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An Initial Study of Soundscape of Visually Impaired People in Urban Parks 1CE Mediastika, 2AS Sudarsono, 1L Kristanto, 1G Tanuwidjaja, 1RG Sunaryo, 1R Damayanti 1

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2 Department of Physics Engineering, Bandung Institute of Technology, Bandung, Indonesia Abstract Urban parks in a developing country hardly accommodate people with disability. The

objective of this study is to investigate **the** possibility **of** improving **urban** parks using **the** 3

perception of visually impaired people of urban parks' sonic environment. This study was conducted off-site the urban park using a questionnaire survey with two groups of participants: sighted people (35 participants) and visually impaired people (35 participants). The analysis was conducted using semantic analysis from the word used for explaining the sonic environment. This study shows that the visually impaired participants explained the sonic environment with more terminology (56 terminologies for visually impaired participants and 32 terminologies for sighted participants). It indicates the engagement with the sonic environment is higher for the visually impaired participants compared to the sighted participants. Further analysis using semantic categorization also shows that the visually impaired participants have broader perception compared to the sighted participants. The sighted participants use the terminology related

to the perception of comfort, dynamic **of the sound source,** 6

and other perceptions (visual and thermal). The visually impaired participant answers also represent the same aspect, but with more perception: safety, directivity, and space. Keyword: Soundscape; urban park; visually impaired people. 1 . Introduction An urban park is ideally a place with relaxing atmosphere surrounded by fresh air and calming environment. It is a place where rainwater is absorbed for water conservation. It is also a place where urban communities may escape from the stressful urban activities, a place where the natural soundscape is present. A study showed that people like to hear the natural soundscape as it comforts and calms heart and mind (Yan and Kang, 2005). In Indonesia, urban population grows rapidly and results in the excessive development of buildings and infrastructures to accommodate the population needs. For movement, Indonesians are now assisted by the ease of ownership of motorized vehicles, which increases the number of motorized vehicles significantly. It directly triggers more noise in the surrounding area. In the end, it creates a totally different urban soundscape compared to that of the earlier decades. The rapid turnover causes a significant degradation of the built environment (Schulte-Fortkamp et al, 2006; Ge, 2009; Semidor, 2006). A soundscape is a surrounding sound experienced by a person in a particular location. In the early decades, the soundscape was a hi-fi (high fidelity) soundscape. It is when the background sounds around us is at a low-pressure level so that people easily hear the type of sounds around them. In the past, natural soundscape was dominant. Nowadays, the urban soundscape has dramatically changed to lo-fi (low fidelity). In the lo-fi soundscape, the masking of sound is very strong caused by a quite loud background noise. In the lo-fi soundscape, people are difficult to recognize sounds, especially when machinery sounds are dominant. Dubois et al (2006) described that people can tolerate the sound of people activities than machinery sound. The unrecognizable urban soundscape caused by machinery sounds may create an uncomfortable and unsafe environment for people. Visually impaired people may be positioned as the most vulnerable here, due to the inability to see the surrounding. The lo-fi soundscape causes visually impaired people difficult to recognize the surrounding. This condition happens also in urban public areas such as urban parks, where all urban communities gather for calming and soothing. Surabaya is a second metropolitan city in Indonesia with better quality and more percentage of urban parks compared to other cities in Indonesia. Surabaya's urban parks have become a role model for other Indonesia cities. The rapid development of urban parks in Surabaya started approximately the last 10 years when the current mayor was the head of Cleanliness and Landscape Office Surabaya. From only one

to three parks, now it is more than 30 active urban parks in Surabaya. The rigorous development of urban parks in Surabaya was highly appreciated by the communities. However, with so many parks, the ideal condition of urban parks in Surabaya has not been fully perceived. Most urban parks in Surabaya are located adjacent to major streets condensed with motorized vehicles with the potentiality of traffic noise dispersion to the park area. It creates lo- fi soundscape within the parks, where natural sounds are difficult to be perceived. Sighted people commonly mark and enjoy the surrounding visually. It includes the way how sighted people enjoy the urban parks. We mostly slide aside the need for a community with a visual disability who use hearing sense to mark, locate and enjoy the environment. Apart from the audio features that are barely experienced by the urban park visitors, safe and comfortable access to the parks are also an issue of most Surabaya urban parks. There are parks where safe access is unavailable, especially for those with disabilities. Taman Pelangi Surabaya, for example, is surrounded by streets for U-turn. No bridge or underground pathways for pedestrians to access the parks. Even a city park designed specifically for the elderly, namely Taman Lansia is surrounded by major streets where there is no safe access for people to go into (Figure 1 and Figure 2). The use of the soundscape of the visually impaired is interesting since there was soundscape research, but none of them had particularly examined the soundscape of visually impaired people, not even to utilize visually impaired person's capability in soundscaping. Several related soundscape studies were by Botteldooren,

et al, 2006; **De** Coensel, **et al,** 2005; Dubois, **et al,** 2006; Evensen, **et al,** 2016; Lynch, **et al,** **2**

2011; Miller, 2008; Nilsson, et al, 2006; Raimbult and Dubois, 2005. Figure 1. City map of two urban parks in Surabaya namely Taman Lansia (Senior Garden) and Taman Pelangi (Rainbow Garden) that are surrounded by major streets but without appropriate access. Figure 2. Bird's eye view of Taman Persahabatan (Friendship Garden) surrounded by streets and insufficient access. Concerning this condition, a project was programmed to invite visually impaired people to participate in soundscape surveys both off-site and on-site (for the later stage). The project focuses on Taman Bungkul, the most popular and most visited park in Surabaya. The soundscape experienced by the visually impaired respondents will be utilized as a tool to map the comfort and safety perception of visually impaired people toward an urban park. The desired environment of an urban park may also be described by their soundscape. Using this approach, at the end of the project, a recommendation for more habitable urban parks may be borne-out; i.e. a more habitable park for both sighted and visually impaired communities. 2. Methods At the very first stage, the

aim of the project was to collect people's **perception of** **5**

an urban park without necessarily being on-site. This stage was deliberately designed to be off-site to investigate participants' perception of the sonic environment that they have experienced before, for those who already have a chance to visit a park; and to purely collect people's imagination or expectation of an urban park, for those who do not have a chance to visit a park. This stage was conducted using both qualitative and quantitative methods. The qualitative was employed in the first stage using focused group discussion of 2 sighted persons and 2 visually impaired persons. The finding of the focused group discussion was then used as a reference to develop questionnaires for the later quantitative stage. The

questionnaire was developed simply in the structure for the ease of the visually impaired to elaborate the question before answering. The visually impaired participants answered the questionnaire assisted by sighted participants who were also respondents in this project (Figure 5). There were two groups of respondents, i.e. group of sighted people and group of visually impaired, and each consists of 35 persons, thus 70 respondents in total. All respondents are within school-age and college-age between 14 to 22 years old. Prior to the questionnaire survey, all respondents were examined of their hearing ability, assuring that they normally perceive sound around them (Figure 3). The hearing test result declared that all respondents are in a normal hearing condition. Figure 3. Hearing test for both sighted participant (left) and visually impaired participant (right). Figure 4. The first stage of the project was focused group discussion. 3. Finding and discussion At the first stage, the focused group discussion was carried out to collect the general perception of urban parks among participants consist of two visually impaired persons and two sighted persons (Figure 4). The focused discussion was led by a question on what comes across the participants' mind when people talk about urban parks. They may describe the park in a word or a sentence or even a paragraph. Both type of participants also expressed the reason for visiting parks or gardens in the city because it is free-entry. They also have a linked activity prior or after visiting a park, i.e. shopping either for food or other daily needs. From the focused group discussion, some terminologies were borne-out. At this stage, the visually impaired described both "visual" and sonic environment of urban parks with more terminologies that the sighted ones. The findings from the focused group discussion were to be strengthened by the questionnaire stage. Figure 5. The visually impaired participant (right) was assisted by the sighted participant (left) to describe their perception of urban parks off-site. At the quantitative stage, the data collected from questionnaires were elaborated using word clouds (Figure 6 and Figure 7). Word clouds were selected due to the capability to identify trends and patterns that would otherwise be unclear or difficult to see in a tabular format. Figure 6. The terminologies of sonic environment of urban parks by the visually impaired participants in Bahasa Indonesia (left) and in English (right). Figure 7. The terminologies of sonic environment of urban parks by the sighted participants in Bahasa Indonesia (left) and in English (right). By the word clouds, we may learn that visually impaired participants described the urban parks' soundscape with more terminologies compared to the sighted ones (compare Figure 6 and Figure 7). The visually impaired participants explained the sonic environment with 56 terminologies, whilst the sighted respondents explained it with 32 terminologies. It indicates the engagement with the sonic environment is higher for the

are terminologies of the visually impaired relates to safety, directivity, and space, which are not borne- out from the sighted participants. The terminologies that relate to safety are confused, afraid, dangerous, safe, and worry (5 terminologies). The terminologies that relate to directivity are position, important, near, directed, and confused (5 terminologies). The terminologies that relate to space are oversized, opened, wide, too small, big, full, and few (7 terminologies). The terminology "confused" may be plotted to the sonic environment of both safety and directivity. Interestingly, there was also terminology of "contaminated" which seems not belong to either safety, directivity, or space. The nearly equal ratio of terminologies (5:5:7) of safety, space and directivity indicate that for the visually impaired participants, the aspects of safety, space, and directivity in an urban park are equally important. With the safety, space, and directivity aspects are 1/3 of the total terminologies perceived by the visually impaired participants, we ideally consider these aspects while improving urban park facilities. 4. Conclusion and Recommendation The initial study of the soundscape of visually impaired shown that visually impaired person perceived the sonic environment more

detail than the sighted person. They perceived sound surround them as a guide to their activities. It indicates and strengthens the finding of the earlier research that sighted people perceived their surroundings more visually rather than auditory (Nilsson et al., 2012 and Jeon et al., 2012). It is an indication that safety, space, and directivity are all similarly important aspects of an urban park for the visually impaired to explore and enjoy the park. Further research to explore the visually impaired person's perception of an on-site survey is recommended to obtain more data for detailed design recommendation for urban parks improvement. 5. Acknowledgment The research team

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