

CHAPTER I INTRODUCTION

1.1. Background

Soundscape is defined as the condition of the acoustic environment, as perceived and understood by a group of people or individuals according to their context (ISO 12913-1, 2014). Contrary to the approach of noise studies, which concentrate on "unwanted sounds", the context of the soundscape in question refers to the sounds of a specific place, time, and culture that influence the perception and interpretation of sound (Fink, 2019). Research by Lionello, Aletta, and Kang (2020) demonstrate that variations in specific factors significantly alter the perception of otherwise similar soundscapes. Consequently, soundscapes offer a holistic framework for comprehending the intricate relationship between individuals, their environment, and sound within distinct contexts.

Research shows that the perception of soundscapes differs significantly between urban and rural environments, influencing quality of life and well-being (Papadakis et al., 2023; Hui Yang & Zhang, 2024). The findings indicate that individuals frequently perceive technological sounds as more chaotic, while they find natural sounds more vibrant and restorative. These differences impact daily experiences, emotional states, and stress levels, making soundscape an important factor in environmental design and public health.

Urban and rural environments present contrasting soundscapes influenced by their unique activities, physical settings, and cultural habits. In cities, soundscapes are typically dominated by human-made noises like traffic, construction work, and conversations. In contrast, rural areas are more commonly associated with natural sounds, including bird calls, running water, and the rustling of leaves (Wei Yang & Kang, 2005). These differences highlight the distinct environmental and social characteristics of each setting, emphasizing the importance of comparing them to better understand how sound interacts with place and shapes human experiences.

Park has been demonstrated to have a restorative effect on the mental well-being of residents, thereby reducing stress and fatigue associated with urban living (Mohamad, 2021). Urban parks function as pivotal locations where individuals can encounter restorative soundscapes within urban environments. The presence of natural sounds in parks has been demonstrated to be closely associated with positive perceptions, emotional benefits, and increased preference for these spaces. Urban parks function as acoustic refuges, providing respite from the cacophony of city life and fostering mental well-being through exposure to restorative soundscapes (Guo, Wang, Zhang, & Jiang, 2022).

Human perception of soundscapes is a multifaceted process that entails psychological elements, including experience and expectations. These elements subsequently influence an individual's behavior in relation to a particular soundscape and its associated location (Bruce & Davies, 2014; Ma, Mak, & Wong, 2021). Another study by Guo et al. (2022) has explained how exposure to natural soundscapes, including those in urban parks or rural areas, can promote psychological restoration, lessen stress, and relieve cognitive overload. Understanding the mechanisms by which the brain processes and interprets sound is a critical aspect that is beginning to be explored, as psychological responses to sound can vary even when exposed to the same acoustic stimulus (Liu & Kang, 2016).

This complexity encourages researchers to use more objective brain measurement methods such as electroencephalography (EEG) (Kubetschek & Kayser, 2021; Mansi et al., 2024; Zhang, Feng, & Shen, 2021). EEG can objectively measure cognitive and emotional responses to different auditory environments, supporting self-reported experiences. This neurophysiological data can complement subjective assessments to provide a deeper understanding of how people experience different soundscapes, bridging gaps in traditional soundscape research methodologies.

However, studies on EEG or soundscape have so far explored more on urban soundscape. Therefore, this research aims to explore the response of human perception to urban and rural soundscapes, especially in parks as one of the places that promotes well being with EEG-based measurement methods to objectively measure their response.

1.2. Research Problem

Soundscapes play a crucial role in shaping human well-being, with urban and rural areas offering markedly different auditory experiences. While urban parks can offer calming soundscapes that help alleviate stress, how individuals perceive these environments as complex and shaped by several factors. Although EEG technology provides an objective method for assessing cognitive and emotional reactions to soundscapes, most studies have concentrated on urban contexts. As a result, there is limited understanding of how people neurologically and psychologically respond to both urban and rural soundscapes, particularly in park settings. This study aims to fill that gap by examining and comparing perceptual and brain responses to soundscapes in urban and rural parks using EEG, contributing valuable insights for environmental design and mental health promotion.

1.3. Research Objective

Based on the background description and research problem above, leads to a research question: How do individuals perceive and respond to soundscapes in urban parks and rural parks through EEG-based measurement and soundscape assessment methods? Therefore, the objective of this research is to (1) figure out the EEG frequency bands of individuals experiencing varying soundscape characteristic present in urban and rural park environments, (2) identify individual's perception of soundscape attribute to urban and rural park soundscape through subjective soundscape assessment, and (3) find out the influence of demographic background on both EEG-based measurements and subjective soundscape perceptions in urban and rural park environments.

1.4. Research Benefits

The benefits that can be obtained from this research are:

1. Scientific Development

The study advances soundscape research by integrating neurophysiological measurement (EEG) with traditional subjective assessments, offering a more comprehensive understanding of human cognitive and emotional responses to different soundscapes in urban and rural parks.

2. Practical Implications

Insights from the study can guide architectural planning and design by identifying soundscape features that maximize restorative benefits, such as making an adaptive sound environment in indoors building or even public spaces.

1.5. Research Limitation

This research focus is on line with the research objectives which is to explore and describe the differences between individuals in the respons on EEG measurement and perception in soundscape assessment after experiencing representative soundscape from urban park and rural park. This research will analyze individual perceptions objectively and subjectively with the help of Electroencephalography devices and soundscape attribute questionnaires. Items outside of the objectives will be discussed as necessary. Future limitations will be discussed again after the discussion if necessary.

1.6. Research Methodology

This research will use mixed methods by involving a descriptive quantitative approach that is able to help in describing, showing, or summarizing data numerically and a qualitative approach to describe the observations.

1.7. Research Structure

This research is organized into the following chapters as shown in **Figure 1**:

1. **Chapter I Introduction:** introduces the background, research problems, and objectives of the study.
2. **Chapter II Literature Review:** introduces basic concepts from books or journal articles that support the perspective of this study.
3. **Chapter III Methodology:** explains the design of the method that is used and the details of procedure on how the data collection has been performed.
4. **Chapter IV Object Overview:** introduce and describe the representative urban and rural park soundscape that will be used for this study.
5. **Chapter V Result and Discussion:** the result of the data collection will be shown in this chapter along with the discussion on how the subjects perceived different soundscapes.
6. **Chapter VI Conclusion:** this chapter summarizes the findings of the study, discusses its limitations, and suggests directions for future research.

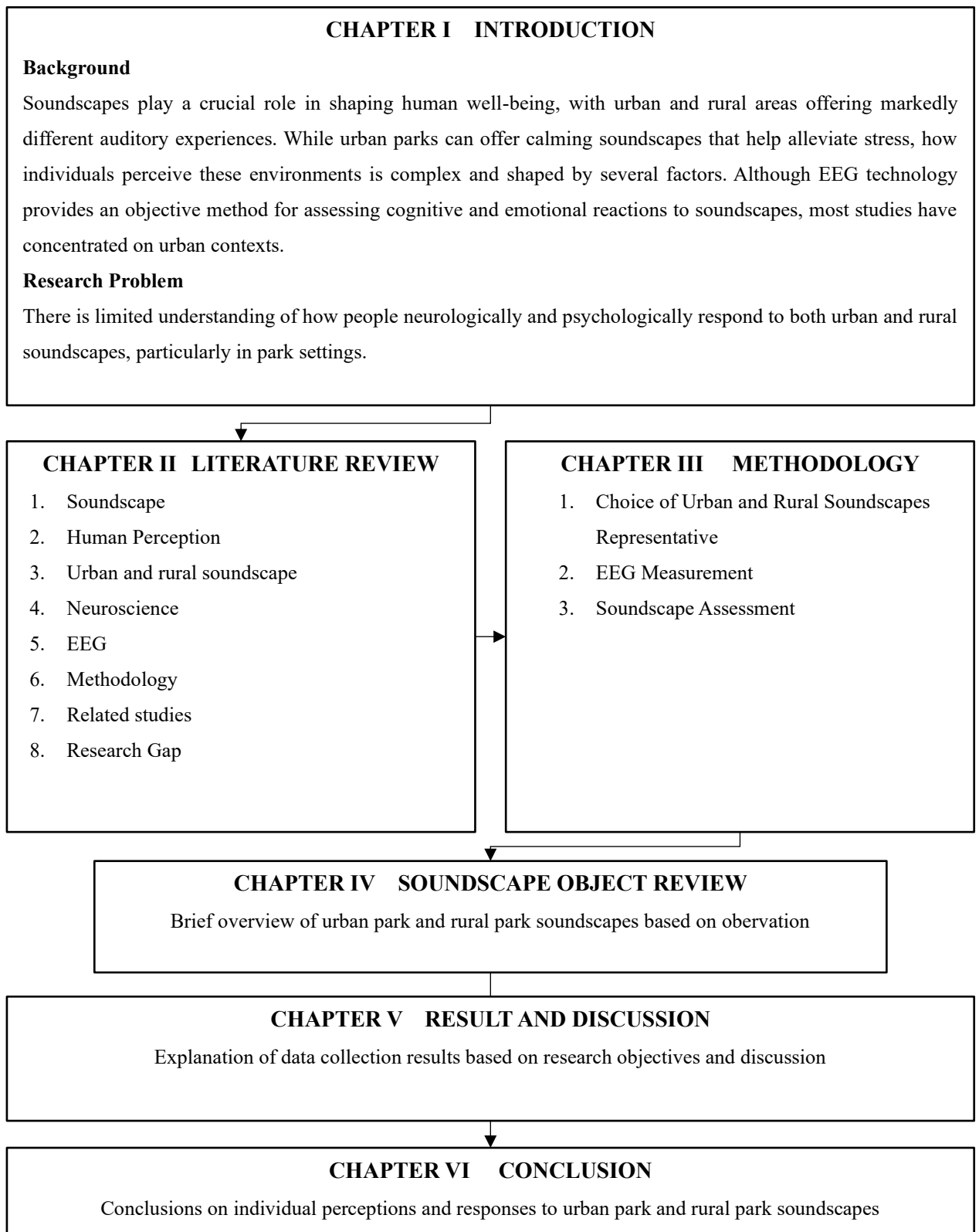


Figure 1. Research Structure