MADRID
inter.noise 2019
June 16 - 19
NOISE CONTROL FOR A BETTER ENVIRONMENT

General Overview to Strategic Noise Maps and Action Plans in Turkey: The case of Quiet Areas Identification Process

Akbulut Çoban[1], Nilgün
Antalya Provincial Directorate of Environment and Urbanization
Meltem Mahallesi, Dumlupınar Bulvarı, No: 135
07030, Antalya, Turkey

Hüsmen, Nuray[2]; Türkel, Esin
Department of Environmental and Vibration Control
Ministry of Environment and Urbanization
Ankara, Turkey

Doğan[3], Güray
Department of Environmental Engineering
Akdeniz University
07030, Antalya, Turkey

ABSTRACT

As a full candidate country of European Union (EU), Turkey have been preparing the strategic noise maps and action plans for the agglomerations and transportation infrastructures in the scope of National Regulation on Environmental Noise Assessment and Management (RAMEN), which was harmonized with the European Environmental Noise Directive (END) (2002/49/EC) in the year 2005. Up to 2019, the strategic noise maps were prepared for 46 agglomerations totally with a population of 46126881. Moreover, for the 41 airports, railways with totally 563 kilometres and 10704 km of major roads, the strategic noise maps were prepared. After 2016, the noise action plans have been starting to be prepared and 8 agglomerations completed it and the others have been starting to work on this. The aim of this paper is to give the general information on the progress of strategic noise maps and action plans in Turkey.

[1] nlgn.akbulut@gmail.com
[2] nuray.husmen@csb.gov.tr
[3] gdogan@akdeniz.edu.tr

Moreover, the action plans will be discussed with a focus on quiet areas identification process and this will be assessed considering the "Good practice guide on quiet areas" published by European Environment Agency in 2014 and taken consideration with the literature after this publication.
Keywords: Quiet area, soundscape, noise map, noise action plan, Turkey
I-INCE Classification of Subject Number: 52

1. INTRODUCTION

World Health Organization (WHO) stated that noise pollution is considered as the second most hazard environmental type of pollution after air pollution [1, 2] and it has been increasing day by day due to rapid urbanization and industrialization. The European Commission (EC) predicted that the social cost of noise and air pollution including death and disease is up to €1 trillion every year [3]. It is apparent that it must be needed to develop management and control strategies for the noise pollution when considering the items aforementioned. One of the most important legislation on this issue is Environmental Noise Directive (END) 2002/49/EC implying the assessment and management of environmental noise [4]. This directive was transposed to Turkish National Noise Legislation and driven into force with "Regulation on Assessment and Management of Environmental Noise (RAMEN)" in 2005. The main aim of RAMEN is to prevent and reduce the harmful health effects due to noise exposures through determination of common approaches for developing the required noise control applications. In order to attain this goal, the strategic noise maps and action plans for the defined noise sources should be prepared [5].

In Turkey, during the transposition of Environmental Noise Directive 2002/49/EC, European Twinning Project was carried on with a title of "Harmonization and Implementation of EC Directive on Noise Management" between the years 2006-2008. In the scope of this project, noise maps for the determined noise sources in 5 metropolitan municipalities in Turkey (railway noise map in Ankara, airport noise map in Adana, industrial plants in Bursa, roads in İstanbul) were prepared and also the action plans were prepared for these noise sources. By this, the institutional capacity was firstly developed in terms of the implementation of END. Moreover, "Noise Mapping Guideline", "Catalog on Noise Mitigation", "Handbook on Noise Prevention" were published and delivered to the related authorities under this project. In addition to this, project on "Technical Assistance for Implementation Capacity for the Environmental Noise Directive (EuropeAid/131352/D/SER/TR)" which was co-funded by European Union and Government of Turkey was carried on between 2013-2015. In the scope of this project, strategic noise maps for agglomerations was prepared for the pilot cities. With these European initiatives, the first steps have taken on environmental noise management and to increase both central and local governmental institutions.

In this paper, the progress on environmental noise management will be presented in terms of strategic noise maps, noise action plans and specifically the identification

process of quiet areas, which are one of the most important point for the sustainable acoustic environment and for creating healthier cities

2. STRATEGIC NOISE MAPS AND NOISE ACTION PLANS IN TURKEY

Based on RAMEN, Ministry of Environment and Urbanization is the main responsible authority for providing coordination and cooperation, giving opinion to the prepared strategic noise maps and action plans and establishing the data bank for noise maps and action plans. The other responsible authorities are summarized in Table 1.

Table 1: Responsible authorities for strategic noise maps and action plans in Turkey

<table>
<tr><th>Action</th><th>Area</th><th>Noise Source</th><th>Responsible Authority</th></tr>
<tr><td rowspan="6">Noise Maps</td><td rowspan="4">Within the agglomerations</td><td>Railways</td><td rowspan="2">Ministry of Transportation and Infrastructure</td></tr>
<tr><td>Airports</td></tr>
<tr><td>Roads</td><td rowspan="2">Municipalities (For the areas within the Major Municipality, That should prepare the noise maps.)</td></tr>
<tr><td>Ports, industrial plants, and tramway on the surface of the roads</td></tr>
<tr><td rowspan="4">Outside the agglomerations</td><td>Major Railways</td><td rowspan="3">Ministry of Transportation and Infrastructure</td></tr>
<tr><td>Major Airports</td></tr>
<tr><td>Major Roads</td></tr>
<tr><td>Ports and Industrial Plants close to major transportation sources</td><td>Special Provincial Administrations</td></tr>
<tr><td rowspan="2">Action Plans</td><td>Within the agglomerations</td><td rowspan="2">Taking into account of strategic noise maps consisting all noise sources</td><td>Municipalities</td></tr>
<tr><td>Outside the agglomerations</td><td>Special Provincial Administrations</td></tr>
</table>

2.1 Strategic Noise Maps

The strategic noise maps used in the determination of the areas where noise reduction and control measures needed to be taken is used to inform public and decision makers and help to determine noise policies at the local, national and international level together with the strategic predictions [36]. According to Turkish National Noise Regulation, up to end of the year 2016, the strategic noise maps should be prepared for agglomerations with more than 250 thousand inhabitants, for major roads which have more than 6 million vehicle passages per year, for major railways which have more than 60 thousand train passages per year and for main airports with more than 50 thousand air traffic movements per year. By June 30, 2018, for agglomerations with a resident population of more than 100 thousand, major roads that have more than 3 million vehicle passages per year and

major railways that have more than 30 thousand train passages per year should be prepared [5].

In this extent; until end of the year 2018, the strategic noise maps in Turkey were completed for the noise sources given in Table 2. Totally, 46 agglomerations completed their noise maps with totally 13081 m^2 area modelled respecting 46126881 inhabitants. In addition to these, noise maps for roads with 16235 km and for railways with 16076 km and for 41 airports were prepared. The cities with noise maps for their agglomerations is given in Figure 1.

Table 2. Completed strategic noise maps in Turkey

Strategic noise map	Scope
Agglomeration	46 agglomeration Total area modelled: 13081 m^2 Total population modelled: 46126881
Airport	41
Roads	All roads: 16235 km including 9919,5 km major roads
Railway	All railways: 16076 km Including 563 km major railways

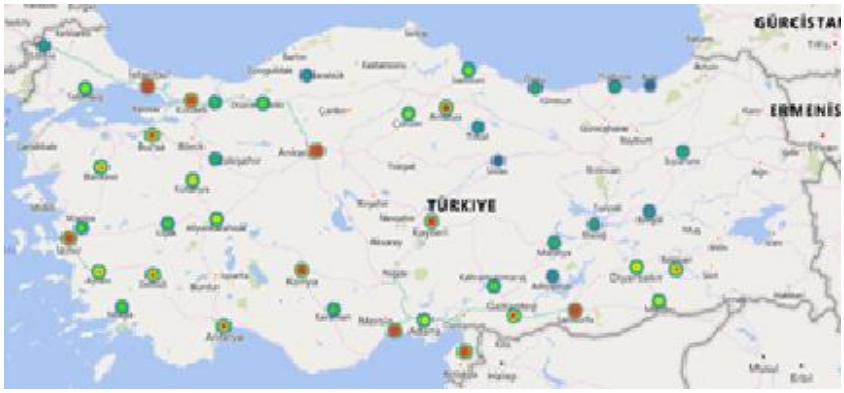

Figure 1. The cities with strategic noise maps for their agglomerations

Figure 2. Airports with strategic noise maps

2.2 Noise Action Plans in Turkey

According to Turkish National Environmental Noise Regulation, up to 31/12/2017, noise action plans should be prepared for the major noise sources and the agglomerations defined in RAMEN for the first round. However, cases where the limit values specified in this By-Law are exceeded or priorities identified as other criteria chosen by the competent authorities should be specifically identified in the action plan and implemented in the most important areas determined by the strategic noise maps. Moreover, for the second round, until 18th of June 2019, for major roads which have more than 3 million vehicle passages per year, major railways which have more than 30 thousand train passages per year, and nearby places and agglomerations with more than a 100 thousand inhabitants, noise action plans should be completed.

Up to 2019, in Turkey, noise action plans for eight agglomerations as Konya, Bursa, Mersin, Kayseri, Sivas, Manisa, İstanbul and Kocaeli were prepared. All noise action plans included a description of the agglomerations with the major roads, the major railways, major airports and areas close to noise sources such as industry, entertainment and recreation, manufacturing shops. In addition to this, they had information on the responsible authorities, the legal context, limit values defined in legislation, a summary of the results of the noise mapping, an evaluation of the estimated number of people exposed to noise, identification of problems and situations that need to be improved. They also included public consultations, noise-reduction measures, provisions envisaged for evaluating the implementation and the results of the action plans with including measures to preserve quiet areas. However, when evaluating the identification process of quiet areas in action plans of these 8 agglomerations, it is seen that they have different approaches from each other in terms of the tools during the identification and the approaches for the protection of those areas.

3. QUIET AREAS IDENTIFICATION

The concept of "quiet areas" was firstly introduced with "Regulation on Assessment of Management of Environmental Noise (RAMEN)" in Turkey in 2005, which is stated that it is needed to preserve areas where environmental noise quality is good which is called as "quiet areas". RAMEN requires that action plans to be prepared after noise mapping should aim to protect the quiet areas in agglomerations and in open country. The regulation provides the definition of "quiet areas in agglomeration" as an area, delimited by the competent authority which is not exposed to or of another appropriate noise indicator greater than a certain value set by the authority from any noise source. "Quiet area in open country" is defined as the area delimited by the competent authority, which is not exposed to noise from transportation, industrial or recreational activities. As it is understood from these two definitions, there is not a certain and clear limit value or indicators to be used during the determination of quiet areas in the scope of RAMEN.

When examining the noise action plans prepared for 8 agglomerations in Turkey, it is found that the methodology used during the identification of quiet areas shows differences

from each other. 6 action plans of 8 were directly based on the strategic noise maps and the limit values defined for the noise sources in RAMEN. The areas whose noise levels are lower than the 55 dBA and the areas not exposed to the road traffic, industrial and entertainment noise levels under the noise limit levels defined in RAMEN were selected as “quiet area”, which were basically the neighbourhoods meets these requirements [6-8]. The examples for these noise maps showing the quiet areas is given in Figure 3.

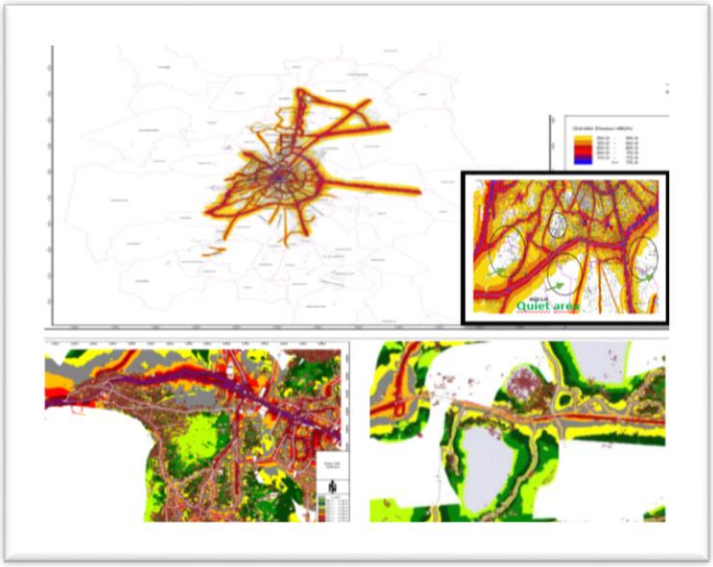

Figure 3: Quiet area identification directly based on strategic noise maps [6-8].

When evaluating the other noise action plans, there are mainly two approaches based on noise maps and expert opinions. The candidate quiet areas were selected according to the road traffic exposure and the areas not exceeded the noise limit values defined in RAMEN. In addition to these; the opinions of the experts from the related authorities within that agglomeration was also taken into consideration. Hence, mainly 10 specific locations were selected as “quiet area”. 4 of them was determined as the quiet areas in rural agglomeration which consisted of 2 picnic area and recreational area near the river, 1 natural park, 1 forest. Moreover, 2 urban parks and 1 historical place and old football stadium was identified as quiet area in agglomeration [9], which is shown in Figure 4.The other different approach during the identification of quiet areas is to make further computation by using the results of strategic noise maps during the preparations of noise action plan. Noise scores were determined to find the hot spots and if the noise score is lower than 0,7 for the investigated area, that area was identified as quiet area. In this extent, these are mainly 4 areas as 3 of them neighbourhoods and 1 of them is natural picnic area shown in Figure 4 [10].

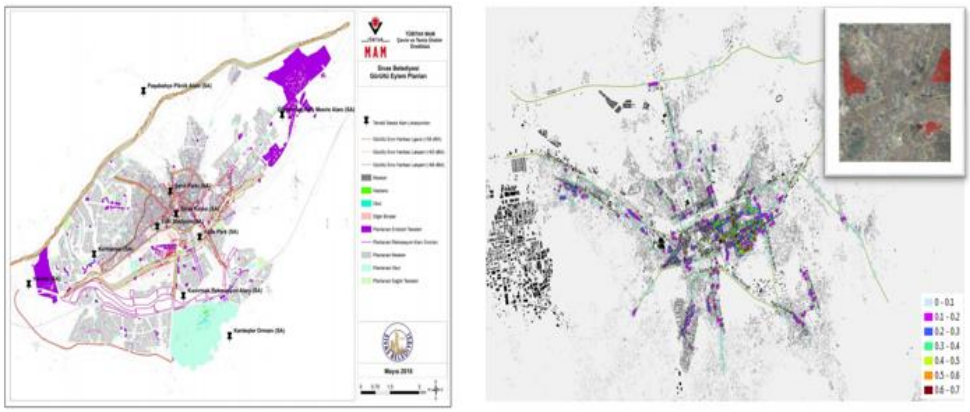

Figure 4. Noise maps showing quiet areas [9,10].

4. DISCUSSIONS AND CONCLUSIONS

In Turkey up to the year 2019, strategic noise maps for 46 agglomerations including the major roads, airports and railways and industrial and recreational places with modelled area 13081 m^2 that have the population of 46126881 were prepared. Based on these strategic noise maps, noise action plans for 8 agglomerations were also completed. When investigating these noise action plans in terms of the identification process of quiet areas, it is seen that different approaches were used.

The main reason of such differences is that National Turkish Legislation on environmental noise as in the case of European Noise Directive does not provide any common methodology to introduce, determine, protect and plan quiet areas. Although the Ministry published "Handbook on Noise Control" and "Catalog on Noise Mitigation" [11], they do not mainly focus on quiet areas and do not include sufficient information on identification, selection and management of quiet areas. On the other hand, there is very limited research specifically focused on the quiet areas in national academic literature. In 2010, one expertize thesis was prepared for the Ministry of Environment and Urbanization and this thesis includes the quietness concept, the criteria for determination of the quiet areas and overview of the general approaches to identify those areas until that day [12]. Moreover, one of the research discussed whether it would be beneficial to make the hospitals or the other health institutions installed in quiet areas [13]. From the academic point of view, the bibliometric analysis of environmental noise pollution studies in Turkey published on WOS and Scopus between the dates 1976-2014 showed that there is very limited scientific research and application in the scope of both quiet areas and soundscape concept which is the hot topic on environmental noise management recently in European countries [14, 15, 16]. Therefore, this situation shows the need to improve and develop strategies on common methodology for identification and management of quiet areas in Turkey.

In Member States of EU, different approaches on determination and management of quiet areas have been used, which leads to difficulties on production of harmonized strategy [17, 18, 19]. With taking into account of the gaps on this field throughout Europe, some projects have been implemented, which are mainly QSIDE (The Positive Effects of

Quiet Façades and Quiet Urban Areas on Traffic Noise Annoyance and Sleep Disturbance), CityHush (CityHush Acoustically Green Road Vehicles and City Areas), HUSH (Harmonization of urban Noise reduction Strategies for Homogenous Action Plans), HOSANNA (Holistic and Sustainable Abatement of Noise by Optimized Combination of Natural and Artificial Means), LISTEN (Listen, Auralization of Urban Soundscapes) [19]. As one of the most important one specifically focused on the quiet areas is the QUADMAP (QUiet Areas Definition and Management in Action Plans) Project whose main aim was to propose a solution to overcome the lack of harmonized methodologies for "Quiet Urban Areas" [20]. With this project, "Good Practice Guideline on quiet areas" was produced. According to the guideline, Member States mainly use four complementary methods in order to define the quiet areas, which are noise mapping, actual measurements in situ, evaluation of user's experience (soundscape approach) and expert assessments. Each of these approaches have both advantages and disadvantages [21].

In Turkey, the detail examination of noise action plans for 8 agglomerations in terms of identification process of quiet areas indicated that there are mainly three approaches were used, which are noise maps, expert opinions and noise scores in noise action plans. More than half of them took into consideration only strategic noise maps for the determination of quiet areas and only one of them took into consideration of expert opinions for candidate quiet areas. During the identification of quiet areas, using noise maps is more cost efficient than actual measurements. However, since these maps are mathematical models according to the specific assumptions and restricted conditions, the situation of variations in those specified criteria leads to incompliance with the real life conditions. Moreover, noise maps cannot distinguish the positive sounds like bird singing, wind in trees etc. which are necessary characteristic in determining the quiet areas. In addition, these magnitudes could not reflect the accurate representation how people perceive that acoustic environment [22, 23]. In addition to this, the study of Rodrigues (2018) showed that noise maps based on Equivalent Noise Levels [Leq] are not suitable to identify people reaction in "Quiet Areas" and that study represents an important tool in order to clarify the relationship between noise exposure and the concept of quiet area [24].

When considering all these finding through the lots of scientific researches, soundscape approach has gained more importance. Since this new approach is not limited with only the numerical values of the legislations, it is considered that it can add a new acoustic consciousness to the virtual dimensions in urban design with involvement of the citizens, which is necessary for suitable design of modern city [25]. With this context, the studies on soundscape approach provide opportunity for cooperation between engineering sciences in terms of physical measurements and the social sciences (for example psychology, sociology, architects and anthropology) in terms of the human perception and urban planning with taking into account for the diversity of soundscapes across countries and cultures [26]. Due to the complexity of the soundscape study, there is no single method to evaluate the people perception or their response to noise [27-29]. In this extent, the "open source soundscapes" methodology is recommended as an alternative approach to the identification, evaluation and planning of urban quiet areas, based on: the

novel concept of “everyday quiet area”, by combining the soundscape approach, the concept of citizens as “smart, active sensors”, the use of new mobile application- the Hush City app. and of quietness as a commons and this methodology is recommended for the integration of the “open source soundscapes” methodology in noise action plans [30]. In order to position this soundscape discipline in urban sound planning and design, it is needed to make connections and build bridges between the academic and practice sides of the soundscape community [36].

For the case of Turkey’s noise action plans, some of the municipalities responsible for preparing the strategic noise maps and action plans for their agglomerations organized coordination meetings with local governmental participants and shared the progress of noise action planning. However, citizen participation was included only through the questionnaires published on websites on municipalities. Most of them focuses on mainly preventive actions to decrease the sound levels coming from the noise sources as road traffic, industrial /recreational facilities or airports and it is seen that they are not try to take the opinions on the candidate areas for quiet areas where the acoustic quality is good. At that point, as it was discussed on Brown’s study [27], the environmental noise management considers the sound as waste. Therefore, as in the waste management, the main focus is to reduce this waste in higher levels, in the context of this case the higher noise levels. By contrast, soundscape researches considers the environmental sound as a resource rather than a waste [28]. As in other resource management, the acoustic environment regarded as the resource for the soundscape approach is assessed under the concept of beneficial use and it is aimed to make these areas beneficial for both present and future generations with protecting and improving. Hence, for the coming noise action plans including the quiet areas identification and management in Turkey, it is recommended that it will be beneficial to use the soundscape approach for the citizen participation and sustainable acoustic environment for healthier cities.

The other point to be discussed on the word meaning of the “quiet”. during the translation of the European Directives to the member states’ language, sometimes the meaning of the words may not give the same definition as it is in EU directive. Pauline et al. carried out the lexicographic study and it was compared the translations of END in different European languages. Thus, it was found that the definition and meaning of this term is not overlapped. At the end of that study, it was proposed that before examining the indicators to identify the quiet areas according to END, the states should be defined this term precisely based on their national language [31]. Such as in Turkey, “quiet area” term is reversely translated into English, it is written as “silent area”. Therefore, it may lead to problem in identification and management of these areas both for local authorities and public so “the calm areas” may be more suitable and hence it may become more corresponded to the needed meaning for EU Directive [15, 16, 32, 33].

The European Commission’s Report on the Refit Evaluation of END, published at the end of 2016, highlighted the differences across Europe in terms of implementation of national strategies for environmental noise management, and, with that, there is inevitably considerable variance in the quality of “lived experience” of the public administrations who are responsible of the application of this Directive [34]. Therefore, there is need for greater knowledge and practice exchange with using the innovative developments with

cooperation transnationally. In order to develop sharing of good practices through the partnership between European countries as Turkey, Italy and Spain, "Noise Training Project" has been implementing, which is financed by EC under Erasmus+ Program Strategic Partnership Projects on Vocational Training for the year 2017-2019. The main outputs of the project will be a common curriculum on environmental noise and the handbooks on legal, technical and communicative aspects of environmental noise management, which will also include the quiet areas management. Hence, it is expected to be beneficial for the current applications on this.

5. RECOMMENDATIONS

In this paper, the existing situation of progress on strategic noise maps and action plans in Turkey was discussed specifically in terms of quiet areas identification process under the light of both governmental applications and academic literature. Since accessing to quiet areas is emergently needed and seriously important for the people living especially in densely populated urban areas when considering both health benefits of the quiet areas to human beings that have been proved in lots of scientific studies and also the requirement of RAMEN and END, the followings items is shared as recommendation.

- It is seen that Turkey has great progress on strategic noise maps and action plans as a full candidate of EU and it is important to carry on the initiatives for institutional capacity of the related authorities on environmental noise management.
- It was found that different approaches are used during identification process of quiet areas in Turkey. Therefore, there is need to improve and develop strategies on common methodology on this issue.
- It was determined that identification of quiet areas is mostly based on noise maps in Turkey, which are just based on physical sound level assessments which could not distinguish positive sounds like bird singing, leaves of trees, water etc. that is the inevitable elements of quiet areas. Therefore, in addition to such quantitative and objective approaches, for the coming noise action plans including the quiet areas identification and management in Turkey, using soundscape approach for the citizen participation and for sustainable acoustic environment for healthier cities would be more beneficial.
- Both national and international researches and projects should be encouraged in terms of quiet areas and soundscapes and it should be provided to install the bridges between the academic studies and practical management.

REFERENCES

[1] WHO Regional Office for Europe. "*Burden of disease from environmental noise: Quantification of healthy life years lost in Europe*", (2011).
[2] WHO Regional Office for Europe. "*Environmental noise guidelines for European region"*, (2018).
[3] EC, "Links between noise and air pollution and socio economic status". EC Publication Office., (2016).

http://ec.europa.eu/environment/integration/research/newsalert/pdf/air_noise_pollution_socioeconomic_status_links_IR13_en.pdf
[4] European Commission. "*Directive 2002/49/EC of the European Parliament and of the Council of 25 June 2002 relating to the assessment and management of environmental noise"*, (2002).
[5] Turkish Ministry of Environment and Urbanization. *Regulation on assessment and management of environmental noise,* Official Gazette, (2010).
[6] Konya Metropolitan Municipality, "*Strategic Noise Action Plan for Konya*", (2017). http://www.konya.bel.tr/sayfadetay.php?sayfaID=1846
[7] İstanbul Metropolitan Municipality, "*Noise Action Plan for İstanbul",* (2017). http://cevrekoruma.ibb.gov.tr/Gurultu/
[8] Bursa Metropolitan Municipality. "*Noise Action Plan for Bursa*", (prepared by Egetest Çevre ve Ölçüm Lab. Ltd. Şti.), (2018). https://www.bursa.bel.tr/dosyalar/file/gurultu_eylem_plani.pdf
[9] Sivas Municipality, "*Development of Alternative Scenarios for Noise Reduction in Sensitive Areas of Sivas Province"* (prepared by The Scientific and Technological Research Council of Turkey-TÜBİTAK), (2017).
[10] Kayseri Municipality, "*Report on Noise Action Plan for Kayseri Province*" (prepared by Frekans Çevre – Selin Ölçüm Ltd. Şti", (2018).
[11] Ministry of Environment and Urbanization, "*Catalog on Noise Mitigation*", (2015). https://cygm.csb.gov.tr/hava-yonetimi-dairesi-baskanligi-i-85453
[12] Akbulut Çoban, N. 2010. "*Türkiye'de Sessiz Alanların Belirlenmesine Yönelik Prosedürlerin Değerlendirilmesi –Assessment of Prosedures for Quiet Area Identification in Turkey"*. Çevre ve Orman Bakanlığı, Çevre Yönetimi Genel Müdürlüğü, Uzmanlık Tezi, Ankara, (2010).
[13] Çoban M., Akbulut Çoban N., "*Kentsel Bölgelerdeki Hastaneler Sessiz Alanlar Kapsamında Değerlendirilmeli midir"*, IV.Sağlık ve Hastane İdaresi Kongresi, Antalya, Türkiye, 4-7 Şubat 2010, pp.56-56.(2010).
[14] Akbulut Çoban, N. ve Gedik, K. "*Thinking of Noise Control in a Positive Way: Soundscape Concept"*, International Conference on Civil and Environmental Engineering, Nevşehir, 20-23 May (2015).
[15] Akbulut Çoban, N., Gedik, K. ve Kaya S. "*A Case Study On Public Noise Annoyance İn Relation To Research Trends On Noise Pollution"*.10. European Acoustic Congress on Science and Technology for Quieter Europe, 31.05-03.06.2015, Maestricht, Hollanda. (2015).
[16] Akbulut Çoban, N. ve Gedik K. "General Overview to Quiet Areas", International Conference on Environmental Science and Technology, Side, Antalya, (2014).
[17] Bartalucci, C., Borchi, F., Carfagni, M., Governi, L. Weber, m., Wolfert, H. "*Quiet Areas Definition And Management İn Action Plans: General Overview*". İnternoise 2012, Newyork, USA, (2012).
[18] Licitra, G., Chiari, C., Ascari, E. and Palazzoali, D. *"Quiet areas definition in the implementation of European Directive 2002/49/EC"*, New Zealand Acoustics 24 (4) (2011) 20-26, (2011).
[19] Weber, M. *"Quiet Urban Areas: repositioning local noise policy approaches – questioning visitors on soundscape and environmental quality"*, İnternoise 2012. Newyork, (2012).
[20] Aspuru I., Garcia, I., Bartalucci, C.; Borchi, F., Carfagni, M.., Governi, L., Bellomini, R., Luzzi, S., Wolfert, H.; Gaudibert, P. *"LIFE+2010 QUADMAP Project: a new methodology to select, analyze and manage Quiet Urban Areas defined by the European Directive 2002/49/EC",*. Noise Mapping. 3(1), 2016, 120-129, (2016).

[21] EEA, European Environment Agency, 2014. "*Good practice guide on quiet areas*". EEA 2014/4. (2014).
[22] Nilsson, M.E. and Berglund, B. "*Soundscapes in city parks and suburban green parks*" in: European Congress and Exposition on Noise Control Engineering (Euronoise), (2006).
[23] Nilsson, M.E., Berglund, B. "*Assessment of outdoor soundscape in quiet areas"*, J. Acoust. Soc. Am., 117 (4) 2592. (2005)
[24] Rodrigues, R.C. 2018, "Quiet areas and urban sustainability", Energy Procedia, 153 (2018), 334-341.
[25] Asdrubali, F. *"From the soundscape to the architectural redevelopment". Conference: Forum Acusticum 2014. (2014).*
[26] COST Soundscapes of European Cities and Landscapes, 2015. http://www.soundscape-cost.org/ (2015).
[27] Brown, A.L. Kang, J., Gjestland, T., "*Towards standardization in soundscape preference assessment". Applied Acoustics* 72, 387–392. (2011).
[28] R. F. S. Job and J. Hatfield, "*The impact of soundscape, enviroscape, and psychscape on reaction to noise: Implications for evaluation and regulation of noise effects. Noise Control Engineering Journa*l, 49(3),120–124. (2001).
[29] B. L. Mace, G. C. Corser, L. Zitting, J. Denison, "*Effects of overflights on the national park experience".* Journal of Environmental Psychology, 35, 30–39. (2013).
[30] Radicchi, A. *"Every day Quiet Areas": What they are, how can they be integrated in noise action plans", Internoise2018., (2018).*.
[31] Pauline, D., Catherine, L., Caroline, C., Jean, P. " What is the definition for the French Word calme in the European Directive related to "Quiet Areas? A lexicographic study from the 16th century until today". Journal of Acta Acustica United with Acustica 98 (2013).
[32] Akbulut Çobna, N. ve Gedik, K. "*Çevresel Gürültü yönetiminde ve kentsel planlamada sakin alanların önemi"* , 10. Çevre Mühendisleri Kongresi, 2015. Bursa, Turkey.
[33] Akbulut Çoban N., Doğan, G. *"Çevresel gürültü yönetimine ilişkin politikaların değerlendirilmesi: Antalya İli Örneği,"* Proceedings in Türk Akustik Derneği, İzmir, (2017).
[34] European Parliament. Commission, "*Staff working document executive summary of the refit evaluation of the directive 2002/49/EC relating to assessment and management of environmental noise"*, (2017).
[35] Alletta, F. and Xiao, J. "*What are the current priorities and challenges for urban soundscape research?"* Challenges 2018, 9, 16; doi:10.3390/challe9010016. (2018).
[36] Özkurt, N."*Teknolojik gelişmenin yan etkisi: Gürültü kirliliği (Technological Development Side Effect: Noise Pollution"*, TÜBİTAK Bilim ve Teknik Dergisi, Sayı:611, Sf:42-50. (2018).