

ANALYZING THE SOUNDSCAPE OF AN URBAN PARK - A CASE OF SEMMOZHI POONGA

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ABSTRACT

This paper investigates the soundscape of a designed urban park in Chennai. Acoustic measurements and subjective evaluations of the soundscape were conducted at various locations in the identified case. The park was divided into nine zones for conducting the primary survey, such as parking area, entrance court, tree court, children's play, herbal garden, butterfly garden, open-air theatre, duck pond, and mound. Fourteen different sounds were mapped based on the pilot survey that affected the users. Totally thirty responses were collected from each zone. The observed sounds include traffic sound, honking of vehicles, screaming of people & children, chuckling of children, the chirping of birds, ringing of the mobile phone, crowd talking, rustling of leaves, wind sound, play equipment sound, splashing of water, flowing of water, and machine sound. From the subjective survey, it is found that the individual soundscape preference collected from each space have no correlation with the overall soundscape experience of the same space. Based on the measurement data, the individual and the overall experience on soundscape perception were examined.

INTRODUCTION

City parks are considered to be the leisure space. Generally, the visual experience is always regarded as the dominating feature for the people to visit the park. It becomes less significant that people suffer the loss of opportunity in experiencing the sounds of parks. In most cases, landscapes are designed whereas soundscape are not designed. In this regard, this paper aims at understanding how landscape influences the soundscape characteristics of urban parks.

Soundscape definition stated by ISO (International standard organization) is that acoustic environment as perceived or experienced and/or understood by a person or people, in context. In general soundscape is the combination of all sounds within a given location with an emphasis on the relation between individual's or society's perception (Schafer 1977). He explained the control of visual aesthetics in the present societies. Urban park soundscape gained its importance while in the process of understanding how urban parks attract more number of visitors. Good soundscape quality in parks cannot be provided without a systematic understanding of the complex relationships among different elements like sound, environment, and individuals (Tse & Kwan, 2013). The acoustic comfort evaluation plays an important role on user's acceptability of the urban park environment besides visual comfort evaluation of landscape. Acoustic preferences decide the likeliness towards the park environment.

They consist of multiple sound sources as, natural sounds and artificial or man-made sounds. There have been various natural sounds as sounds from birds, sounds from the beach; sounds from branch of the trees etc. there have also been manmade sounds as mechanical sounds from vehicles, sounds from fountains, etc. Most of this soundscape either its natural or manmade, it defines the character of the park and contributes to urban park soundscape. In line with this the paper aims at understanding the people's perception of different sounds in a designed landscape urban park.

METHOD

Study area

The urban park selected for the study is “Semmozhi Poonga”(Classical Language Park) which is designed as a unique and friendly botanical garden of 8 acres located at the Cathedral Road ,Chennai ,Tamil Nadu (The State's Capital).It showcase 600 species of plants and won the competition and awarded as the best landscape design in India 2011. For survey purpose the entire park is divided totally into nine different zones as parking, entrance court, tree court, children's play, herbal garden, butterfly garden, Open air theatre, Duck pond and mound.

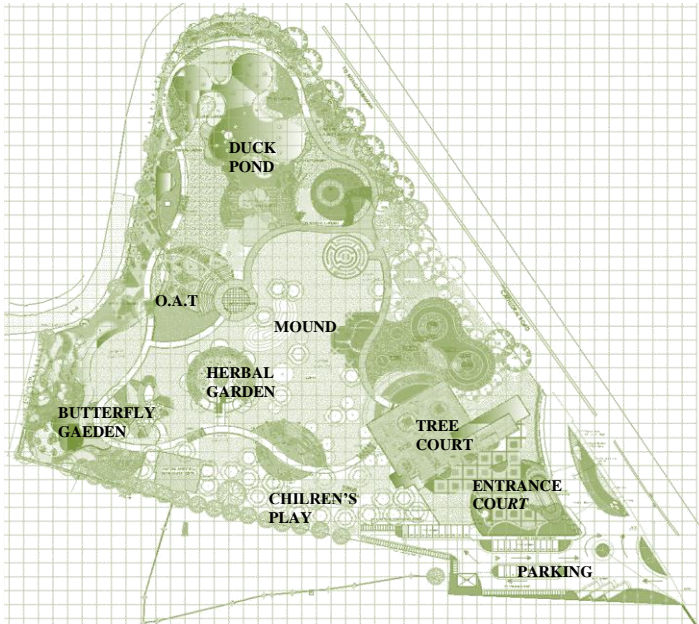


Figure 1: Site plan of Semmozhi Poonga

Participants

The participants were selected randomly within the specified zone .The size and shapes of the zones are based on the existing landscape and architectural design. In each zone 30 samples are collected based on the different age groups who were above 18, who visit the park from different places. Totally 270 responses were gathered. The sample was the representative of the people from different location who visited the park.

Questionnaire

The questionnaire survey was divided into three sections, 1) First one includes the measurement of background noise level (L_{eq}) using norsonic sound level meter type 140 in the particular place where the questionnaire was distributed.

2) The second section of questionnaire focused on people's perception of different types of sounds in that particular space.14 different types of sounds collected

during pilot study in each nine different zones of the park. They were traffic sound, honking of vehicles, screaming of people & children, chuckling of children, the chirping of birds, ringing of the mobile phone, crowd talking, rustling of leaves, wind sound, play equipment sound, splashing of water, flowing of water, and machine sound. The participants were asked to give their response on the sounds they hear in that particular space and also were asked to give their response on whether the sounds they hear bother them or not. In addition , a question to rate the overall experience of the particular space based on the five point LIKERT rating scale ranging from relaxing to stressful (very relaxing, relaxing, neutral, stressful and very stressful).

3) The third section aims at the demographic factors of the respondent as age, gender, years living in Chennai, profession, number of times the park is visited.

Procedure and Design

The questionnaire survey were conducted Monday to Friday from 10.00 – 18.00, the last week of May 2017. The survey was conducted with 30 participants in each space. A survey lasted approximately 5 min per respondent. Before the questionnaire was distributed, the participants were briefed about the questionnaire, and asked to fill it without disturbance to each other. The purpose of this questionnaire was not to raise the participants' awareness of the park soundscape alone but to measure it. At each listening location, while the participants filled in the questionnaire, the soundscape was recorded for at least 15 seconds.

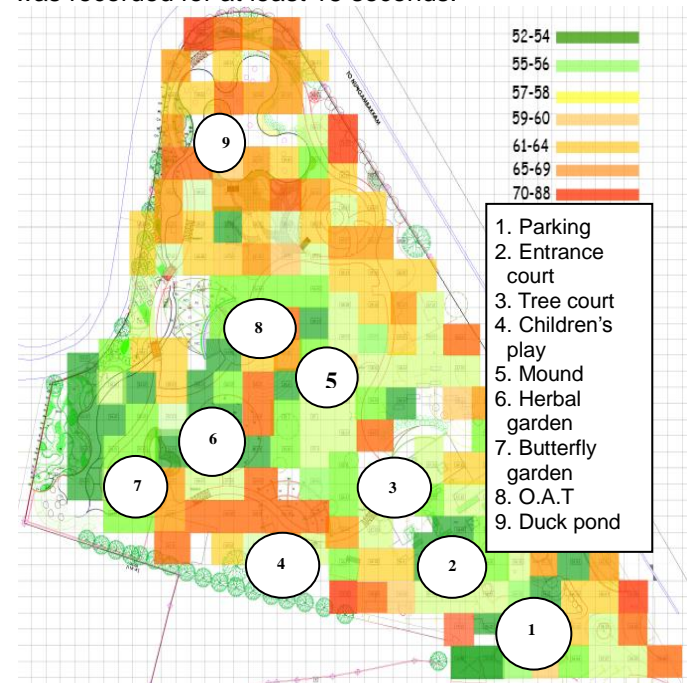


Figure 2: overall measured sound level of the park

Results and Discussions

Perception of sound in each divided zones of the park
(Based on Table 1)

Parking

The predominant sounds in the parking area were traffic sound and honking sound. Figure 4(a) shows that the highest recorded sound level in the parking area was 72 dB and the lowest was 53 db. Though according to survey, 80 % of the people heard traffic sounds, the results shows that they have only 40% level of botheration of such sounds. This may be due to the fact that people does not generally considers parking space as a relaxation space or people already expect these sounds in the parking area ,which does not affect their botheration level.

Entrance Court

The highest recorded sound level in the entrance court was 78.4dB and the lowest recorded was 53 dB. The predominant sounds heard in the entrance court were traffic, honking, birds chirping and crowd talking. Though the sounds such as birds chirping, leaves rustling and wind sound have the highest degree of hearing in the space, the botheration level for the same is considered to be less by the users. This denotes that people have preference level towards such kind of sounds.

Tree Court

In the tree court the highest recorded sound level was 75 dB and the lowest recorded was 53.4dB. The predominant sounds heard in the tree court were traffic, honking, bird's chirping, children's playing, etc. As per the results, the highest bothered sound in the tree court was traffic sound and honking.

Children's Play

The highest recorded sound level in the children's play was 65.7dB and the lowest recorded was 56.5dB. Though according to the survey, 100 % of the people heard children's sound, the results shows that they have only 16% level of botheration for such sound. This may be due to the fact that people already expect this sound in the area, which does not affect individuals botheration level.

Mound

The predominant sounds heard in the mound were traffic sound, honking, birds chirping, and crowd talking. As per the survey result traffic and honking are considered as the highest bothered sound. Though 57% of the people

heard the sounds of the wind and leaves rustling, the results shows that no individual is bothered by these sounds. This shows that people generally prefer these kinds of natural sounds.

Herbal Garden

The dominating sounds in the herbal garden were birds chirping, children playing, screaming of people, leaves rustling and play equipment sound. The highest sound level recorded was 75.3dB and 56.4dB. The level of botheration was more for play equipment whereas the botheration level for people screaming, children playing are less in this space. This may be due to the fact that people are more tolerant towards human sounds and not mechanical sounds.

Butterfly Garden

The highest recorded sound level in the butterfly garden was 71.7dB and the lowest was 53.6dB. The space was dominated with birds chirping, and crowd talking. According to the survey, only 6% of the users are disturbed by birds sound whereas the hearing was around 97%. Crowd talking was heard by 65% of the users in which 40 % of the users are affected by that sound. This shows that people did not prefer and expect any disturbance in this space as people must have considered the space to be more relaxing.

O.A.T (Open Air Theatre)

The O.A.T is dominated by traffic, honking, birds chirping and leaves rustling sound. In line to other spaces though birds sounds and leaves rustling were dominating, it affects only very few users of the space. Traffic sound, in contrast to other spaces, annoyed only 23% of the users whereas 90% of the users heard the sound. This may be due to the fact people were engaged in more activities in this particular space. The highest recorded sound level in the space was 69.3dB and the lowest was 55.9dB.

Duck pond

The highest sound level measured in the park is 80.4dB whereas the lowest was 57.5dB. Though the sound level recorded in duck pond is considered to be the highest, the overall experience of the soundscape in this space is considered to be pleasing. The traffic sound is heard by 100% of the users but only 50% of the people are bothered. This may be due to the presence of natural sounds as birds chirping because only 10% of the people consider the bird sound affect the botheration level, whereas the hearing level went up to 81%.

Table 1: % of Hearing and Botheration level in classified zones of the park based on identified sounds

	VARIOUS PARK ZONES																	
	H - Heard B-Bothered																	
	Parking		Entrance court		Tree court		Children's play		Herbal garden		O.A.T		Butterfly garden		Mound		Duck pond	
	H	B	H	B	H	B	H	B	H	B	H	B	H	B	H	B	H	B
Traffic sound	80%	43%	82%	57%	83%	50%	42%	15%	43%	18%	90%	23%	60%	26%	97%	37%	100 %	50%
Honking	73%	30%	73%	43%	75%	43%	71%	10%	40%	13%	81%	33%	30%	16%	90%	30%	66%	43%
Screaming of people	66%	23%	30%	16%	60%	16%	68%	13%	73%	21%	50%	18%	43%	33%	60%	23%	55%	31%
Chuckling of children	50%	3%	27%	8%	63%	8%	83%	10%	53%	11%	33%	15%	16%	15%	68%	21%	16%	1%
Children playing	40%	3%	43%	8%	68%	8%	100 %	16%	78%	8%	50%	13%	10%	0%	78%	26%	57%	10%
Birds chirping	68%	16%	77%	8%	57%	3%	85%	13%	80%	15%	93%	18%	97%	6%	90%	2%	81%	10%
Mobile ringing	63%	26%	33%	20%	27%	8%	16%	8%	16%	2%	15%	13%	10%	2%	15%	2%	18%	10%
Crowd talking	56%	16%	63%	27%	56%	8%	50%	8%	67%	26%	50%	23%	65%	40%	85%	18%	76%	46%
Leaves rustling	40%	10%	53%	17%	58%	16%	47%	15%	73%	16%	73%	18%	15%	0%	52%	0%	71%	13%
Wind sound	43%	3%	57%	10%	58%	8%	40%	13%	47%	10%	46%	6%	18%	10%	57%	0%	65%	13%
Play equipment	10%	0%	10%	1%	20%	10%	70%	17%	70 %	37%	6%	0%	6%	2%	52%	18%	63%	10%
Water splashing	16%	3%	27%	1%	57%	3%	1 %	0%	33 %	3%	16%	6%	53%	18%	13%	2%	30%	16%
Water flowing	8 %	0%	27%	2%	60%	3%	15%	1%	23%	3%	16%	2%	18%	2%	10%	10%	33%	6%
Machine sound	16%	13%	13%	10%	16%	15%	16%	8%	20 %	3%	15%	6%	16%	10%	6%	2 %	18%	16%

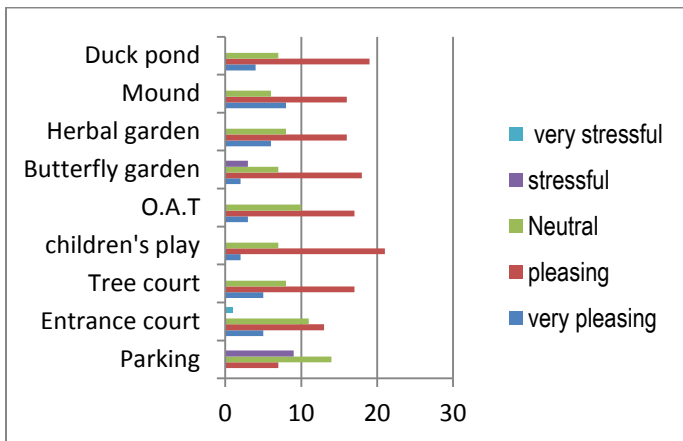


Figure 3: Overall experience of soundscape in the park

Overall experience of Soundscape

According to Figure 3, though parking is dominated by honking and Traffic sound, the overall experience of the soundscape seems to be neutral. In places as entrance court and tree court the dominated sounds were the traffic and the honking sounds. According to Figure 4(b) the highest sound level recorded in the entrance court was 78.4 dB and the lowest recorded was 53dB whereas in the tree court it was 75 dB and 53.4 dB respectively. Though the hearing level of birds chirping in the entrance court and children's playing, water splashing, water flowing, wind sounds, leaves rustling in the tree court were recorded as the highest , it does not affect the botheration levels of the users, this may be due to the fact that people have more inclination towards such kinds of sounds. In the children's play the play equipment and the children's playing dominated the overall area though honking was identified as the major sound source.

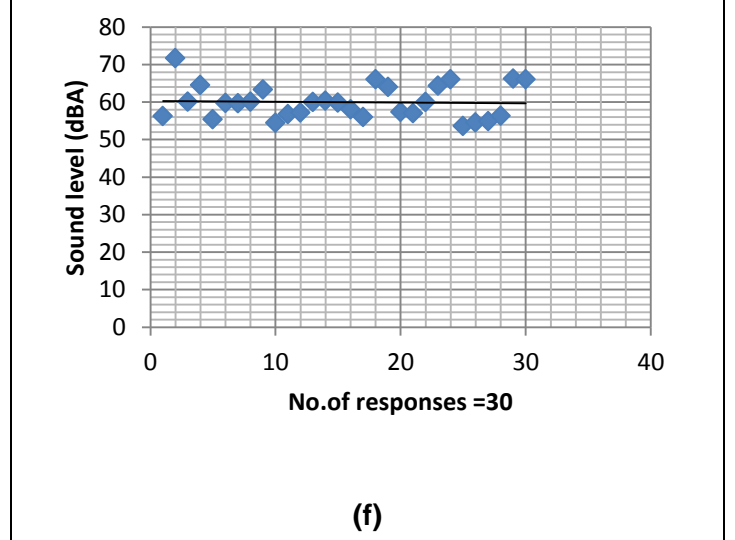
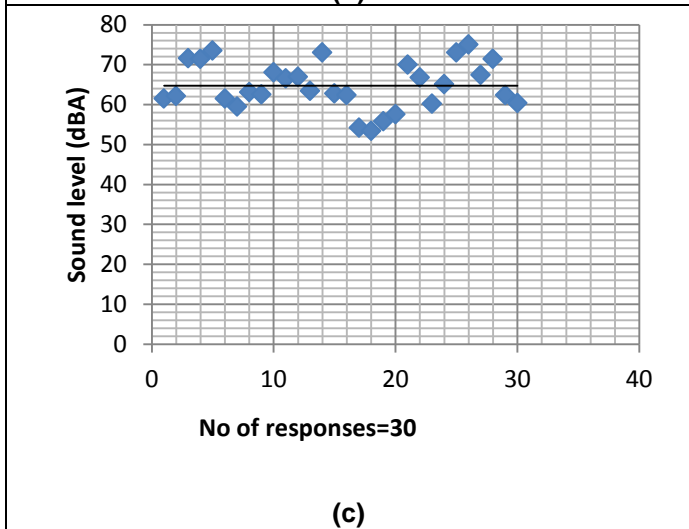
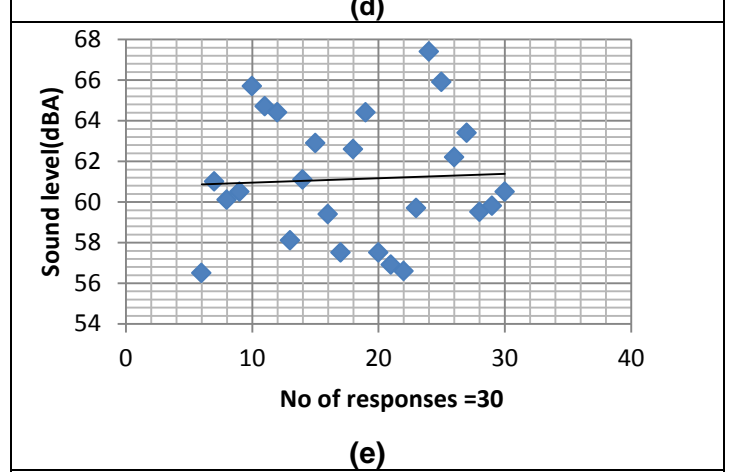
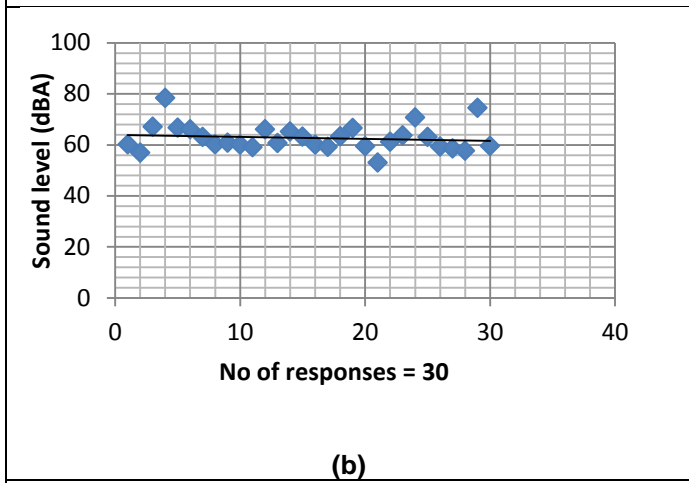
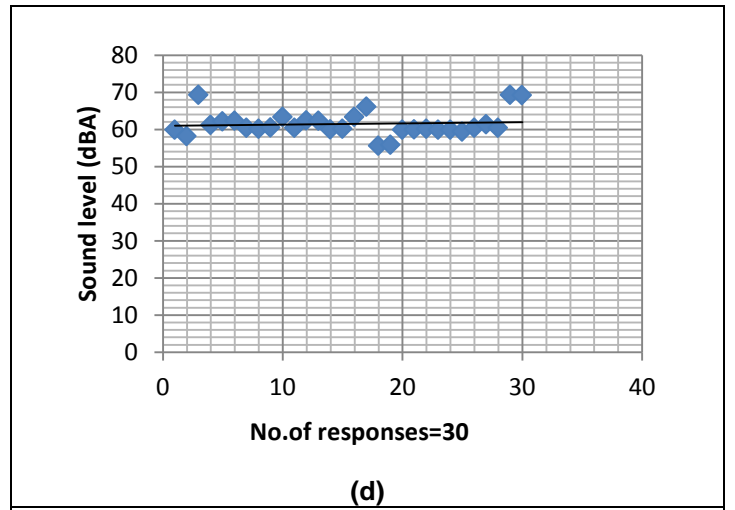
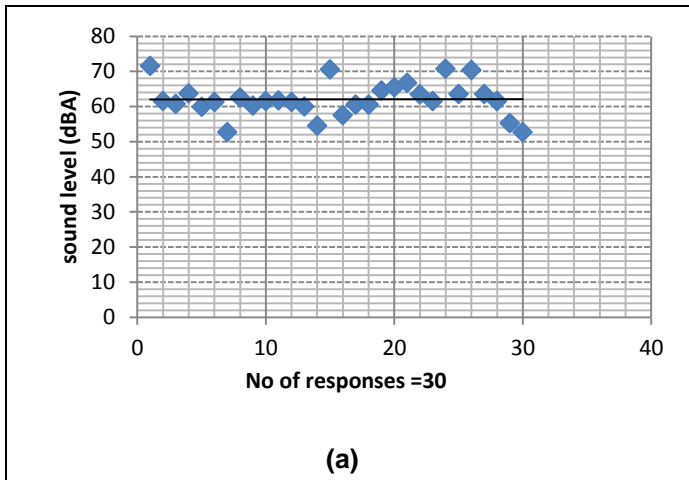


Figure 4: Measured Sound levels (dBA) in each zone of the park (a)Parking (b)Entrance court (c)Tree

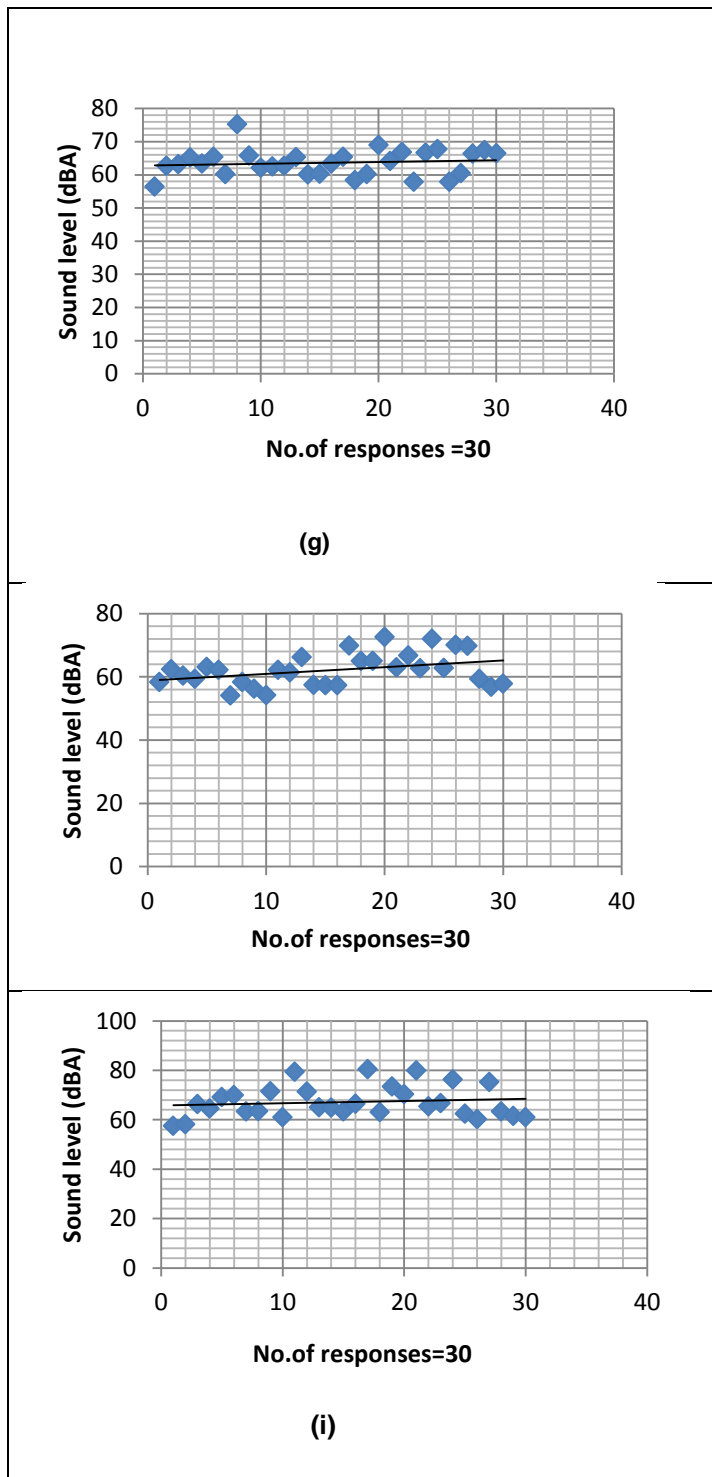


Figure 4: (g) Herbal garden (h) Mound (i) Duck pond

It is also interesting to note according to Table1, that though the bird sound in the children play recorded 85 % hearing level it affected only 13% of the users in the botheration level. This shows people have inclination towards natural sounds even though they are dominated

by artificial sounds. Since herbal garden is in close proximity to the children's play the dominating sound in the garden was the sounds of children playing. The herbal garden was also dominated by the sounds of birds. The highest recorded sound for the O.A.T is the birds sound. The butterfly garden is dominated by the bird's sounds whereas the duck pond is dominated by the Traffic sound which also has highest recorded level of botheration. This may be due to the fact that people expected relaxation in this space. In butterfly garden the individual soundscape experience of the users are dominated by bird's sounds, whereas the overall experience of the space is recorded as stressful by few users. Though tree court, attracts birds, the overall experience of soundscape seems to be recorded as stressful by few users.

Conclusion

A study has been carried out to analyse the soundscape of the park. There have been variations in sound level in each zone due to the location of each zone in the park. The periphery of the park are mostly affected by traffic and honking sound. It is found that the individual soundscape preference collected from each space have no correlation with the overall soundscape experience of the same space. The results shows that people have more inclination towards natural sounds as birds chirping, leaves rustling, wind sound etc whereas least preference towards mechanical sounds as traffic sound ,honking and play equipment were in most of the zones of the park. It is also found that the individual and the overall soundscape experience are affected by the activities and the expectation factor by the users of the space.

References

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