

## THE STUDY ON THE SOUNDSCAPE OF THREE JAPANESE GARDENS

Haruyoshi Sowa

*Kyoto University of Art & Design, Japan*

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### Introduction

Recently, studies on the sound environment have been increasing, because of the influence of the studies of soundscape by R. Murray Schafer [1]. However, the studies about the soundscape of the gardens [2] have not. Through the case studies of the soundscape of Katsura imperial villa garden<sup>1</sup>, Tairyu-villa garden<sup>2</sup>, and Shisendo garden<sup>3</sup>, this study aims to clarify the structure of sonic environment and the gardeners' technique to design the soundscapes of Japanese gardens mainly by the grading and the sound of water.

### The method of investigation

To investigate the soundscape profiles of three Japanese gardens, we used the sound level meter. With the sound level meter, we measured A-Weighted Sound Pressure Levels such as, Laeq<sup>4</sup>, Lp<sup>5</sup>, and L50<sup>6</sup>. In these soundscape investigations in each garden, 30 through 75 measurement points had been set, according to the limitations indicated by the owner of each garden. In order to verify the measurement results, investigation on the hearing of environmental sounds were conducted.

### The soundscape profiles of 3 Japanese gardens

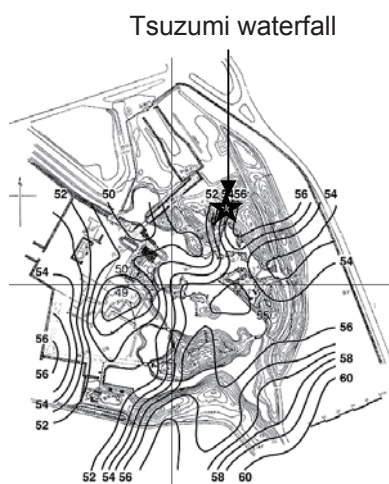


Fig. 1: The contour map of Katsura imperial villa garden



Fig. 2: The contour map of Tairyu-villa garden



Fig. 3: The contour map of Shisen-do garden

From the measurement results, three maps of the sound level contour of each garden have been drawn. Fig.1 is the contour map of Katsura Imperial Villa Garden, Fig.2 is Tairyu-villa Garden, and Fig.3 is Shisendo Garden.

### The risk of traffic noise intrusion

With respect to the risk of the vehicle and train noise intrusion, Katsura imperial villa garden was revealed to be higher exposure by traffic noise, for Tairyu-villa garden and Shisendo garden are low. More over, it was found that the noise of the adjacent roadway penetrates easily to the quietness of all three gardens.

### The presence of the characteristic sonic space of the each garden

1) Katsura imperial villa garden: There exists a quiet area around the waterfall and the sonic space of “Tsuzumi-waterfall”. (Fig.4) 2) Tairyu-villa garden: We named this garden as a “garden of water sounds”. The sonic space of north of the pond showed the noise levels along the sequential design of scenery point. Auditory reinforcement by the invisible waterfall under the floor is found at “Tairyu-dai” guest room. (Fig.5) 3) Shisendo garden: There is the high-density sonic space consists from “Shishi-odoshi”, waterfall, and stream (Fig.6). More over, it was found that the style to listen the invisible sound of “Shishi-odoshi” is Japanese unique method to enjoy various nature sounds.

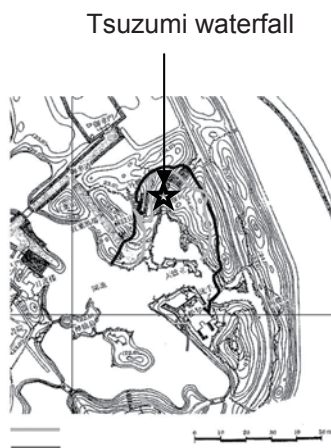


Fig. 4: The sonic space of “Tsuzumi-waterfall”

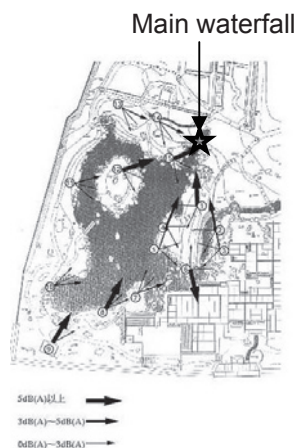


Fig. 5: The sonic space of North pond



Fig. 6: The high-density sonic space

### The soundscape design by the Japanese garden designer

1) Katsura imperial villa: To make the sonic space of “Tsuzumi waterfall”, Prince Hachijō Toshihito and Prince Hachijō Toshitada must have designed the soundscape using the artificial terrain. 2) Tairyu-villa garden: With presence of the characteristic soundscape such as the sonic space of north pond, Jihei Ogawa must have controlled the soundscape of this garden. 3) Shisendo Garden: To select the location like the sunken garden, and, to set the “Shishi-odoshi” to the invisible place, Jozan Ishikawa must have controlled the soundscape of this garden.

## Conclusion

From the viewpoint of relationships with the surrounding environment, the arrangements of sonic elements, such as waterfalls, streams, “Shishi-odoshi”, the topography and architectural placement, it is found that there are unique soundscapes in each gardens investigated. It is pointed out strongly from the results of the investigation for three historical gardens of our own time should have a technical skill to design the soundscape of gardens, with making best use of water and grading the surrounding terrain.

## Notes

1. The Japanese stroll garden. Constructed during 1620~1649, by Prince Hachijō Toshihito and Prince Hachijō Toshitada.
2. Natural landscape garden. Reconstructed from 1901 to 1906, by Jihei OGAWA.
3. Japanese dry landscape garden. Constructed in early edo period, by Jozan ISHIKAWA.
4. Equivalent continuous A-weighted sound pressure Level.
5. Instantaneous value of A-weighted sound pressure Level.
6. Fifty Percent Level of A-weighted sound pressure Level

## References

- [1] Murray Shafer, R., The music of environment series, No2.The Vancouver Soundscape. No4.Five village soundscape, etc. *A.R.C.Publications*, 1975 - 1978.
- [2] Xiaomei, Y., Shuoxian, X., On the soundscape of traditional Chinese garden, *China Architectural Journal*, vol2, pp70-72, 2007., Xiaomei, Y., Shuoxian, X., Sound Environment Planning in Chinese Classical Gardens, *Inter-noise2008*, pp.130-132, 2008. etc.