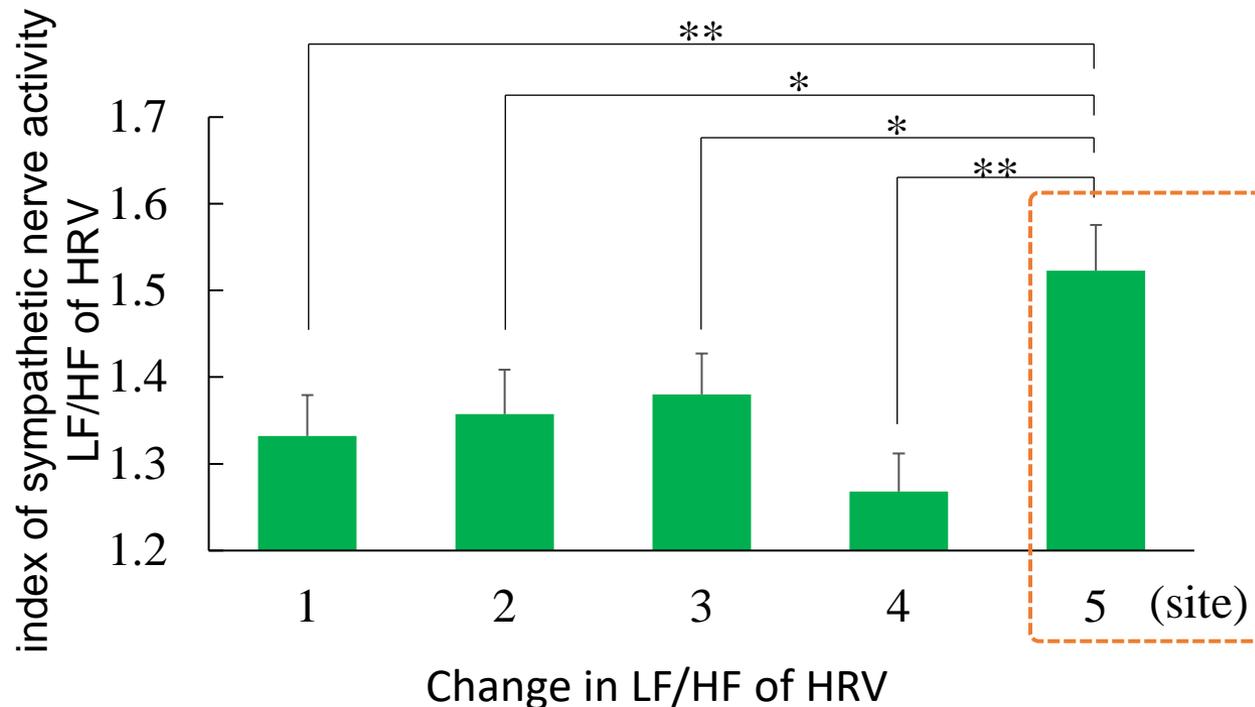


N=100, Mean  $\pm$  SE, \*\*:p<0.01 by paired t-test

# Physiological and psychological effect of forest environment on human

## The Results of Field experiment

HRV

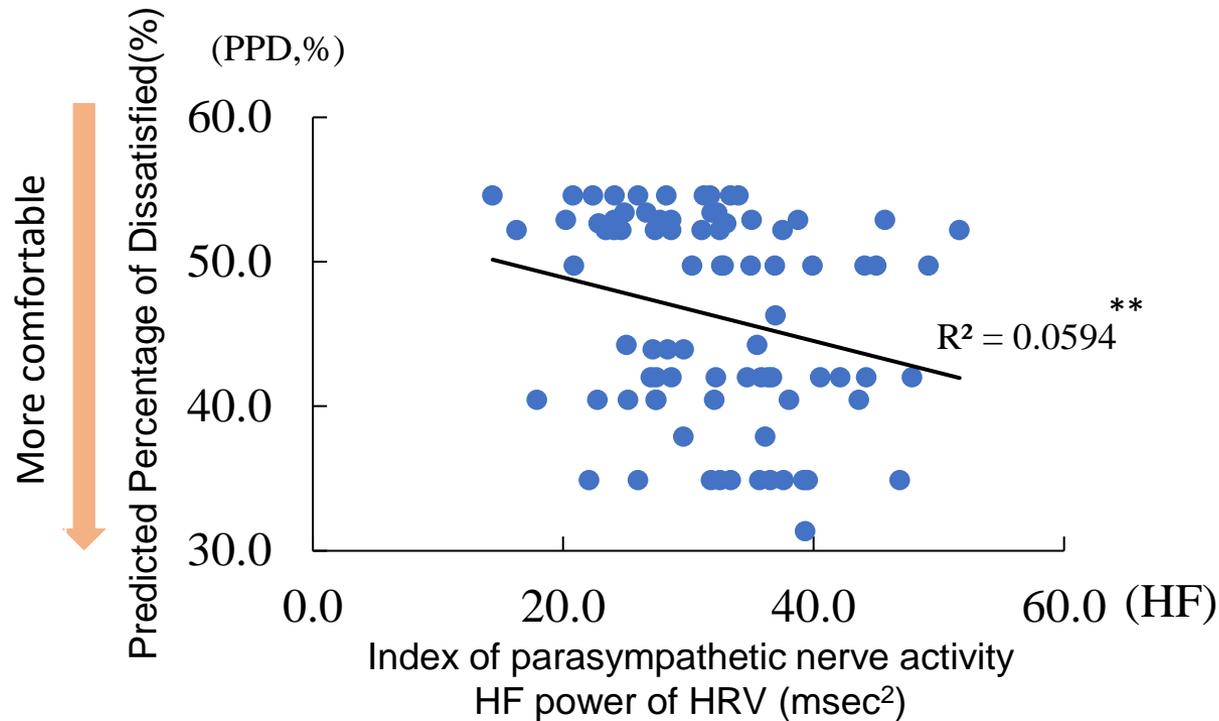


N=100, Mean  $\pm$  SE, \*\*:p<0.01 by paired t-test

# Physiological and psychological effect of forest environment on human

## The Results of Field experiment

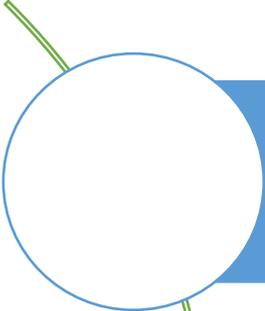
The relationship between HF and PPD



The relationship between HF and PPD at Site 5  
N = 100, \*\*:  $\alpha < 0.01$  by Pearson test

# Results

## ■ Design of forest environments for Forest Medicine

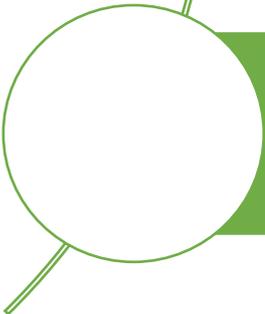


Physiological and psychological effect of a forest environment on human-being

2



Design of forest environments for Sup-Chiyu



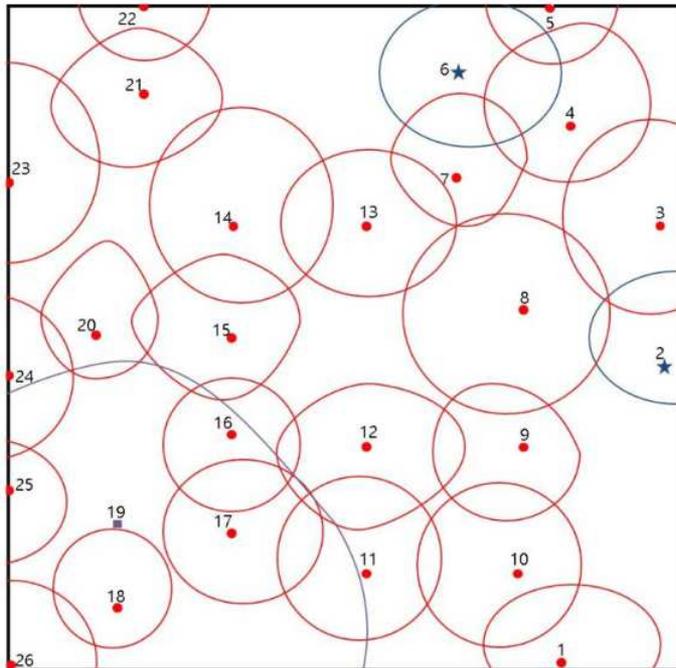
Planning of serious games in a forest environment

# Design of forest environments for Forest Therapy

## The Results of Field experiment

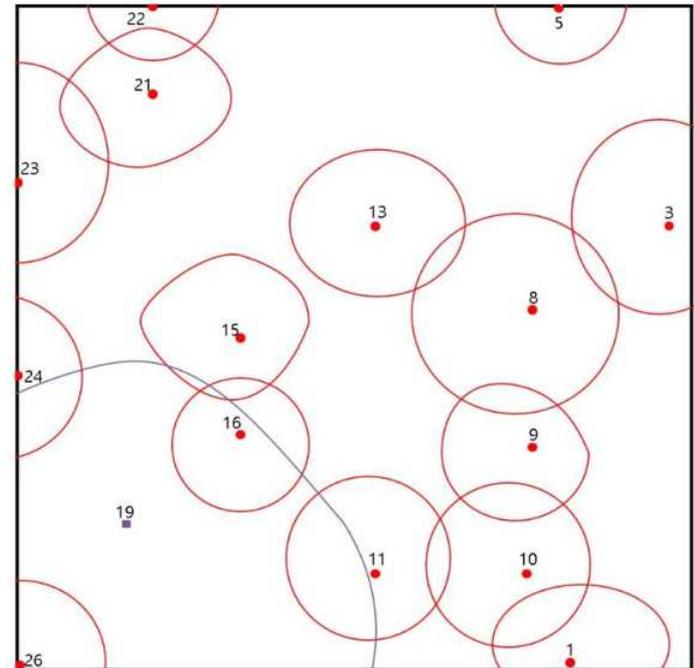
Change of Human Thermal Comfort by stand density of green space

Site A (120%)



- *Pinus koraiensis*
- ★ *Pinus densiflora*
- *Quercus acutissima Carruth.*

Site B (80% stand density)



- *Pinus koraiensis*
- *Quercus acutissima Carruth.*

Vs.

Stand Density : number of trees/10,000m<sup>2</sup>,

100% of stand density : optimum density for timber products

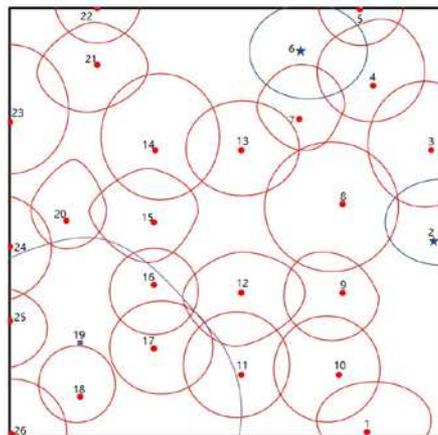
# Design of forest environments for Forest Therapy

## The Results of Field experiment

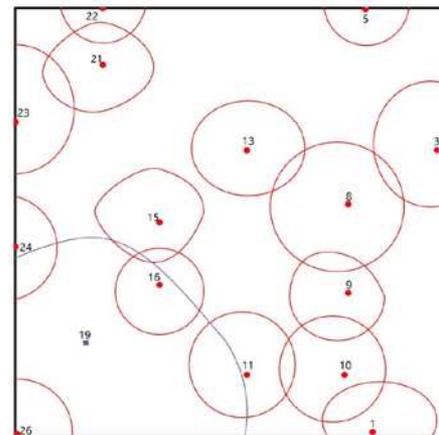
Change of Human Thermal Comfort by stand density of green space



Site A (120%)



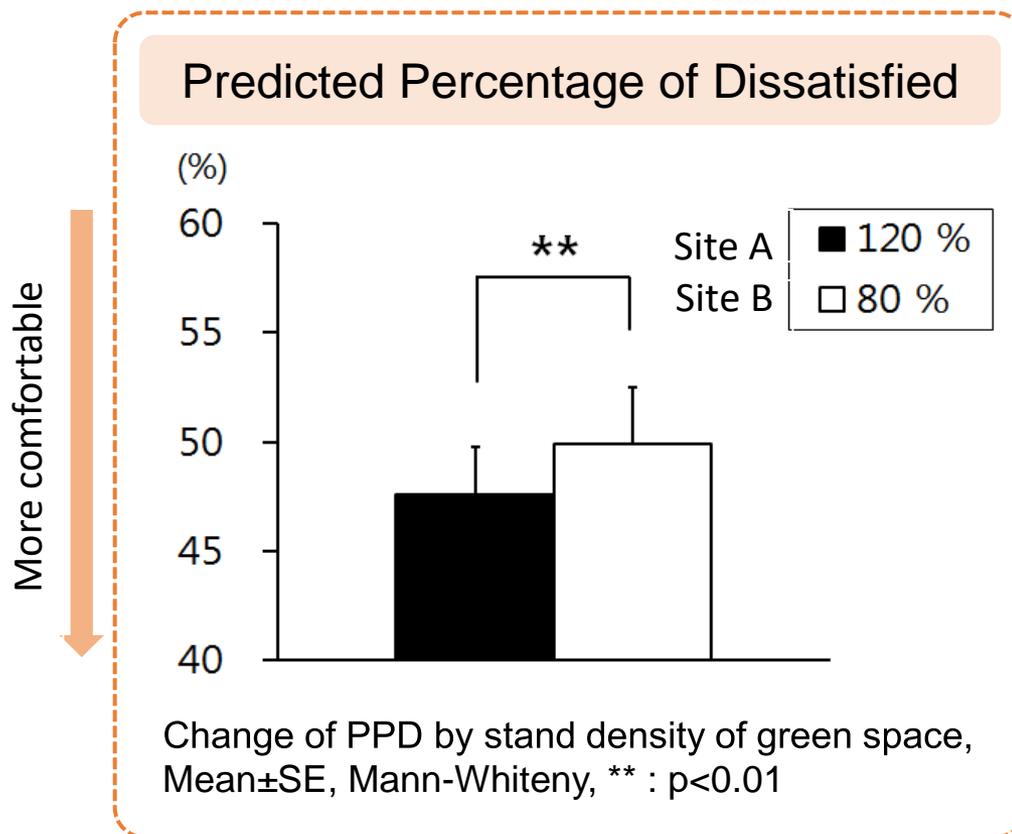
Site B (80%)



# Design of forest environments for Forest Therapy

## The Results of Field experiment

Change of Human Thermal Comfort by stand density of green space



Stand Density : number of trees/10,000m<sup>2</sup>,

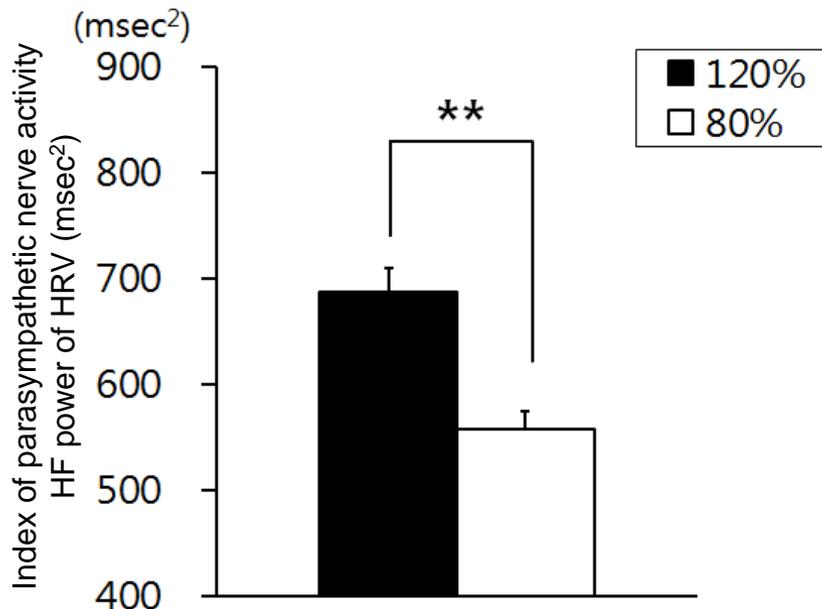
100% of stand density : optimum density for timber products

# Design of forest environments for Forest Therapy

## The Results of Field experiment

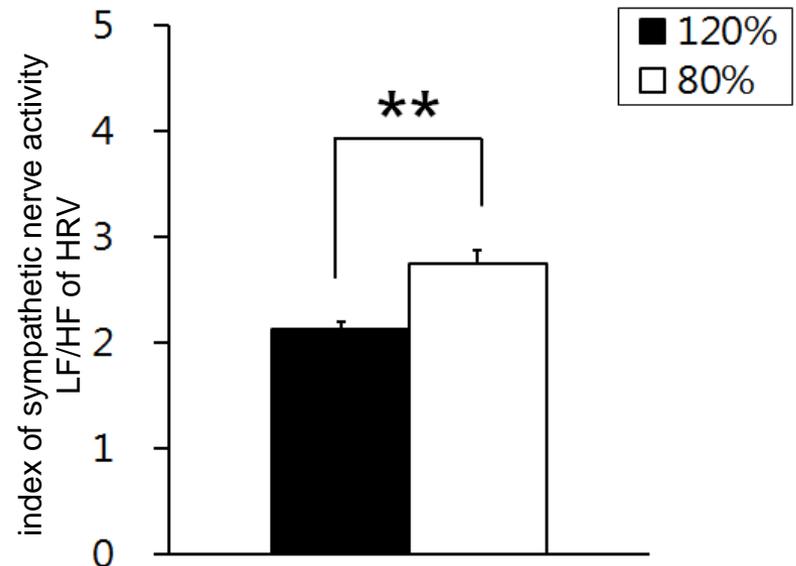
Change of Human Thermal Comfort by stand density of green space

### HF power of HRV



Change of HF by stand density of green space, Mean±SE, Mann-Whitney, \*\* : p<0.01

### LF/HF of HRV



Change of LF/HF by stand density of green space, Mean±SE, Mann-Whitney, \*\* : p<0.01

Stand Density : number of trees/10,000m<sup>2</sup>,

100% of stand density : optimum density for timber products

# Results

## Planning of serious game in forest environment



Physiological and psychological effect of a forest environment on human-being

Design of forest environments for Sup-Chiyu

3

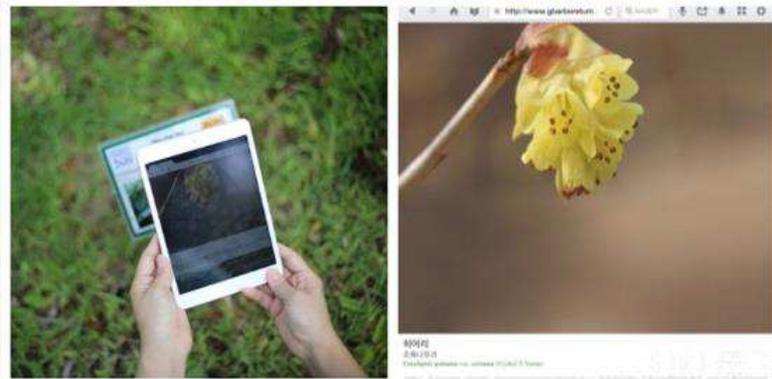
Planning of serious games in a forest environment

# Planning of serious game in forest environment

## Field experiments (using QR cord)

### serious game 1

Entertainment and Forest Education



# Planning of serious game in forest environment

## Field experiments (using offline role-playing-game)

### serious game2

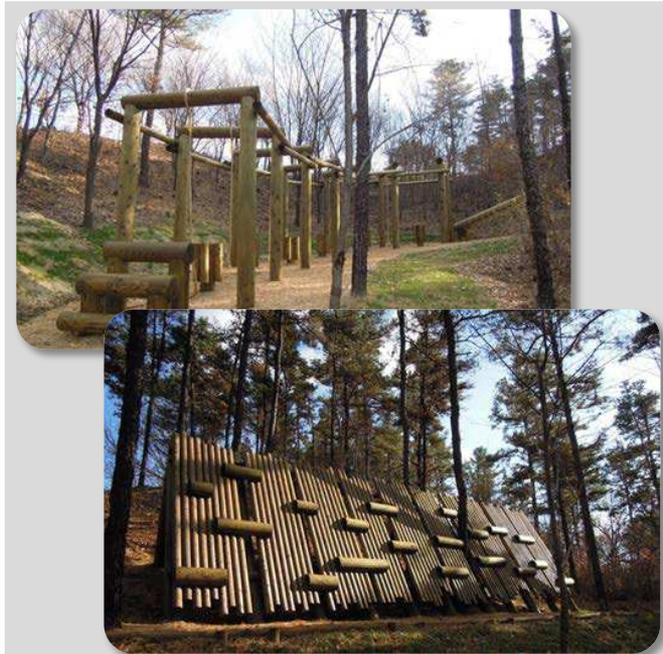


최윤희, 최윤희, 박범진. (2011) 산림환경을 활용한 기능성게임 - 게임중독 예방을 목적으로. 한국임학회 산림과학 공동학술대회. p.1234-1237. 2011.

# V. Planning of serious game in forest environment

## Field experiments

### serious game3



## 나무파도 타기

- 놀이 법 : ❶ 시작점에서 벽에 붙어 있는 디딤판을 밟고 잡으면서 이동합니다.  
❷ 디딤판을 이용하여 계속해서 옆으로 이동합니다.  
❸ 도착 지점까지 계속 이동하여 갑니다.



- 주의사항 : ❶ 앞 사람과의 안전 거리를 유지해 주세요!  
❷ 반드시 한 방향(화살표 방향)으로 이용해 주세요!  
❸ 노약자는 반드시 보호자와 함께 이용해 주세요!  
❹ 미끄럼에 주의해 주세요!



미끄럼주의



비올때 사용금지



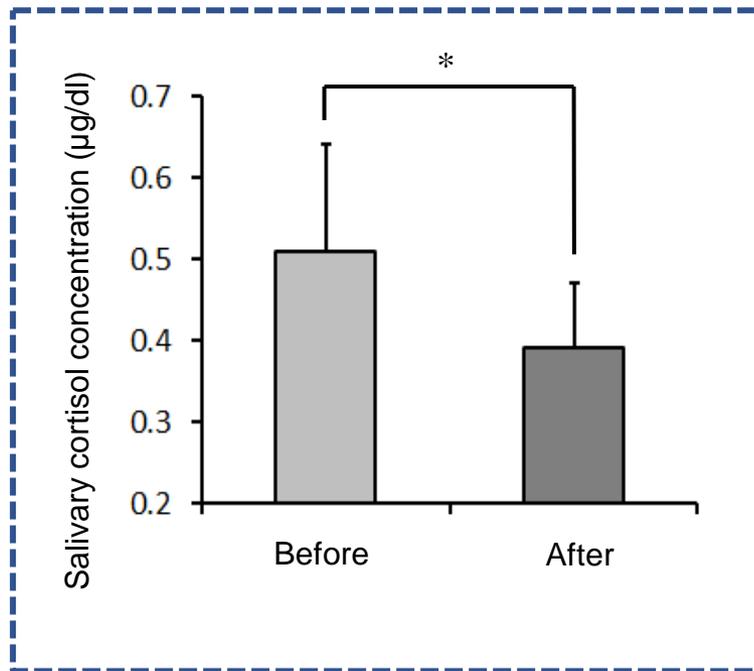
눈물때 사용금지

박범진, 최운호, 이준우. (2011) 네이처스포츠의 개념과 활용방안.  
산림과학 공동학술대회. 1242-1243.

# Planning of serious game in forest environment

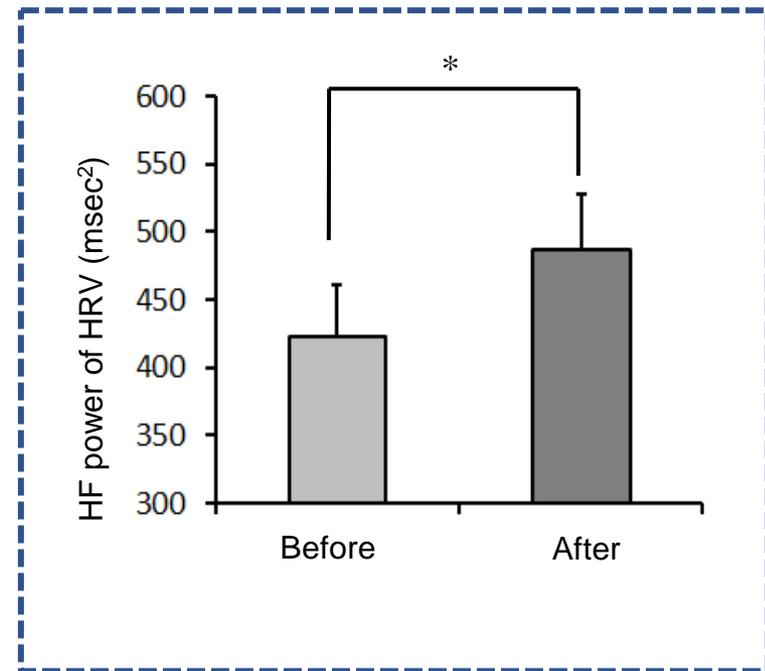
## Field experiments

### Physiological effects of serious game



Change in Salivary cortisol concentration before and after attending serious game

N: 150, Mean±SE, \*: p<0.05, p-value by t-test



Change in HF power of HRV before and after attending serious game

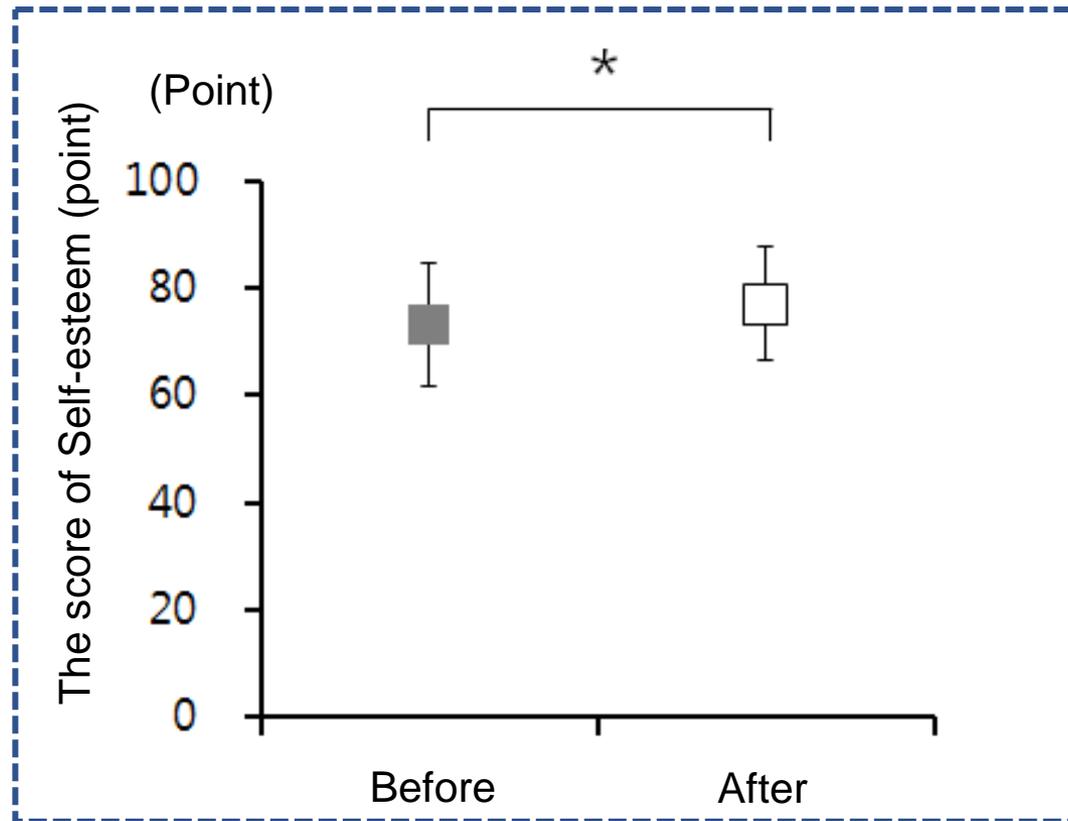
N: 150, Mean±SE, \*: p<0.05, p-value by t-test

박범진, 최윤희, 이준우. (2011) 네이처스포츠의 개념과 활용방안.  
산림과학 공동학술대회. 1242-1243.

# Planning of serious game in forest environment

## Field experiments

### Psychological effects of serious game



Change in score of self-esteem before and after attending serious game

N: 150, Mean $\pm$ SD, \*: p<0.05, p-value by t-test

# Conclusion

1. Sup-Chiyu is the best way to keep Hong Kong citizens healthy by using urban forests and urban parks.
2. In order to increase the effect of Sup-Chiyu in summer, it is effective to increase thermal comfort by managing the tree stand density.
3. Forest-based serial games can be used to promote children's outdoor activities in nature.



**Thank you for your attention!**

