

**ISTANBUL TECHNICAL UNIVERSITY ★ GRADUATE SCHOOL OF SCIENCE**  
**ENGINEERING AND TECHNOLOGY**

**CREATING SONIC EXPERIENCES AS A LANDSCAPE DESIGN ELEMENT  
FOR INCREASE THE VALUE OF PUBLIC SPACE**



**M.Sc. THESIS**

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**Department of Landscape Architecture**

**Landscape Architecture Programme**

**SEPTEMBER 2019**



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**SEPTEMBER 2019**



**İSTANBUL TEKNİK ÜNİVERSİTESİ ★ FEN BİLİMLERİ ENSTİTÜSÜ**

**PEYZAJ TASARIM ÖĞESİ OLARAK TASARLANAN SES DENEYİMLERİYLE  
KAMUSAL MEKANIN YARATICI DEĞERİNİ ARTIRMAK**

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**EYLÜL 2019**



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**Date of Defense : 18 September 2019**





*To my beloved ones,*



## FOREWORD

Thanks to my advisor, family and friends for the support for my writing process of the thesis. It was my dream for a long time to make a research and to practise about the ways of relating sound design with urban planning and landscape architecture. This thesis is an important step in order to realise this dream.

September 2019

Ekin Bozkurt  
(Urban and Regional Planner, Sound Artist)



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## **CREATING SONIC EXPERIENCES AS A LANDSCAPE DESIGN ELEMENT FOR INCREASE THE VALUE OF PUBLIC SPACE**

### **SUMMARY**

The aim of this work is to investigate the methods of providing creative interaction between urban space and the dwellers by making sound installations and sound design in public spaces. The subjects which are approached in the chapters are as such respectively: In the first chapter an introduction is implemented to the thesis and the main reasons for this work are explained. In the second chapter, the main 'soundscape' notions are explained in detail in order to understand the subject of 'sonic experiences in public space'. In the third chapter, previous works of methods and guides in urban soundscape design are examined. In the fourth chapter, the soundscape projects are examined which are installed or proposed and have a contribution to the usage of the public space actively and creatively; and which aimed the public spaces to be used actively and creatively; are examined.

It is aimed that the thesis would contribute to the literature about the possible usages of sound in landscape architecture, urban planning and architecture disciplines, and to be a reference guide for spatial sound design works in the future. Additionally, it is aimed to be a reference guide for sound-led artists, musicians, and multimedia artists to create art installations in public spaces by understanding the design and organization of the spaces. Finally, this work is aimed at making a contribution to the acceptance of the sonic interventions which are as important as visual interventions in spatial design.

Nine open public space sound art/design case studies were examined according to their design objectives such as "noise treatment", "aesthetics" and "supportive sound works". Under these topics, they were sub-categorized by objective, design approach, societal goal, method, technical method, relevant concept, relevant sound characteristic and outputs/contributions to public space. The main reason for categorizing the cases is to simplify the research process of further urban / landscape sound interventions by proposing an initial point.

The categorization method is proposed within the scope of the accumulation of the knowledge of the thesis author. The previous and further approaches and methods may be changed according to the needs, professions, and preferences. Therefore, it is essential to emphasize that the proposed method remains flexible and open-ended.

As a result of the thesis, it is understood that the main reason for the effectiveness of the examined urban / landscape sound design works is their capacity to integrate the technical knowledge of sound and contemporary technology with the public open space design. Therefore, access to this kind of knowledge and the possible technologies, which can be integrated with sound and open public space, should be posed more straightforward in order to ease the further design processes.

Furthermore, the development of reference guides of technical sound concepts and contemporary technologies which specifically can be used as design tools in open public spaces would be very complementary with the urban / landscape sound design methods, categorization methods and guidelines.



# PEYZAJ TASARIM ÖĞESİ OLARAK TASARLANAN SES DENEYİMLERİYLE KAMUSAL MEKANIN YARATICI DEĞERİNİ ARTIRMAK

## ÖZET

Ses, mekanın en belirleyici öğelerinden birisidir. Duyu organının sürekli açık oluşu; sesin limitsizliği, yani mekansal sınırların dışındaki seslerin de algılanabilir oluşu; sesi oluşturan fiziksel öğelerin psikolojik etkileri; sesin ne kadar güçlü bir kavram olduğunu kanıtlamaktadır. Algılanan sesler, özellikle kentsel mekanda her geçen gün daha çok çeşitlilik göstermekte; gündelik yaşantıda “nostaljik”, “kültürel”, “rahatlatıcı”, “yorucu”, “rahatsız edici”, “eğlendirici” vb. birçok anlam edinmektedir. Mutlak sessizlik, bu deneyim için özel olarak yapılmış bir mekanda bulunulmadığı sürece mümkün değildir. Ses bu kadar baskın ve kesintisiz bir gerçeklik iken; mekansal planlama/tasarım alanlarında görselliğin geri planında kalmamalıdır. Mekana dair deneyimleri önemli ölçüde etkileyebilecek, değiştirebilecek, dönüştürebilecek olan ses, en az görsellik kadar önemli bir mekansal tasarım öğesi olarak düşünülmelidir.

Sesin, görsel tasarım öğelerinin rijid, sınırlı mekansallığını aşan bir yapısı vardır. Sesin oluşturduğu alan, sesi duyan kişi tarafından 360 derece algılanabilir. Görselin, gözün görüş alanı kadar sınırı varken sesin böyle bir sınırı yoktur. Ayrıca, sesin algılanışı duyu organıyla da sınırlı değildir. Ses, titreşim olduğu için katı maddelerce de iletilebilir, dolayısıyla kemikler tarafından iletilen ses titreşimi dokunma duyusuyla da hissedilebilir. Bunun haricinde, ses kimi zaman ses kaynağından farklı bir yerde de algılanabilir ki bu durum daha çok, sesin bina, duvar gibi katı cisimlerden yansması sonucu meydana gelir. Ses kaynağının uzaklığı, gürlüğü, konumu, nelerle çevrili olduğu, hareketli olup olmadığı, frekansı vb. sese dair birçok parametre, sesin nasıl bir mekan oluşturduğunu belirler. Mekanlar görsel mekan tasarımı aracılığıyla nasıl değiştirilebiliyor, dönüştürülebiliyor, iyileştirilebiliyorsa; ses peyzajı tasarımı ile de değiştirilebilir, dönüştürülebilir ve iyileştirilebilirler. Ses peyzajındaki bu müdahaleler günümüze kadar sanatçılar, tasarımcılar, mühendisler tarafından; gürültüyü azaltma, notaya dönüştürme, doğal sesleri ön plana çıkarma, farkındalığı yüksek bir dinleme deneyimi sağlama, sesi kullanarak politik, sosyal, ekolojik konularda farkındalık yaratma vb. amaçlarla yapılmıştır.

Tezin amacı, daha önce yapılmış olan mekansal ses peyzajı tasarımı/müdahalesi örneklerini ve belirlenen tasarım yöntemlerini inceleyerek; gelecekteki sespeyzajı konsept tasarım süreçlerinde başvurulabilecek bir kategorizasyon yöntemi önermektir.

Tezi oluşturan bölümlerin konuları sırasıyla şöyledir: Birinci bölümde teze giriş yapılmış ve bu çalışmanın yapılmasını sağlayan temel nedenler açıklanmıştır.

İkinci bölümde, ‘kamusal alandaki sesle ilgili deneyimler’ konusunu anlayabilmek için gerekli görülen temel ‘ses peyzajı’ kavramları detaylı olarak tanımlanmıştır. Üçüncü bölümde, ses peyzajıyla bağlantılı müdahaleler aracılığıyla kamusal mekanın

yaratıcı, aktif bir biçimde kullanımına dair uygulanan ve önerilen örnek çalışmalar incelenmiştir. Dördüncü bölümde, literatürdeki daha önce üretilmiş olan kentsel ses tasarımı yöntemleri, tez kapsamında belirlenen kategoriler altında incelenmiştir. Beşinci bölümde, bir önceki bölümdeki kentsel ses tasarımı örnekleri incelemesinde yapılan çıkarımlar ve varılan sonuçlar tartışılmıştır. Altıncı bölümde tezin giriş bölümünde sorulan araştırma soruları cevaplandırılmış, tezin özgün ve yaygın değeri detaylı olarak irdelenmiş ve tezin, gelecekteki kentsel ses tasarım çalışmalarında başvurulabilecek kategorizasyon yöntemi önerisi vurgulanmıştır.

Dokuz kentsel açık alan ses sanatı/tasarımı örnek çalışması, “Gürültünün değerlendirilmesi”, “Estetik” ve “Sesin yardımcı eleman olduğu çalışmalar” olmak üzere üç amaca göre seçilmiştir. Çalışmalar bu başlıklar altında, “amaç”, “tasarım yaklaşımı”, “toplumsal amaç”, “metod”, “teknik metod”, “ilgili kavram”, “ilgili ses karakteristiği” ve “tasarım çıktıları” alt kategorileri altında incelenmiştir. Kategorileri oluşturmadaki amaç, örnek çalışmaların incelenmesini kolaylaştırmak ve gelecekteki kentsel açık alan ses tasarım çalışmalarının araştırma aşamalarına bir başlangıç noktası/rehberi sunarak katkıda bulunmaktır.

Tez kapsamında önerilen katagorizasyon yöntemi kentsel tasarım ve peyzaj mimarlığı arakesitinde üretilmiştir. Daha önceki veya sonraki araştırma çalışmalarındaki yaklaşım ve metodlar, her araştırmacının kendi mesleki bilgisine, ihtiyacına, tercihinine göre değişim gösterebilir. Bu yüzden, tezde önerilen kategorizasyon metodolojisinin esnek ve açık uçlu olduğunun altını çizmek elzemdir.

Tasarım örneklerinin tartışıldığı bölümde, örneklerin ortak özellikleri ve farklılıkları yorumlanmıştır. Çalışmaların en önemli ortak noktasının sese dair teknik bilgilerin kullanımındaki beceriklilik olduğu kanaatine varılmıştır. Çalışmalarda, sese duyarlı sensörlerle etki-tepki, topografya değişimiyle sesi yönlendirme, doğal sesleri yükseltme, gürültüyü harmonik hale getirme gibi yöntemler kullanılmıştır. Ses kullanımının kamusal alanın canlanmasına, değişimine, dönüşümüne yaptığı katkıların ne kadar güçlü olduğu görülmüştür.

Tezin sonucunda anlaşılmıştır ki, incelenen açık kamusal alan ses tasarımı çalışmalarının etkili olmalarının temel nedeni, teknik ses bilgisi ve zamanın teknolojisiyle kamusal açık alan tasarımını birleştirebilme kapasiteleridir. Dolayısıyla, gelecekteki çalışmalar için, bu tip teknikler ile ses ve mekanla entegre edilebilecek olası çağdaş teknolojilerin bilgisine erişim daha kolay hale getirilmelidir.

Ses, sesin mekansallaştırılması, ses ve teknolojinin birleştirilmesi teknik bilgi gerektiren konulardır. Ses içeren mekansal tasarım çalışmalarında, çalışmanın içeriğine göre mühendislerle, teknisyenlerle, sanatçılarla iş birliği yapmak, beraber proje geliştirmek önemlidir.

Ayrıca, spesifik olarak kamusal açık alanlarda tasarım aracı olarak kullanılacak teknik ses kavramlarıyla ve çağdaş teknolojilerle ilgili referans rehberlerin üretimi; kentsel ses tasarımı metodlarını, kategorizasyon metodlarını ve rehberlerini tamamlayıcı nitelikte olacaktır.

Tezin, peyzaj mimarlığı, şehir planlama ve mimarlık disiplinlerinde sesin yeri ve kullanım olanaklarına dair literatüre katkıda bulunması ve gelecekteki, mekansal ses tasarımı çalışmaları için başvuru kaynağı olarak değerlendirilmesi amaçlanmıştır. Aynı zamanda, ses odaklı çalışan sanatçılar, müzisyenler, multimedya tasarımcılarının da sanat yerleştirmelerini mekan tasarımı ve kurgusunu anlayarak yapmalarına katkıda bulunacak bir başvuru kaynağı olması amaçlanmıştır. Bu

alıřmanın, mekan tasarımında sesle ilgili mdahalelerin, grsel mdahaleler kadar nemli olduėunun kabul edilmesine katkıda bulunması amalanmaktadır.





## 1. INTRODUCTION

Sound as a spatial design tool is a relatively new research area in landscape architecture, urban planning, and urban design studies. The introduction of sound into architecture is comparatively early considering the acoustic design of indoor spaces. However, beyond the consideration of acoustic design, on a wider scale, it has been disregarded or kept in the background of visual design until a very recently. Sound is one of the principal parts of the living spaces as well as visibility even if one doesn't see it. In spite of this, spatial sound design has not been considered as much as spatial visual design until recently. In the last decade, the research on sound in spatial fields have emerged. A significant amount of the research focuses on analyzing the sound quality of outdoor spaces, reducing or masking unwanted sounds which in general are being described as "noise". However approximately within five years, the research which goes beyond this 'defensive' approach and reaches the questions of "creating new environments" (Lacey 2016:35) started to emerge. The practice-led approaches in soundscape design such as install creative/builder sound elements for creating new spaces is an emerging research field today.

In order to understand the significance of sound in spatial design, it is essential to understand the "sound environment" which was introduced in literature as "soundscape" by World Sound Project<sup>1</sup>. Traux (1978) defines 'soundscape' as "an environment of sound with emphasis on the way it is perceived and understood by the individual, or by a society" (Traux, 1978).

The term will be examined in the following chapters broadly and with some other aspects. The soundscape is an essential term because it encompasses all the sonic characteristics in spatial environments: "systematic relationships between humans and sonic environments is called 'sound ecology' and 'improvement or modelling of any such environment (soundscape design)" (Traux, 1978).

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<sup>1</sup> A research project focused in 'soundscape' which was established in 1970s in Sonic Research Studio of the School of Communication, Simon Fraser University.

In this research, using ‘creating sonic experience’ concept instead of ‘soundscape design’ is especially preferred. ‘Sonic experience’ term seems to evoke broader perspectives about the use of sound in spatial fields, comparing with ‘soundscape design’. Creating any sonic experiences may also encompass ‘soundscape design’. This flexibility and bendability of ‘sonic experience’ term introduce the sound art in landscape architecture as a landscape design tool. ‘Sonic experience’ term is presumably first used by Augoyard and Torgue (Augoyard, J., & Torgue, H., 2005). Cerwén (2017) describes ‘sonic experience’ as “A term used to refer to the role sound plays in the everyday experience. The term is broad and includes, among other things, the connection between sound and behaviour and preferences for various environmental sounds” (Cerwén 2017:14).

The aim of this thesis is to propose a categorization method for urban soundscape design by analyzing the previous methods and case studies; to investigate the ways of designing sound design/art interventions in soundscapes of public spaces in order to contribute to the creative encounters/connections between citizens and space. Thus, it reclaims the creative value of public space with a holistic approach towards the soundscape of the space.

## **1.1 Research Questions**

In the context of the thesis the main research questions are defined as follows:

- Can urban/landscape sound design be categorized systematically in order to be considered as an analytical design tool?
- How to determine the methods of the categorization of the existing sound design applications?
- How can be made a contribution to the urban/landscape sound design methodology literature? Can the new categories by new approaches be developed?

## **1.2 Unique Aspect**

The unique aspects of this thesis were defined as follows:

- Focusing on the integration of technical knowledge of sound and technology in urban/landscape sound design field.

- Using an interdisciplinary approach in-between art and landscape architecture.

### **1.3 Impact**

The possible impact of this thesis is defined as follows:

Architects, urban planners, landscape architects, sound artists, sociologists, researchers in spatial fields can benefit from this thesis. It can be used as a basic guide or a start point for further design research for soundscape interventions in landscape architecture, urban planning, architecture fields.





## 2. KEY CONCEPTS RELATED TO SOUNDSCAPE AND SOUND EXPERIENCE

### 2.1 Soundscape

‘Soundscape’ is a foundation concept for this research. There have been many aspects of definitions of soundscape throughout history. The term of soundscape was first coined by urban planner Michael Southworth in 1969 (Pijanovski et al.2011a). Southworth was interested in “how the sounds of the built environment enhanced people’s perception of space and their relationship to the activities occurring within cities” (Pijanovski et al.2011b). That is to say, the first emergence of the term was in urban planning literature (Pijanovski et al.2011b). This is a humanistic approach and mostly related to urban soundscapes. An example of the practices of Southworth in this field was testing “how blind people used sounds to form a ‘sonic identity’ of unique areas in Boston (Pijanovski et al.2011a).

However, this term is broadly acknowledged as it was developed by World Soundscape Project<sup>2</sup> research group and particularly after the book *The Soundscape: Our Sonic Environment and the Tuning of the World*, written in 1977, by the composer and acoustic ecologist Murray Schafer who was one of the founders of WSP. Schafer defined soundscape as “any acoustic field of study” (Schafer, 1977). He mostly focused on the acoustic characteristics of natural sounds; the sound indications of environmental pollution such as urban noises. He was interested in constituting awareness about natural sounds and using them as musical composition tools also.

According to Schaffer (1977), a “soundscape analyst first need to understand the significant features of the soundscape” and there are three main elements of the soundscape:

Keynote sounds: “In soundscape studies, keynote sounds are those which are heard by a particular society continuously or frequently enough to form a background

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<sup>2</sup> World Soundscape Project was established in late 1960s at Simon Fraser University, in Vancouver – Canada, in order to understand the sonic environment by various methodologies like ‘sound walk’.

against which other sounds are perceived. Often keynote sounds are not consciously perceived” (Traux, 1978).

Sound signals: “Signals are foreground sounds and they are listened to consciously. In terms of the psychologist, they are figures rather than ground. Examples of sound signals can be acoustic warning devices like bells, whistles, horns, and sirens” (Schafer, 1977).

Soundmarks: “The term *soundmark* is derived from landmark and refers to a community sound which is unique or possesses qualities which make it specially regarded or noticed by the people in that community” (Schafer, 1977).

Schafer (1977) explains the soundscape also by using ‘hi-fi’ (high fidelity) and ‘lo-fi’ (low fidelity) terms. He explains that “The hi-fi soundscape is one in which discrete sounds can be heard clearly because of the low ambient noise level.” He adds that “The country is in generally more hi-fi than the city; night more than day; ancient times more than modern” (Schafer, 1977).

Barry Traux from the World Soundscape Project defines ‘soundscape’ as “an environment of sound with emphasis on the way it is perceived and understood by the individual or by a society” (Traux, 1978). In his aspect, the soundscape “depends on the relationship between the individual and any such environment. The term may refer to actual environments, or to abstract constructions such as musical compositions and tape montages, particularly when considered as an artificial environment” (Traux, 1978). If one considers World Soundscape Project as a school, its aspect is soundscape: human perception and experience of environmental sounds. This aspect differs from the urban-focused angle of Southworth while World Soundscape Project is planting the acoustic characteristics of environmental sounds from a compositional perspective by also emphasizing the sound characteristics of rural and nature in general.

In 2011, Pijanovski, Farina, Gage, and Krause defined ‘soundscape’ as “the collection of biological, geophysical and anthropogenic sounds that emanate from a landscape and which vary over space and time reflecting important ecosystem processes and human activities” (Pijanovski et al.2011a). This attitude is relating soundscape with landscape ecology. It goes back to musician and soundscape ecologist Bernie Krause’s *Into a Wild Sanctuary* book which he wrote in 1998.

Krause “coined the term biophony -derived from bio (means life in Greek) and phon (means sound in Greek)- to express the combined aural sensation that groups of living organisms produce in any given biome” (Krause, 2008). Between 2001-2002 Bernie Krause and entomologist Stuart Gage suggested two other components of soundscape addition to biophony:

One was the term geophony: the nonbiological sources of natural sound, such as landslides, wind, weather, water and geophysical acoustic phenomenon (earthquakes, avalanches, volcanoes and other geothermal events). The other term was anthropony; defined as all of the human-generated sounds that occur in a given environment: physiological (talking, grunting, body sounds), electromechanical, controlled sound (music, theatre, etc.) and incidental (walking, clothes rustling, etc) (Krause, 2008).

All these different approaches to soundscape which this thesis comprises, are the basic historical concepts helping to understand and finally intervene living spaces or make installations involving sound.

Approaching to soundscapes as a complement of biophony, geophony and anthropony leads us to the concept of ‘Soundscape Ecology’.

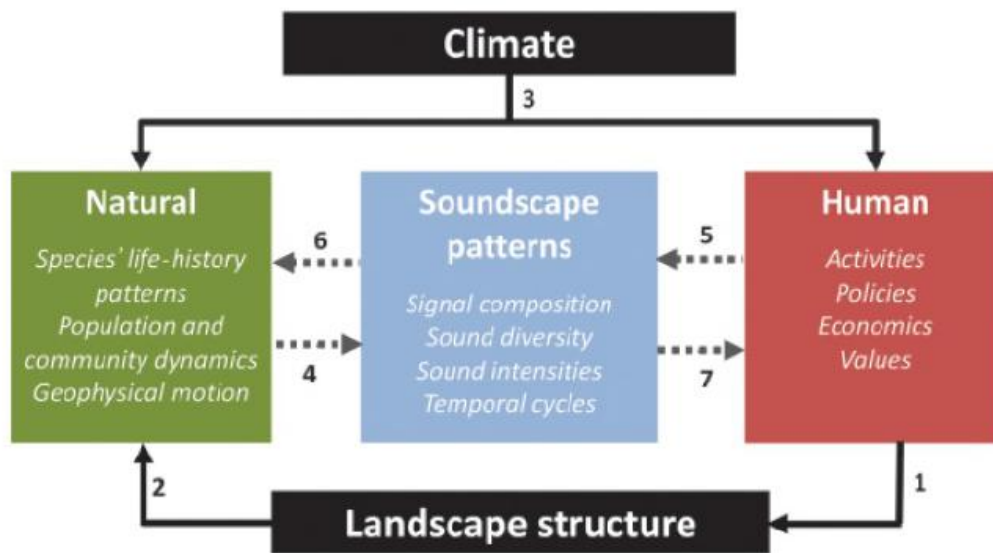
## **2.2 Soundscape Ecology**

Truax who coined the term construes ‘soundscape ecology’ as “the study of the effects of the acoustic environment, or soundscape, on the physical responses or behavioural characteristics of those living within it. Its particular aim is to draw attention to imbalances which may have unhealthy or inimical effects” (Truax, 1978). He also highlights that it is also termed as ‘acoustic ecology’. About 33 years after that, in 2011, Traux specified soundscape ecology in an article which he co-wrote with Barrett as “a new synthesis that leverages landscape ecology and acoustic ecology” (Truax and Barrett, 2011). In these definitions, it seems like Truax came to the idea that acoustic ecology and soundscape ecology pose differences. Pijanowski et al. are describing sound ecology as “all sounds, those of biophony, geophony, and anthropony, emanating from a given landscape to create unique acoustical patterns across a variety of spatial and temporal scales” (Pijanowski et al.2011b). They suggest that in the definitions of Schafer (1978) and Truax (1978) acoustic ecology “is seen as complementary to traditional ecological concepts rather than situated within them” (Pijanowski et al.2011b). And “largely emphasizes human-centered

inquiry rather than the larger socio-ecological system approach” (Pijanovski et al.2011b).

Pijanovski et al. (2011b) noted that their “Conceptual Framework of Soundscape Ecology” bases soundscape ecology on the same foundations as landscape ecology: “natural and human systems interacting to form spatial-temporal patterning of sound in landscapes” (Pijanovski et al.2011b).

Figure 2.1 shows biological, geophysical and anthropogenic processes influence/transform each other which Pijanovski et al. (2011b) synthesized deriving from several theories.



**Figure 2.1:** Structure of Soundscape Ecology (Pijanovski et al.2011b).

### 2.3 Deep Listening

Deep listening and soundwalk are two notions for enlightening the research of sonic experience and sound interventions in living spaces. American composer Pauline Oliveros coined the term ‘Deep Listening’. She found the term while composing ‘Sonic Meditations’ of which she explains as “a body of work that could be done by persons without musical training” (Oliveros, 2005). Oliveros (2005) delineates the pieces in this work as “based on patterns of attention” and “ways of listening and responding” as well. She says that these are the basis of deep listening. When she came up with the idea that musicians were playing but not actually listening, she wrote some exercises for “bring her students attention to listening through

observation and sounding” (Oliveros, 2005). Before defining ‘deep listening’ she first marks that hearing and listening are two different concepts. She demonstrates that “to hear is the physical means that enable auditory perception. To listen is to give attention to what is perceived both acoustically and psychologically” (Oliveros, 2005). So listening is an ‘act’ done by a conscious and paying attention to the sound while hearing is an auditory sensation and not related to paying thoughtful attention to the sound. Starting from this view, Oliveros explains ‘deep listening’ as: “Learning to expand the perception of sounds to include the whole space/time continuum of sound-encountering the vastness and complexities as much as possible” (Oliveros, 2005).

The training exercises for deep listening are the practices that Oliveros thought for her students. She emphasizes that this is a practice that can be done by anybody, not necessarily by musicians.

Deep listening concept influenced the research and the works of sound recordists, soundscape composers, soundscape designers etc. Independent researcher and practitioner Lacey (2016) tells that Oliveros’s “approach has encouraged my own practice of concentrated listening preceding sonic interactions with sonic ecologies” (Lacey, 2016).

## **2.4 Soundwalk**

Soundwalk is a listening exercise introduced by WSP. Sound recorder and composer Hildegard Westerkamp is one of the pioneers who practiced soundwalks. Lacey (2016) describes soundwalk as “a group event in which participants walk in silence and by listening attentively, become fully conscious of the sonic environment (Lacey, 2016).

As Westerkamp (2006) puts “a soundwalk is any excursion whose main purpose is listening to the environment. It is an exploration of our ear/environment relationship, unmediated by microphones, headphones and recording equipment. It is an exploration of what the ‘naked ear’ hears and how we relate and react to it” (Westerkamp, 2006).

Westerkamp (2006), defines the effects / benefits of soundwalk as follows:

Alerting senses, heighten aural perception, noticing unique soundscape characteristics of a location,

“Raise general consciousness towards the acoustic environment...Creates a living connection between listener and place.”

Meditation effect: Be aware of the surrounding environment but not engaging with it.

“Spend time in a social grouping without speaking”

An unusual experience that affects in public space by breaking the daily routine both for soundwalkers and observers who pass by.

“A soundwalk does not only reveal relationships within the acoustic environment but perhaps more importantly, makes relationships conscious between listeners’ experiences and their acoustic - social environment” (Westerkamp, 2006).

Mccartney and Paquette (2012) say that “the practise of soundwalking reveals the intimate connection among inhabitants and their urban environments by highlighting the relationship between movements, sounds, and spaces” (Mccartney & Paquette, 2012).

## **2.5 Noise**

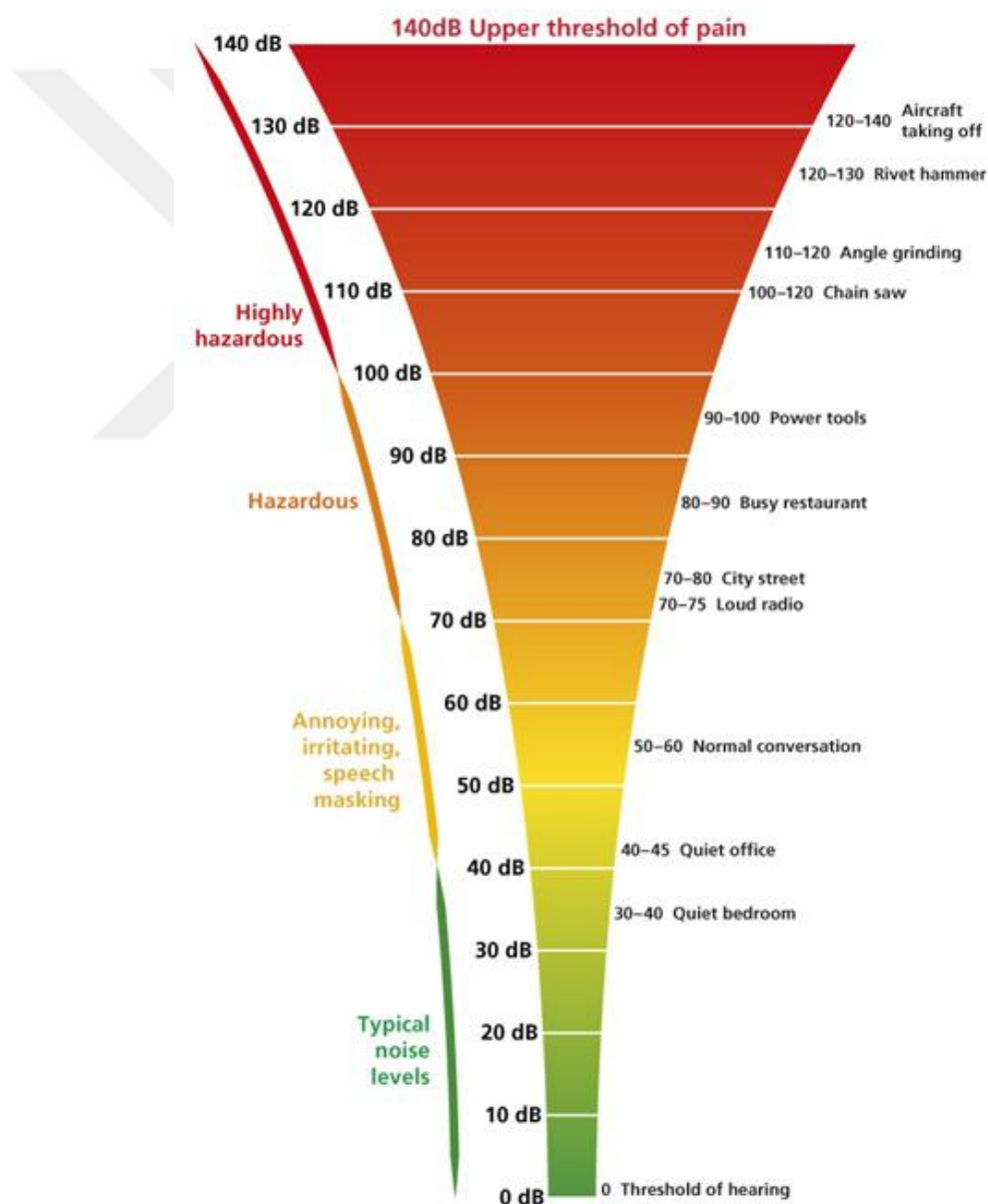
Noise is one of the fundamental notions in the soundscape field. Most of the spatial sound design works are made considering the noise treatment strategy because the hearing health and welfare come before listening pleasure and aesthetics. If there is a problem with hearing health, it can’t be ignored.

Traux (1978) sorts the definitions of the noise as such:

- “1. Unwanted sound
2. Unmusical sound
3. Any loud sound
4. Disturbance in any communication system” (Traux, 1978).

The most indispensable issue about noise is the loudness of the sound which can cause health damages like hearing loss. When the level of the sound gradually decreases, danger threshold of the noise also decreases but, the sound can still be uncomfortable or irritating causing a decrease in life quality.

In the case of the urban soundscape design, the definitions of “any loud sound” and “unwanted sound” are the focus points because the hearing health is fundamental within any discipline including urban soundscape planning. The most significant examples of quasi-damaging loud sounds can be heard in cities in the aircraft sound. This is one of the reasons that airports are built at a certain distance to the settlements. The loudness of the sound is expressed in ‘decibels’. According to Traux’s (1978) definition, “The measurement of the intensity of a sound in comparison to another sound or fixed level as expressed in decibels” (Traux, 1978). In the Figure 2.2, the average decibel levels (dBA) of some common sounds are showed.



**Figure 2.2:** Decibel Levels of Everyday Sounds (Noise Level Chart, 2019).

“Unwanted sound” is a much more common problem in the cities. According to Hedfors (2003), “Environmental noise management has been criticised as being too focused on sound pressure levels and failing to provide a nuanced understanding in which the actual experience of sound is given due recognition” (Hedfors, 2003, as cited in Cérwen, 2017). The traffic and construction noise are the noises that sometimes people do not even notice. They are like background noises or “keynote sounds” (see: Chapter 2.1). The discomfort of this kind of continuously unwanted sounds are generally noticed if they suddenly stop. When they continue in the background indefinitely, they may subconsciously intervene in the moods of the people.

The noise management in urban soundscape design is generally based on reduction and masking the noise.

Besides, for the noise treatment, there are also different approaches that turn noise into an element of design instead of treating the noise as an unwanted sound.

## **2.6 A Different Approach to Noise**

The use of noise in a musical context is known as Luigi Russolo’s Futurist Manifesto, which is one of the basic manifestos in Italian Futurism. He suggests that ancient life without machines, traffic and “noise” was silent and the ears of humans were used to listen to nature. Now with the invention and progress of modern machines and technology, our listening habits and even admirations have been changed (Russolo, 1967).

In his manifesto, Russolo emphasizes that the ear of the eighteen-century human was not accustomed to the inharmonious sounds in a musical orchestra. But educated ears which are accustomed to modern life demand a more different range of music even if it is discordant and maybe even better when it is discordant.

Dreadless, with the development of modern technology and life, aural perception or hearing has been changed. In the foreword of “Sonic Experience – A Guide to Everyday Sounds” Schafer remarks; “The loss of distant hearing is one of the most significant changes in aural perception in history. Everything in the urban environment is present and happening everywhere at once” (Augoyard and Torgue, 1995).

The changing perception may also be related to the change in the way of thinking. The prospect of pleasure now contains to be excited with strange, indefinable music or just the environmental sounds which aren't composed. This kind of pleasure can be associated with the feeling of pleasure obtained in a situation of rupture in perception. According to Schafer, this kind of pleasure is sourced by perceptive confusion. In the foreword of "Sonic Experience..." Shaffer explains that in order to explain this kind of pleasure Augoyard and Torgue (1995) are transferring an ancient Chinese concept to the realm of the urban sound environment: 'Sharawadji' which is a concept that means "an unexpected perception of beauty in the absence of any discernible order or arrangement" (Augoyard and Torgue, 1995).

In "Sonic Experience", Augoyard and Torgue speak of 'Sonic Effects'. Sonic Effects is a research conducted by "Centre de Recherche Sur L'espace Sonore et L'environnement urbain" for the investigation of sonic perception and behaviors in everyday life, especially in the urban environment. For this research, "Centre de Recherche Sur L'espace Sonore et L'environnement urbain" collected information about the effects by posing surveys with inhabitants. The inhabitants talked about the effects such as cut out, niche, masking, and reverberation. Augoyard and Torgue (1995) state: "the environment can be considered as a reservoir of sound possibilities, an instrumentarium used to give substance and shape to human relations and the everyday management of urban space" (Augoyard and Torgue, 1995). They see the sonic effects which can be perceived in urban environment as instruments that can also give information to urban planners, landscape architectures and social scientists. Moreover, these perceivable effects open the way to make interventions in urban sound environment.

Analyzing the perceivable effects in urban environment can encourage the researchers working at the interface of urban planning/design and sound make interventions on urban sound.



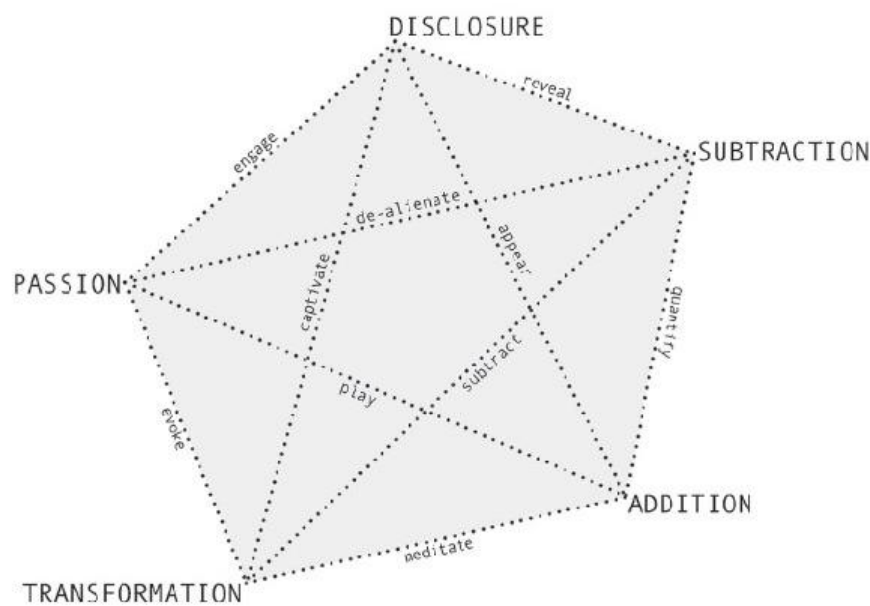
### **3. PREVIOUS WORKS OF METHODS AND GUIDES IN URBAN SOUNDSCAPE DESIGN**

In soundscape design history, there have been several approaches, strategies, methods, and guides which can be regarded as auxiliary tools in order to define and treat the environmental sounds. These works belong to a comparatively early period of the soundscape literature. The pioneers who planted these early methods and to whom are referred are Murray Schafer, Barry Truax, Michel Chion and Jean François Augoyard&Henri Torgue. However, although their works have been forming the base of soundscape design; evaluating the soundscape as a component of urban and landscape design and developing design methods is the issue of the last 5 years. The objective of the thesis is to determine some principles and approaches about the soundscape design in public spaces in order to enhance the creative value of the space. Thus, in order to make a contribution to the literature, it is essential to introduce and examine the previous methods which have been developing in soundscape design field. The intentions of introducing the approaches, methods, and guides in urban soundscape design in the last five years were described as previous works. The aim of choosing very recent works is to be able to know how the soundscape notion is introduced in urban design and landscape architecture disciplines in recent years in order to facilitate further contributions.

The common aim of spatial soundscape design researchers and practitioners is that “there is a need for new sonic tools in practical spatial planning and landscape design for acoustic considerations besides issues of noise abatement” (Hedfors, 2003).

The interdisciplinary artist and researcher Jordan Lacey (2016) developed an urban soundscape design methodology model called “Sonic Rupture”. In his work Lacey (2016) described “five approaches to urban soundscape design: Addition, subtraction, passion, transformation, and disclosure” (Lacey, 2016). He developed these manners by pondering the sound art installations related to urban space. These five attitudes categorize the “ways of using sound” as a design tool in urban

environment. He also describes ten other approaches categorizing “the intentions of using sound”. These intentions are such as: “Reveal, captivate, evoke, play, appear, subtract, quantity, mediate, de-alienate, engage” (Lacey, 2016). The intentions and the methods Lacey (2016) is suggesting can be considered as the elements of one of the guidelines of urban soundscape design. He marks that describing the approaches of methods and intentions is an ongoing process and further additions can be made. He relates the intentions with the methods and thus forms a visual model showing these relations (Figure 3.1).



**Figure 3.1:** Sonic Rupture Model of Lacey (Lacey, 2016, p:143).

Lacey (2016) describes the five urban sound design attitudes (they also may be considered or interpreted as methods in this thesis) as such briefly:

1. Addition: Addition is “introducing sounds that interact with the urban soundscape in some way” (Lacey, 2016).
2. Subtraction: Removing dominating noises for preventing “urban noise pollution and its alienating effects” (Lacey, 2016), revealing the existing but hidden endemic sounds etc. Subtracting a sound is more complex and difficult than adding sound.
3. Passion: Lacey (2016) defines the works under his “passion” approach as such: “What is common to all these works, and that which exemplifies the passion

approach, is a desire to draw a passionate response from the listener” (Lacey, 2016).

4. Transformation: As Lacey (2016) coins, by “transformation of everyday sounds into new sonic experiences, newly effective environments challenge the everyday programming of space.” Lacey (2016) divulges its difference from “passion” approach such as: “While ‘passion’ approach seeks to extract our passions - states for play or emotive response- ‘transformation’ has the capacity to suspend perception in-between dreaming and awakened state.” For example, by transforming the traffic noises into the meditative sounds, it is possible to evoke the imaginative world of individuals and thus change the perception of reality for a while in daily life.

5. Disclosure: Lacey (2016) describes this manner as “the approach that reveals the complexity of the urban environment, which is typically hidden by the dominating sounds of the everyday” (Lacey, 2016).

Lacey (2016) suggests the ten intentions of soundscape design (according to his experiences in the field) which of each two of the approaches are corresponding to:

1. Reveal: Removing or subtracting some dominating sounds (unwanted sounds of the traffic for example) which mask some other sounds of the space, thus, revealing the “hidden” sounds of the sonic environment. Subtraction and disclosure are the relevant approaches.

2. Captivate: Attract the listener’s attention by transforming the “sonic ecology” of the space such as transforming an unheard endemic sound to a heard sound. Transformation and disclosure are the relevant approaches.

3. Evoke: Creating an alternative to the functionalist use (shaped around consumerism) of urban spaces by making arrangements that can evoke emotions of the people and thus give them “passion” by increasing the joy and creativeness. Passion and transformation are the relevant approaches.

4. Play: To find ways to increase the “playfulness” of the space by making unstructured arrangements such as the arrangements apart from “bars, parks and festivals” (Lacey, 2016). Passion and addition are the relevant approaches.

5. Appear: Revealing the hidden sounds of the environment by adding something to space in contrast with subtracting. Addition and disclosure are the relevant approaches.

6. Subtract: Literally subtracting or removing noises. Subtraction and transformation are the relevant approaches.

7. Quantity: Adding or subtracting the sounds with very scientific and practical reasons. Considering the quantifiable values like “volume levels, density of materials, hours of operation” (Lacey, 2016) etc. Addition and subtraction are the relevant approaches.

8. Meditate: By addition method, noise can be transformed into meditative sounds. Addition and transformation are the relevant approaches.

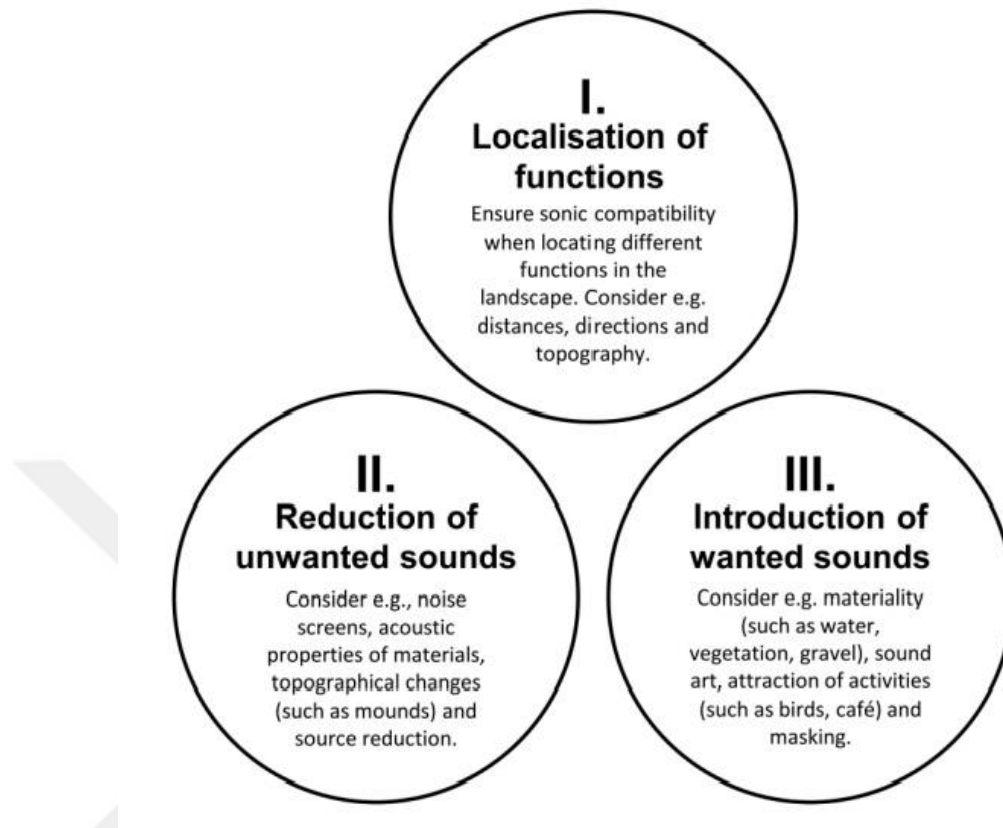
9. De-alienate: “Homogeneous fields of noise cause the human subject to withdraw from the everyday” (Lacey, 2016). De-alienate the people who have been alienated from the environment they live in. Passion and subtraction are the relevant approaches.

10. Engage: Intention of making people participate in urban space such as providing interactive events / installations. Passion and disclosure are the relevant approaches.

One year after Lacey’s (2016) work, landscape architect and sound researcher Gunnar Cerwén introduced another approach model consisting of the strategies of using sound as a landscape architecture element. The three strategies are as follows: “Localisation of functions, reduction of unwanted sounds and introduction of wanted sounds” (Cerwén, 2017).

Cerwén’s model and the actions that he describes clarify the exact technical methodologies that can be used more, compared to Lacey’s work. While Lacey tells us subtraction of noise is an approach to the treatment of noise; Cerwén is describing how to reduce noise for example, by installing “High noise screens”. Furthermore, while Cerwén’s general focus/approach is on the “Treatment of noise”, Lacey adopts a wider approach as containing sound art installation examples. Lacey has a more philosophical approach as he departs from the “affection” theory based on Spinoza. Cerwén sets a clearer and technically more readable approach.

Figure 3.2 shows the three strategies and Figure 3.3 shows 23 “soundscape actions” under those three strategies which Cerwén (2017) introduced.



**Figure 3.2:** Three main soundscape design strategies (Cerwén, 2017).

|  |  |
|--|--|
| <p><b>I) Localisation of functions</b><br/>           Compensation/variation<br/>           Avoid unwanted sound<br/>           Embrace unwanted sound<br/>           Embrace wanted sound</p>   | <p><b>III) Introduction of wanted sounds</b><br/>           Auditory masking<br/>           Visual masking<br/>           Materiality (water)<br/>           Materiality (vegetation)<br/>           Materiality (walking)<br/>           Atmospheric design (loudspeaker-based)<br/>           Sound sculpture and urban furniture<br/>           Biotope design<br/>           Attract activities<br/>           Resonance and reflections</p> |
| <p><b>II) Reduction of unwanted sounds</b><br/>           Vegetation for noise reduction<br/>           High noise screens<br/>           Low noise screens<br/>           Buildings as screens<br/>           Change topography<br/>           Reduce source activity<br/>           Abolish certain functions<br/>           Maintenance<br/>           Absorbing qualities of materials</p> |  |

**Figure 3.3:** Soundscape actions which Cerwén (2017) suggests (Cerwén, 2017).



#### **4. OPEN PUBLIC SPACE SOUNDSCAPE DESIGN PRECEDENTS ACCORDING TO DESIGN OBJECTIVES**

In the context of the thesis, determining a categorization method for analysing the case studies of soundscape design is proposed. To determine a categorization method, the case studies were chosen according to three main design objectives: “Noise treatment”, “Aesthetics” and “Supportive sound works”. The design objectives were determined according to the contribution of the work to the public space. Noise treatment section is the most essential issue of the soundscape design as the control of the sound levels is very important for the health. Sounds that exceed the average threshold of hearing can cause serious damage to health. The aesthetics section includes sound works which appeal to pleasure. They are not necessarily intending to solve a problem. Supportive works are using sounds as auxiliary elements for indicating socio-political issues or solving problems which are not related to the soundscape of the space.

The three design objectives and their definitions:

Noise Treatment: The aim is focusing to find solutions against environmental noise or unwanted sounds.

Aesthetics: The aim is to enhance the acoustic quality and the sonic aesthetics of the space.

Supportive sound works: The aim is to raise awareness about ecological-sociological-political issues using sound as a secondary element.

Nine case studies are chosen according to these three main design objectives. The reason of especially choosing these works is as such: The fact that they are permanently or temporally installed or constructed projects (performances are excluded); Their success of integrating sound with open urban space use; their wide recognition and effectiveness; their level of using technical knowledge about sound and engineering; the ease of finding their technical informations.

The date range of the years of the selected case studies is between 1987 and 2015. However, there was not a particular reason to choose this range.

The works under three objectives are examined then according to nine categories: Description, Objective, Design Approach, Societal Goal, Implementation Method, Technical Method, Relevant Concept, Relevant Sound Characteristic and Output.

The nine categories and their definitions:

Description: The statement of the project

Objective: The purpose/intentions of the project

Design Approach: The explanation of how sound is used as a design tool

Societal Goal: The upper-scale strategy of the project for the welfare of the community

Implementation Method: The construction/production type of the project

Technical Method: Production/construction details of the sound work

Relevant Concept: The guide concepts/notions relevant to the work

Relevant Sound Characteristic: The acoustic features of sound relevant to the work

Outputs: Possible or experimented benefits of the project

## **4.1 Noise Treatment**

### **4.1.1 Buitenschot park (noise reduction park)**

Description: A recreational park which is designed by H+N+S Landscape Architects in Amsterdam, in 2013 that “simultaneously reduces ground noise from the airport. Ground noise is low-frequency noise caused by aircraft taking off” (Buitenschot Park, 2016). The project was implemented on 36 ha area.

Objective: Creating a buffer zone between the airport and the settlement for reducing the noise reaching to the settlement, and creating an aesthetical green area. “After the Polderbaan (5th runway at Schiphol Airport) was opened for operation in 2003, residents in the area were disturbed by ground noise (low-frequency noise caused by aircraft taking off). It was concluded that a 10dB reduction would seriously reduce the noise. Residents noticed that the noise was reduced when farmlands were

ploughed. This was the starting point for research into noise-reducing landscaping” (Land Art and Soundscape, 2013). Figure 4.1 shows the bird-eye view of the park.



**Figure 4.1:** Buitenschot Park (Buitenschot Park, 2016).

Design Approach: Noise reduction by topography changing and sound dispersion.  
Problem solving.

Societal goal: Sanitary, enhance acoustic quality.

Method: Permanent artificial topography construction

Technical Method: Sound dispersion. The three-meter high embankments disperse the ground noise. “The ground ridges are placed perpendicular to the sound waves for optimal sound reduction” (Buitenschot Park, 2016). By the ridges, the sound is deflecting in different directions.

Relevant Concept: Land art, soundscape

Relevant sound characteristic: Noise, ground noise, low-frequency.

Outputs/contributions to public space: Besides providing comfort in the residential area, the park is a large land art project with several sports possibilities and other art projects.



#### 4.1.2 West seoul lake park - sound fountain

Description: Installation of fountains which works responsively when an aircraft noise exceeds 81 decibels and thus, converting the disturbing quality of aircraft noise to an enjoyable event. The project was made in Seoul, by Ctopos Design, as a part of “West Seoul Lake Park” project, in 2011 (Figure 4.4).



**Figure 4.4:** West Seoul Lake Park - Sound Fountain (ASLA, 2014).

Objective: Find solution against “the periodic 1-2 minute roars from aircraft noise, that came from Kimpo International airport” (Kwon, J., & Spirn, A., 2014). And thus, increasing the life quality/welfare of the environment by creating an entertaining event and adding the water jet sound.

Design approach: Problem-solving - Reinterpret the noise as an entertaining element. Turn the negative perception of sound to a pleasant-positive perception. Sound-masking by using water jet. Adding a new sound to the composition.

Societal goal: Enhancing the social welfare of the public space, enhancing acoustic quality.

Approach of the upper scale: Revitalize the area as an eco-friendly park.

Method: Technical equipment installation

Technical method: Responsive design-Using responsive sound sensors - “41 fountains sense the noise of aircraft and automatically spews over 15 meters high water jets when the noise is over 811b” (Kwon, J., & Spirn, A., 2014).

Sound usage technique:

Using sound as an auxiliary launch tool, not as a main element/component

Adding sound of water jet to the sound of aircraft

Relevant concept: Soundscape ecology

Relevant sound characteristic: Noise, sound masking

Outputs/contributions to the public space: Turning a disadvantageous situation into a desired public event.

#### **4.1.3 Harmonic bridge**

Description: A permanent installation made by artist duo O+A in in Massachusetts, in 1998. The work generates harmony from the roadway noise of the highway. In other words, “changing noise into music real-time” (Harmonic Bridge, 1998). Figure 4.5 shows the loudspeaker which emit the harmonic sounds under the bridge.



**Figure 4.5:** Harmonic Bridge Waves (Harmonic Bridge, 1998).

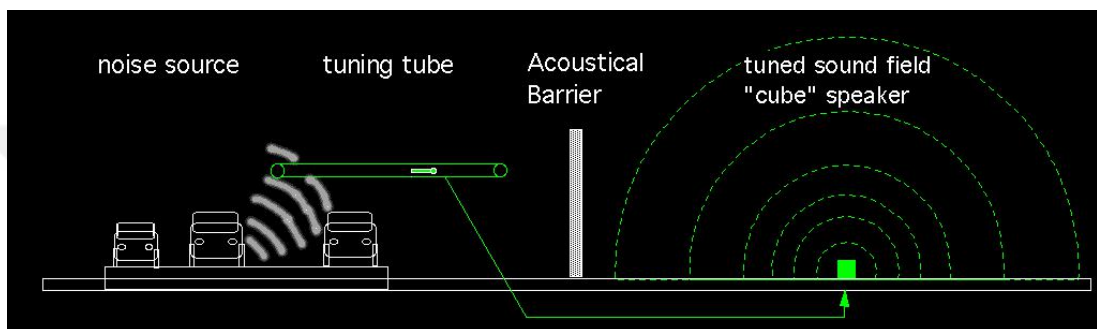
Objective: Transforming the noises of traffic into harmonic/musical sound.

Design Approach: In contrast with the approach of reducing the noise, adopting an adaptive approach such as appreciation and transformation of the noise.

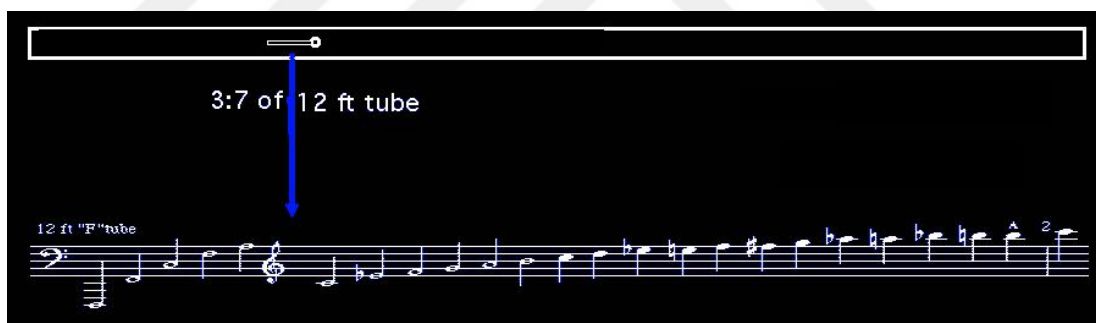
Societal goal: Increasing social interaction on public space, enhancing acoustic quality.

Method: Permanent installation.

Technical Method: Manipulating sounds of traffic by using the tubes as harmonic resonators and capturing that filtrated sound by a microphone, which is installed in the tube, and emit this sound to the loudspeakers located under the highway bridge. The harmonic sounds create a sound space under the bridge which can be heard as continuous ambience music (which is called “drone”). While Figure 4.6 shows the section of the projects, Figure 4.7 shows the notes which are generated by the tube effect.



**Figure 4.6:** Tuning Tube System (Tuning Tube Basics, 1998).



## 4.2 Aesthetics and Pleasure

The sound projects which make contributions to public space as euphonic aesthetical elements are described in this section. The objective of this kind of works is not necessarily problem solving but it is adding a new design element in space in order to enhance the pleasure of the people who experience the public space.

### 4.2.1 The forest megaphones

Description: The megaphones which amplify the natural sounds of the forest are made by Estonian interior architecture students in in Võru County city of Estonia, by the RMK Pähni Nature Centre, in 2015 (Figure 4.8).



**Figure 4.8:** The Forest Megaphones (Managh, A. G., 2015).

Objective: Make people listen to the sound of nature/meditation.

Design approach: Enhancing the listening experience by amplifying the existing sound of the environment. Draw attention to the biophony.

Societal goal: Raising awareness for soundscape ecology. Enhancing the acoustic quality.

Method: Installation

Technical method: Using the megaphones to increase the amplitude of the sound. The sound wave which enters the narrow part of megaphone has high pressure. As the pressure wave moves towards the wider mouth of the megaphone, the pressure decreases, and the amplitude increases (How does a megaphone amplify sound?, 2016).

Relevant concept: Landscape ecology, sound ecology, sound art, sound sculpture, biophony

Relevant sound characteristic: Amplitude, pressure wave, amplifier

Outputs/contributions to public space: Creating a space fully dedicated to listening to the sound of nature. Creating a collective/social listening experience. Creating temporary sleeping/resting shelter for travelers and passengers. Figure 4.9 and Figure 4.10 show the example usages of the “Forest Megaphones”.



**Figure 4.9:** The Forest Megaphones (Azzarello, N., 2015).



**Figure 4.10:** The Forest Megaphones (Azzarello, N., 2015).

#### 4.2.2 Le cylindre sonore

Description: Le Cylindre Sonore was designed by the architect and sound designer Bernhard Leitner in 1987 in Parque de la Villette of Paris. Le Cylindre Sonore is “Within two layers of tall cylindrical concrete walls, located beneath ground level and surrounded by bamboo forests, are twenty four loudspeakers that play sounds that resonate within the cylinder” (Lacey, 2016, p:150).

Objective: Providing a concentrated listening experience, meditation, “transcendence of the place” (Le Cylindre Sonore, 2015).

Design approach: Augmenting the existing sounds by adding resonating walls and adding external sounds which are complementary with the natural sounds.

Societal goal: Enhancing the acoustic quality.

Method: Permanent construction

Technical method: “Behind the eight perforated concrete elements three loudspeakers have been mounted vertically like a column. The circular space between the two curved walls is a functional space for the maintenance of the loudspeakers. It provides access to the control room under the ground” (Lopez, 2011). The circled installation augments the frequencies of the compositions heard through the speakers by the resonance of two curved walls. Besides the compositions which were produced electronically, the acoustic property of the space also allows that the acoustical sounds would be augmented. For example, the rivulets which flow through the water channels around the space are being tuned within the resonated space, naturally.

Relevant concept: Soundscape ecology, sound spatialization, sound art, sound sculpture, biophony

Relevant sound characteristic: Resonation, pre-recorded sound sample.

Outputs/contributions to public space: Enhance the relationship between public space and people by augmenting the natural sounds of the environment. Figure 4.11 shows the bird-eye view of “Le Cylindre Sonore” and Figure 4.12 shows the details of Le Cylindre Sonore.



**Figure 4.11:** Le Cylindre Sonore (Lopez, 2011).



**Figure 4.12:** Le Cylindre Sonore - Details (Lopez, 2011).

### 4.2.3 Sea organ

Description: Made by Nikola Basic in 2005 in Zadar, Croatia. It is a sitting place which consists of white stone steps and “35 musically tuned tubes underneath with whistle openings on the side-walk” (Sea Organ, 2005). “The movement of the sea pushes air through, and – depending on the size and velocity of the wave – musical chords are played. The waves create random harmonic sounds” (Sea Organ, 2005).

Objective: Create an acoustically pleasant environment in order to restore the relationship between the sea and the habitants in Zadar. The most seashore of Zadar “was damaged in World War II turned much of the sea front into an unbroken, monotonous concrete wall. Now, the inviting white marble steps lead down to the water” (Sea Organ, 2005).

Design approach: Problem solving. Revealing use of the hidden sonic values of nature by using simple materials for the acoustic pleasure of people. Re-value the seashore of Zadar by attributing it new meaning as a concert-hall of the sea and the wind. Transforming a geophysical element to musical notes (Figure 4.13).

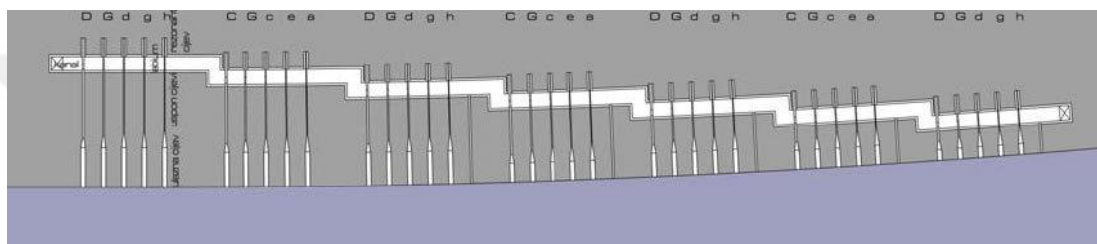


**Figure 4.13:** Sea Organ (Hear This Croatian Seawall Sing, 2015).

Societal goal: Revitalising open public space, enhancing acoustic quality, raising acoustic awareness.

Method: Permanent construction

Technical method: Responsive design - using sea waves as a trigger of wind and thus the harmonies inside of the pipes underneath the steps. Benefits from the resonance of air tubes. No use of any electronic device, son can be counted as a sound sculpture as well. The functioning principle is similar to the pipe organs blown by air. While Figure 4.14 shows the plan, Figure 4.15 shows the air hole details of the of the “Sea Organ” Project.



**Figure 4.14:** "The hidden structure of the musical Sea Organ, and the tuning scheme, detailing the chords and musical notes played by the sea" (Sea Organ, 2005).



**Figure 4.15:** Air Holes (Sea Organ, 2005).

Relevant concepts: Sound art, sound sculpture, psychoacoustics

Relevant sound characteristics: Resonance, vibrating air columns, standing wave harmonics, reverberation

Outputs/contributions to public space: Enhance the relationship between public space and people. Creating a romantic and pleasant spot for both the dwellers and the tourists. Appealing to emotions.

#### **4.2.4 Diana, princess of wales memorial fountain**

Description: A memorial fountain which was designed in remembrance of Princess Diana who died in 1997, was implemented in Hyde Park/London and opened in 2004. The fountain is not a construction which is made aiming to be a sound design element, but can be inspirational by its sonic characteristics.

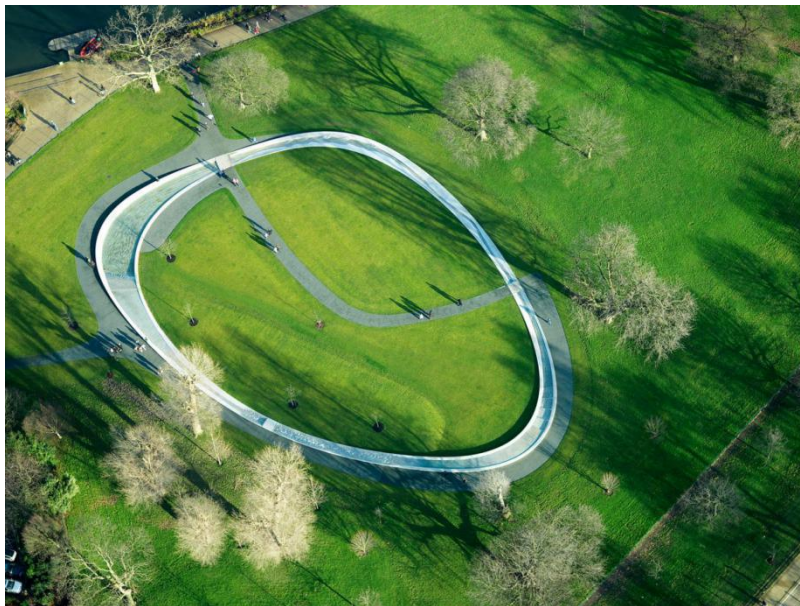
Objective: Creating an enjoyable interaction place for especially families with children as a memorial element which symbolises the love of children of Princess Diana.

Design approach: Enhancing the interaction by creating an accessible water course with many movement possibilities and adding visual and sonic varieties on the construction. Combining the two design elements: Water fountain and sound. Benefit from water flow on different surfaces to create percussion instruments effect.

Societal goal: Increasing social interaction.

Method: Permanent construction

Figure 4.16 shows the bird-eye view of the fountain.



**Figure 4.16:** Diana, Princess of Wales Memorial Fountain (Diana, Princess of Wales, 2017).

Technical method: The fountain has a watercourse in which the water flows constantly. The watercourse has several different parts consisting of different textures, patterns, depth and width. “water features on its surface make the water tumble, cascade, curl and bubble as it ran its course” because of these different textures (Diana, 2014). Figure 4.17 shows the texture details of the fountain.



**Figure 4.17:** Texture details (Diana, Princess of Wales, 2017).

### **4.3 Supportive Sound Works for Social-ecological Purposes**

“Supportive Sound Works” are not made for transforming or enhancing the acoustic quality of the spaces. This category is proposed to refer to the design precedents which use sound as an auxiliary/secondary element in order to solve the social-ecological problems or enhance the social-ecological quality of the space.

#### **4.3.1 Touched echo**

Description: Touched Echo is a memorial sound installation, designed by digital media artist Markus Kison, installed in a public space in Dresden in 2007. The work consists of the noise of carpet bombing explosions of 1945’s Dresden which was in the Second World War and the noise just can be listened by leaning the elbows on the balustrade; the installation is silent until touching it.

Objective: Indicating and emphasising the dreadfulness of the war by using the powerful effect of the sound of the bombs.

Design Approach: Using bone conduction technology integrated with a hard landscape element. Adding bone conduction speaker which transmits sound through bones. Through this, making an interactive design in which the people can locate themselves like protecting their ears by their hands against the noise of the bombs (Figure 4.18).



**Figure 4.18:** Touched Echo (Kison, M., 2007).

Societal goal: Empowering collective memory.

Method: Permanent installation

Technical Method: Responsive technology. "Bone conduction transmission is a technology originally used in military. It's the conduction of sound to the inner ear through the bones of the skull" (Bone Conduction Technology, 2019).

Relevant Concept: Sound art

Relevant Sound Characteristic: Acoustic transmission, vibration, resonance

Outputs/contributions to public space: Making people consider the war heritage collectively in the public space.

Figure 4.19 and 4.20 show the details of the installation.



**Figure 4.19:** Touched Echo (Kison, M., 2007).



**Figure 4.20:** Bone Conductor Integrated Into the Railing (Kison, M., 2007).

### **4.3.2 The World's Deepest Bin**

Description: The Fun Theory (2009) is a technology/art collective that is sponsored by Volkswagen. They are using sound as a fun element in order to “change people’s behaviour” by encouraging them (Merchant, B., 2009). In “The World’s Deepest

Bin” project, the group installed a sound sensor which triggers a sound record like ‘something is falling from a very high place’ inside of trash bins in order to prevent people from throwing their wastes on the streets and encourage them to use the garbage bins.

Objective: Change people’s behaviour of polluting the streets (Figure 4.21).



**Figure 21:** The World’s Deepest Bin (Merchant, B., 2009).

Design approach: Problem-solving. Using responsive technology integrated with urban furniture. Adding a new sound in public space.

Societal goal: Raising awareness for ecological environment.

Method: Installation

Technical method: Responsive design-Using responsive sound sensors. By the sensors which are installed on top-inside part of the bin, the move of garbage throwing people’s hands is detected, the sound player which is connected to the sensor is triggered and the sound is heard by the speakers.

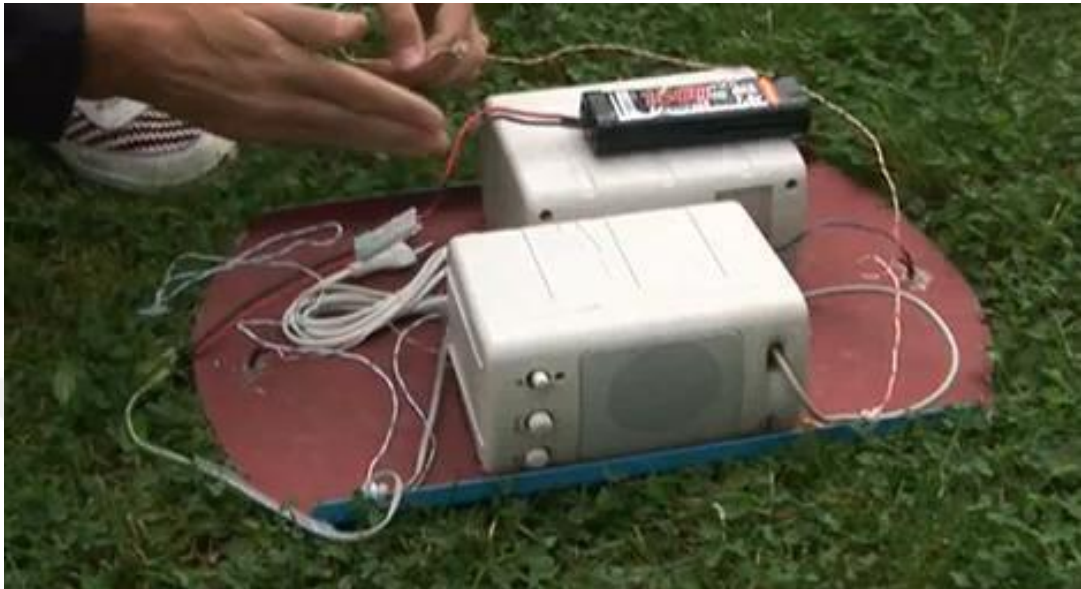
Relevant concept: Landscape ecology, behavioural change

Relevant sound characteristic: Pre-recorded sound sample

Outputs/contributions to public space: Prevention of garbage pollution. Making people have a peculiar public space experience; make them bedazzled and direct

them to ponder investigating the source of the sound; allow them to look inside of a garbage bin.

Figure 4.22 and 4.23 show the technical details of the installation.



**Figure 4.22:** Installation of the sound players, speakers and sensors (How do I build the world's deepest trash can, 2009).



**Figure 4.23:** Installation of the sound players, speakers and sensors (Goldman, D., 2013).



## 5. DISCUSSIONS OF THE CASE STUDIES

In the “Open Public Space Soundscape Design Precedents According to Design Objectives” section, a categorization is developed through the case studies which use sound in the open urban public spaces; and facilitator, clear and standardizing analysis categories were proposed. These categories can be useful for examining the existing urban sound design studies in an abbreviated and simplified way. The categories can be used also for the future conceptual design processes of the projects as a start guideline. However, this categorization is cultivated at the interface of urban design, landscape architecture and sound art and can change according to the other points of view. Therefore, it is important to approach this categorization proposal as a flexible, open-source. The main objective of creating the proposal is to trigger further research in the phase of the conceptual design of an urban soundscape design project.

After the categorization of each project; common points, similarities and differences are discussed as such:

The most important common characteristic of each case study is the usage of technical knowledge about the sound. In West Seoul Lake Park (2011), Touched Echo (2007) and The World’s Deepest Bin (2009) projects, responsive technology is used. In West Seoul Lake Park, sensors that activate the fountain are triggered by sound. In The World’s Deepest Bin, sensors which activate the sound triggered by touch or beat. In Touched Echo, there is no sensor but there is bone conduction which is the technology of spreading the sound vibrations through bones and transmitting the sound by touching. In Buitenschot Park (2013), The Forest Megaphones (2015) and Diana, Princess of Wales Memorial Fountain projects, direction by form technique is used. In Buitenschot Park, the direction of the aircraft’s ground noise is changed by embankments which cut the low-frequency sound waves in a horizontal way. In The Forest Megaphones sound is directed inside of huge megaphones in order to amplify the sound. In Diana, Princess of Wales Memorial Fountain the water is directed on the surfaces with different patterns/forms

and thus a percussion effect can be heard. Also, all these sound interventions are natural. In the Harmonic Bridge (1998) and the Sea Organ (2005) projects, tube effect is used. Tubes are used as harmonic resonators of air which is inside of the tubes. In the Harmonic Bridge example the sound, which is filtrated in the tubes, is being amplified by a speaker; in the Sea Organ it is amplified naturally. In the Le Cylindre Sonore (1987), pre-recorded sounds which are amplified by the speakers are resonated by flexible curved thin walls. This project is similar to the Harmonic Bridge with the use of a speaker and Touched Echo with the use of pre-recorded sounds. Also both Forest Megaphones and Harmonic bridge use materials for amplification of the sound.

The social goals of the projects are sanitary, social, ecological or their combinations. The economic goal is excluded. Under these inclusive, strategic goals; the outputs of the projects are not just related to the soundscape design but also related to the design of an interactive, lively, uniting public space with creativity trigger values. In Buitenschot Park, while reducing the noise of the aircraft for sanitary goals, a park with several sports possibilities and other art projects is provided. The artificial topographies are also being in very large scale land art elements while reducing the noise. Also in West Seoul Lake Park, the main objective was masking the noise of aircraft by the responsive fountains and its public output remained successful. An unpleasant fact of noise was transformed into a collectively expected event. The use of technology has a very high, magical impact on the dwellers because it was new and surprising for that time. In Harmonic Bridge, in a transition area like under the bridge, with the transformed sound of the traffic, and acoustic space is created. It can be seen that changing the perception of the space by just sound is possible. The Forest Organ, Le Cylindre Sonore, Sea Organ and Diana, Princess of Wales Memorial Fountain are meditative works. While they are enhancing the listening experience with their good sound use techniques, they create publicity and attraction centre around them. Even, Sea Organ revitalised a devastated sea shore and provided the connection between the dwellers and the seashore again. Touched Echo empowers collective memory and emphasises the destructiveness of the war by combining technology and creativity; using the intensity of the sound; thus it has a very powerful social impact. The World's Deepest Bin uses technology as an interactive and surprising element. It also uses the sound as a motivating tool for

ecological goals, also, transforming a basic trash throwing action to an entertaining event in public space.

The objectives and categorizations which are determined within the scope of the thesis provided a basic analysis and comparison opportunity. To conclude the chapter of the thesis, the proposal and the further research goals will be explained more in detail.





## 6. CONCLUSIONS

“Creating Sonic Experiences as a Landscape Design Element for Increase the Value of Public Space” is a literature research work which aims to propose a categorization method for urban soundscape design by analysing the previous methods and case studies.

In the spatial fields (urban planning, urban design, landscape design), usually visual characteristics of the environment come upfront and the sonic characteristics are ignored or overlooked. There have always been artworks related to sound, architectural acoustics design works or noise reduction interventions in a significant amount. But considering sound as a design element for urban open space design and producing methodologies in this specific issue has been a subject of the last five years the most. There is a need to make contributions in order to improve the urban soundscape design field. The motive of this thesis is to answer this need.

The aim of the thesis is providing a basic guide or a start point for further design research by introducing the basic notions about soundscape; explaining the previous methodologies in the field and examining the case studies with descriptor categorizations.

In the “Key Concepts Related to Soundscape and Soundscape Experience” Chapter, first, the soundscape and soundscape ecology terms were described and explained in order to understand the relationship between the environment, sound and landscape of the sound that is perceived. The ideas of the pioneers in the soundscape research field such as urban planner Michael Southworth, composer and acoustic ecologist Murray Schafer, composer Barry Traux, musician and acoustic ecologist Bernie Krause were introduced. Then, two of the main sonic experience notions “Deep Listening” and “Sound Walk” are explained as aware listening methods of environment and understand the soundscape which surrounds us by giving thoughtful attention. Composer Pauline Oliveros, the pioneer of deep listening and sound recorder/composer Hildegard Westerkamp, the pioneer of soundwalk are introduced. Finally, as the most considered sound characteristic of especially the urban spaces,

“Noise” notion is explained. First, the importance of the balanced sound levels in the city is mentioned as a health and welfare issue. Then, a different approach such as treatment to noise as a potential design element is discussed. The Italian composer Luigi Russolo and his pioneering ideas about noise in his Futurist Manifesto (1967) are introduced.

In the “Previous Works of Methods and Guides in Urban Soundscape Design” section, two previous guideline proposal works for urban soundscape design are examined. The proposal of Lacey (2016) categorises the urban soundscape design case studies according to the design “approaches and intentions”. He determined 5 approaches to categorize the “ways of using sound” as a design tool in the urban environment and 2 design intentions under each approach. Cerwén (2017) introduced another approach model consisting of the strategies of using sound as a landscape architecture element. These works are the most current methodology proposals which are directly proposed for simplifying or making the subject of urban soundscape design practical. In other words, they can be used by the designers in the design and implementation stages of the urban and landscape design projects as pathfinders.

In the “Open Public Space Soundscape Design Case Studies According to Design Objectives” section, three main design objectives are determined and the relevant case studies are examined under the descriptive categories. (The relevance of the case studies and criteria of the categorization are explained in the “Discussion” section). This work has been influenced and nourished by Cerwen’s (2017) and Lacey’s (2016) works since they are the only founded works from which practically almost the same particular research methodology: Examining the previous sound art works and urban soundscape design case studies and generating a practical design methodology/guide by using the categorization results. Although this is a very universal research methodology; very recently started to be implemented in urban soundscape design area: almost in the last two years. Therefore, there is a quite long way in order to ripen the strategies, methods, design tools in this area.

The difference between the thesis of Lacey’s and Cerwén’s works is the categorization methodology. The proposed categorization of the thesis is an abbreviated, standardized classification. The purpose of making such classification is to simplify the examination of the case studies and the soundscape analysis stage of further design projects.

The answers to the research questions which were asked in the introduction section are as such:

1. Can urban / landscape sound design be categorized systematically in order to be considered an analytical design tool?

It can't be objectively categorised. Every researcher can develop a categorization system within the scope of their discipline, knowledge and needs but an entirely objective, universal and limited categorization cannot be made because spatial soundscape design is an interdisciplinary area fed by many fields like art and science. Therefore, introducing an open-ended, improvable, transformative methodology will be more realistic and will make this work more adaptive.

2. How to determine the methods of the categorization of the existing sound design applications?

The categorization method is determined according to the examination needs and questions in the scope of the thesis.

3. How can a contribution to the urban / landscape sound design be made to methodology literature? Can the new categories by new approaches be developed?

The contributions can be made by examining and understanding the existing works as much as possible and a trial and error process in urban soundscape design practice. The new categories and approaches can always be developed.

Throughout the research process of this thesis work, access to the technical information of the case studies was a very important part. For the chosen case studies, this access has been quite straightforward through the leaflets, websites of the projects or magazine articles about them. On the other hand, the ease of finding their information was already the reason for choosing them. As a result, it is essential to emphasize that the ease of access to the technical information of the urban soundscape projects is very important since the use of sound is a technical issue.

In the success of the examined case studies, the good use of technical knowledge about sound and technology comes to the forefront. Their way of dealing to integrate the technology to public open spaces and to localise the sound is important. Thus, for

further works; contemporary interactive/responsive technologies, the specific knowledge about sound localization can be more of focus points and the research of how to integrate these technologies and knowledge can be made. Produce reference guides of technical sound concepts and contemporary technologies that specifically can be used as design tools in open public spaces would be very complementary with the urban / landscape sound design methods, categorization methods and guidelines.

Creating sonic experiences for including the open public space is as effective as visual urban / landscape design; even more effective in many cases. Sound is a wave on air; it is a limitless, rapidly expansive element. The sound is ubiquitous considering the fact that the ears are the organs that are always open and there is no absolute silence in daily life. Therefore, it has a momentous potential of vitalising and increasing the value of open public spaces. To keep research and brainstorming for the uses of sound in open public spaces is highly essential for further works.

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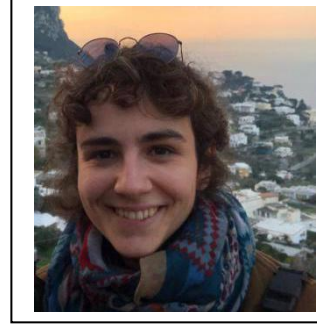
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