

## Comparison of the recreational noise regulation in Russia, Europe, and Asia

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### ABSTRACT

In October 2018 the new Environmental Noise Guidelines for the European Region were published by the World Health Organization (WHO), providing strong evidence that noise is one of the top environmental hazards to both physical and mental health and well-being in Europe. However, recreational noise has not yet been investigated in detail. After a preface about the more recent outcomes on recreational noise provided by EU Guidelines and projects, the current article presents the requirements for noise levels in recreational areas of various categories (parks, specially protected areas, reserves, etc.) in Russia, Europe and Asia. Moreover, it describes the main existing legal and regulatory acts in the countries, the history of their development and restrictions on their use. Furthermore, the article shows a comparative analysis with the allocation of advantages and disadvantages of each system. Finally, suggestions have been made to improve the system for regulating noise levels in recreational areas.

Keywords: Noise, Regulation, Recreation, Legislation, Improvement

### 1. INTRODUCTION

Noise pollution adversely affects the lives of millions of people with serious consequences on their health (1). The more relevant sources of noise pollution, and consequently those which have been mainly investigated, are related to traffic and industrial activities although the prevalence of occupational noise has decreased since the early 1980s. However, in the last 50 years the prevalence of social noise has tripled (2) and cities have been affected by a particular type of noise pollution stemming from recreational activities generally located in the city centers, the so-called nightlife, which is the heart of the night-time economy, seen by the local authorities as a means of revitalizing urban areas (3). It is a very complex phenomenon carrying relevant potentials in terms of social and economic benefits, but also problems related to the impact of alcohol on crime and disorders, coupled with public nuisance caused by recreational noise pollution. In spite of its relevance, the phenomenon has been poorly investigated so far: recreational noise is not even mentioned in the EEA Report, Noise in Europe 2014, while it is firstly mentioned in the new WHO Environmental Noise Guidelines for the European Region (3). According to a recent online survey of residents of France, Sweden, China and the UK, 8% of respondents believe that hearing loss is a problem of extreme importance. According to the report of Tianjin Occupational Disease Prevention Hospital, about 80% of young people were suspended from work due to diseases of the hearing organs. The existence of this problem is presumably associated with frequent visits to noisy places, such as discos, Internet cafes, as well as the use of headphones (4). Events with high noise levels, such as festivals, salutes and fireworks, music festivals where electroacoustic equipment is used uncontrollably can also be marked out. According to the World Health Organization, more than 466 million people worldwide have a hearing loss disability, and by 2050 one in ten people will suffer from hearing impairment and more than 900 million people will not be able to communicate without hearing aids or other assistance. In addition to hearing loss, it is essential to recall that noise increases the development of cardiovascular diseases, which is also confirmed by recent experimental studies (5). As a result, such dangerous diseases as vascular dysfunction, including cerebral vessels, high blood pressure and atherosclerosis can develop.

## 2. REGULATORY SYSTEMS FOR RECREATIONAL NOISE

Regarding regulatory systems for recreational noise, a useful reference is the review made by the WHO in (6). A number of legislative measures relating to environmental noise and occupational exposure are in place in many Countries although they vary in scope and sophistication. However, fewer countries have legislative measures pertaining specifically to recreational noise exposure. For instance, EU Countries of the European Union, China and New Zealand have legislation in place to protect employees who work in the entertainment/recreational sector (bars, concerts, discotheques, nightclubs) from exposure to unsafe noise. Legislation addresses the criteria for acceptable noise levels, control and monitoring procedures to ensure that legislative requirements are met. From the available data and a review of English-language legislation made in (6), it is evident that most Countries of the world still have no legislation to control recreational noise exposure, either for recreational venues or with respect to the maximum output levels of personal audio devices.

There are a few examples of legislation that targets recreational noise exposures. In 2009, the European Commission issued a directive that output levels of new audio devices should be set to a standard of 85 dBA, allowing users to increase the volume to a maximum of 100 dBA. According to the directive, raising the volume to maximum level must prompt a warning message stating that hearing loss can occur at this level. In April 2014, the Minneapolis City Council passed an ordinance making it compulsory for bars and clubs to offer free earplugs to patrons. Such a directive can have far-reaching impact, reducing the risk of noise exposure for those who frequent these entertainment venues. Legal interventions have proved effective for many sentinel public health achievements.

Hence, it is important for legislation to address public health issues such as exposure to noise, in order to bring about a sustained behavioral change.

## 3. INDICATIONS FROM THE WORLD

### 4.1. Europe

In the recently published Noise Guidelines of WHO (7), differently from the previous versions, specific reference is made to leisure noise referring to “all noise sources that people are exposed to due to leisure activities, such as attending nightclubs, pubs, fitness classes, live sporting events, concerts or live music venues and listening to loud music through personal listening devices” both in terms of recommendations and implications for research. As recommendation, a value of 70 dB(A) is indicated as yearly average threshold from all combined leisure noise sources above which adverse health effects may occur. Beside the average noise levels, the noise Guidelines strongly suggest to policy-makers to intervene to prevent children and adults’ exposure above the guideline values also for single-event and impulse noise exposures. In fact, despite there is not enough evidence in terms of relationship between leisure noise and hearing loss/health outcomes, it is clear that the nature of the noise has not a strong influence in causing hearing loss quality. Noise-induced hearing loss can be prevented by following safe listening practices. A reduction of leisure noise is also assumed to reduce nuisance that can be caused to other people than those who enjoy leisure activities, such as neighbors.

Furthermore, specifically for Personal Listening Devices (PLDs), it can reasonably be expected that a reduction of noise exposure could also lead to a reduction in accidents, injuries and other potential safety risks. Considering values and preferences, the Guideline Development Group (GDG) recognized that listening to music with the help of a PLD, going to concerts and attending sport events are activities regarded as enjoyable and therefore assumed to be valued by the overall population.

Furthermore, it is expected that values and preferences might vary in particular with respect to the use of PLDs and embracing leisure activities involving loud noise, like concerts, and that some population groups – especially younger individuals – might voluntarily expose themselves to high levels of sound during these activities. Despite this, the GDG was confident that recommendations to lower noise levels for the prevention of hearing damage from leisure noise would be welcome by a majority of the population. Recommendations are expected to be particularly welcome when it comes to protecting the hearing of young children and teenagers, as these vulnerable groups often do not have control over their environment and the noise levels to which they are exposed, such as from noisy toys or at school.

In conclusion, resources needed to reduce exposure to leisure noise are not expected to be intensive, but implementation and long-term success of measures might be challenging, owing to cultural factors, as changes in behavior are expected to be tricky to implement. One of the main challenges is to conduct a long-term objective exposure assessment of environmental noise and relate this to the development

of permanent hearing impairment and tinnitus. The GDG underlined the strong need for research to develop a comprehensive methodology. In the absence of a method, and as long as no other tools are available, the equal energy principle outlined in the ISO standard for the estimation of noise-induced hearing loss (WHO, 1999) can be used as a practical tool for protecting public health from exposure to leisure noise.

#### 4.2. Russia

The scale of acoustic pollution and its growth trends in the Russian Federation are alarming and require urgent action. At the same time the legal regulation is not completely in the relations in the sphere of environmental safety and creating acoustic comfort of living is not completely. Only some legislative acts address some issues of human protection from harmful noise exposure, mainly in the field of regulating labor relations within the framework of solving problems limited to the scope of a particular law. According to Table 3, line 12 of the SN 2.2.4/2.1.8.562-96 (8) sound and sound pressure levels should be sustained in the recreation areas in accordance with Table 1, regardless of the time of day. For example, sound and sound pressure levels in the rooms of cafes and restaurants are represented in line 6 of Table 3 SN 2.2.4/2.1.8.562-96 (8).

Table 1. Noise standards in the recreation areas according to the SN 2.2.4/2.1.8.562-96 (8)

Purpose of the premises or territories	Sound pressure levels, dB, in octave bands with geometric mean frequencies [Hz]										SL and	Max
	31,5	63	125	250	500	1000	2000	4000	8000	eq. SL,	SL,	dBA
Recreation areas in residential neighborhoods and groups of houses, holiday centers, etc.	83	67	57	49	44	40	37	35	33	45		60
Rooms of cafes and restaurants	90	75	66	59	54	50	47	45	44	55		70

Unfortunately, in the Russia Federation noise standards for national parks, protected areas are currently unavailable.

Requirements for protection of the areas of special protection (further –ASP) are imposed in the Federal law of 14.03.1995 No. 33-FZ ‘On specially protected natural areas’ (9), but do not contain the norms for sound levels. Thus, when designing highways, railways and other facilities affecting or crossing ASP, the issue of ensuring acoustic safety of animals and birds remains open. The Russian Federation has a number of federal laws aimed at environmental protection. In this connection, the Federal law of 10.01.2002 No. 7-FZ ‘On environmental protection’ (10) similarly with the Constitution (11) establishes the right of the citizen for favorable environment and living conditions. The environmental quality standards compulsorily include the standards established for physical parameters. According to this law, the government authorities of the Russian Federation are obliged to take the necessary measures to prevent and eliminate the adverse noise exposure on the environment in urban and rural settlements, recreation areas, habitats of wild animals and birds. Regulation of these relations is provided by the Federal law of 30.03.1999 No. 52-FZ ‘On sanitary and epidemiological welfare of the population’ (12), by establishing sanitary restrictions to indicators of the factors affecting people and legal provisions to ensure them. There is currently no Federal law on the noise in the Russian Federation, there are only a few regional ones, in particular the law of the Moscow region No. 16/2014-OZ of March 7, 2014 ‘On ensuring quietness and rest of citizens in the Moscow region’ (13), the Law of St.Petersburg ‘On administrative offenses in St.Petersburg’, article 8 ‘Violation of quietness and rest of citizens at night, at weekends and on holidays’ (14), the law of the city of Moscow No. 42 of July 12, 2002 ‘On observance of rest of citizens and quietness in the city of Moscow’ (15). However, the system of collection of fine recovery for administrative infringement of rest of citizens and quietness, including recreation areas in the residential neighborhoods and groups of residential houses, is not fully developed at the moment and in the stage of setting and adjustment.

#### 4.3. China

A fairly large number of laws and standards in the field of environmental protection, in particular

against noise, has been developed and is in force in China. So, among the main ones are the following:

- Environmental Protection Law of The People's Republic of China (16);
- Law of the People's Republic of China on Prevention and Control of Noise Pollution (17).

In 2010 a guideline document on strengthening prevention and control of environmental pollution and improving the quality of the urban and rural acoustic environment was issued (18), according to which noise pollution in public life should be prevented and controlled. Thus, the 'Standards of noise emissions in the social environment' should be strictly observed, prohibiting commercial activities to use audio equipment in the open air to attract customers. In addition, noise pollution in the areas of commercial services, such as catering, entertainment, fitness, shopping, etc should be strictly controlled. The main source of noise pollution should be equipped with automatic noise monitoring equipment, and monitoring data should be used as a basis for law enforcement supervision. An automatic environmental noise monitoring system should be installed in key cities. According to this document, it was required to install at least one noise indicator in each city by the end of 2011. In 2002, the State Environmental Protection Administration issued a Notification of measures for establishing a quiet residential community (19). According to this document, in order to implement the 'Response of the State Council to the 10th Environmental Protection Plan' (National letter [2001] No. 196) 'all settlements should focus on solving environmental problems that are strongly reflected in the masses and have unresolved problems' and 'use incentive mechanisms to create environmental protection'. It was decided to launch a 'quiet residential community' in the cities across the country. The objective of this event was to create a number of examples of residential communities with excellent environmental management and quiet and comfortable living conditions to further promote noise management in the urban environment.

The criteria of the 'quiet residential community' were as follows:

- the average equivalent noise level of the environment in the residential area reaches the standard of environmental quality, that is at least 55 dB in the daytime and below 45 dB during night time;
- the level of satisfaction of the population with the quality of the community environment is not less than 95%, and complaints about noise violations can be settled in accordance with the law, the level of settlement is 100%.

Chapter 6 of the Law of the People's Republic of China on prevention of environmental pollution (17) is devoted to prevention and monitoring noise pollution in public life. According to this law, the boundary noise of newly built commercial cultural and entertainment facilities must comply with the state standards for environmental noise; if it does not meet the standards for environmental noise established by the state, the administrative Department of culture does not issue a license for cultural activities, and Business license cannot be issued by the Department of market supervision and management. Article 44 prohibits the use of high-pitched sound signals for commercial purposes or other methods of creating high levels of noise to attract customers. China also has a system of taxation for exceeding noise levels in the environment in accordance with the PRC Law on environmental protection taxes (20). Moreover, according to article 24 of the abovementioned Law, People's governments at all levels should encourage taxpayers to increase investments in environmental construction and provide financial and political support to taxpayers' investments in equipment for automatic monitoring of pollutants. According to the Law of the PRC on environmental protection (effective January 1, 2015), (16) environmental protection is the main national policy of the country.

The state shall adopt economic and technological policies and measures to promote conservation and processing of resources, environmental protection and improvement and harmony between people and nature, so that economic and social development and environmental protection are coordinated.

## **4. EXPERIENCES FROM WORLDWIDE COUNTRIES**

### **4.1 Europe**

#### **5.1.1. The cities**

Berlin has a long history of club culture and nightlife, dated back especially to the 1990s, when club cultural activities flourished due to the surplus of available space and lack of control. Nowadays, an increasing number of residents and tourists share public spaces for different uses such as recreation, sporting and cultural activities, leading to potential conflicts (21). Non-commercial access-free open-air events, which usually take place in public spaces, are indeed particularly critical. Youth cultural music events have spread out over the past years, provoking conflicts regarding noise and littering. Due to the high number of official open-air events (e.g. "Karneval der Kulturen", a street

parade celebrating Berlin's cultural diversity), it is difficult for organizers to get permissions to organize smaller and unofficial events in public spaces. Furthermore, getting approval often takes several weeks, whereas free open airs are usually spontaneously organized. Consequently, many events are illegally organized. For young people and newcomers to the music scene it is rather easy to organize free open airs and thus engage with the cultural scene in Berlin. However, open air events can also negatively affect other groups of people, such as local residents, who might need quietness while resting at home, people who are using the same spot (e.g. a park) to recover or people who work nearby and need to focus on tasks. Thus, Berlin is facing the challenge to identify spaces where open air events can be organized without disturbing other people in order to protect the right to quietness and, at the same time, ensure the right to party. To tackle this challenge, the Club Commission – a Berlin-based association of club, party and event organizers – has launched the Model Space project in 2018 aiming at identifying solutions at spatial and policy level in order to promote and facilitate the use of “Model Spaces” for free open airs. Part of the project was conducted in cooperation with students of the Master program in Urban and Regional Planning at TU Berlin. The joint project looked for spatial parameters and potential spaces in Berlin that support the organization of free open airs, without leading to conflicts. So far, sixty spaces in three Berlin districts (Friedrichshain-Kreuzberg, Pankow and Mitte) were identified and ranked according to evaluation criteria, like: distance to residential areas, accessibility, nature protection status and noise level thresholds. For example, one of the best-ranked spaces is the industrial site “Gewerbegebiet Pankow Nord” in the Pankow district. The area is located far from nearby housing complexes (approximately 600 meters), it's affected by high noise levels due to the nearby highway, and being classified as an industrial site, it has permissible noise levels up to 65 dB(A) during the day and 55 dB(A) at night, according to TA Lärm. Due to the complex overlapping of diverse interests and stakeholders, it is still under discussion whether identifying “Model Spaces” is the most effective measure to address the issue of free open airs. Other measures could include the release of a law inspired by the “Freiluftpartygesetz” (the “open air party law”) passed by the city of Bremen.

In Bremen, the Municipality implemented a simplified procedure for spontaneous non-commercial open-air events with up to 300 people. Instead of applying for permission, people who would like to organize an open-air event can communicate their intention, by handing in a one-page form between one week and 24 hours before the event.

Noise management and planning of noise management interventions are two important aspects of the integrated urban management approach carried out by the Municipality of Florence (22) in the last 15 years, which has been committed to the reduction of environmental noise. Law no. 447 of 26 October 1995 "Framework Law on Noise Pollution" grants municipalities the right to carry out "temporary activities and events in public places or places open to the public and for temporary shows", as an exception to the limit values provided for by the said law in article 2, paragraph 3, in compliance with the provisions indicated by the municipality itself. Generally, the authorizations for derogation are requested for the following activities: construction sites for the realization of works of both private and public interest, including major works, sports activities in general, local festivals, promotional activities and/or tourist-commercial, to be implemented both outdoors and indoors, to enhance the territory such as the holding of parties in the square, musical entertainment or similar promoted by both public and private bodies (party parties, concerts, musical accompaniment of food, nightlife). For the purposes of the request for exemption, the basic data to be known and published are: date of the request for authorization, applicant (public body, local or private), number of days of the activity in derogation, authorized hours, acoustic limits authorized, census of receivers, number and date of the act of authorization. In view of this trend, the Municipality of Florence has developed and is starting to experiment with a new procedure for derogation authorizations, trying to underline that they are a useful tool to guarantee the rights to carry out temporary activities, mitigating their impact and to maintain civil coexistence among citizens. The innovative aspect of the procedure is that in order to characterize the places, the application of a double method is promoted: quantitative, by carrying out noise measurements and qualitative, by carrying out soundwalks with interviews with residents and visitors.

In Milan and Turin, the MONICA project concerning recreational noise has been recently carried out (23). Specifically, results of a self-selected Italian sample obtained through an online questionnaire aimed at threading some light on the nature of the problem, in particular: individuation of the most concerned areas, characteristics of the people complaining and evaluation of economic, health and everyday life consequences. Answers report a picture of really troubled nights in nightlife districts,

with very loud anthropic noise until very late, sleep deprivation, health effects, house depreciation and high costs to mitigate the problem. Besides respondents highlight degradation and safety problems as well as viability and parking difficulties. Noise measurements, carried out in Milan and Turin in nightlife districts, in order to provide a technical basis to the subjectively reported annoyance by the questionnaire respondents, confirm the presence of very high, illegal levels within the resident's homes, both with open and closed windows, especially considering that involved areas are characterized by low or no car traffic and the time period was between 11 pm and 02 am, even in no weekend days.

In Turkey (24), it was examined the recreational noise pollution and management strategies already applied in two cities of Antalya and Konya respectively located in Mediterranean and Middle Anatolian Region in Turkey. For Antalya City, the strategic noise map, noise complaint data and noise assessment reports for entertainment places were evaluated. For Konya City, it was assessed the strategic noise map and the environmental noise monitoring system which can be considered as one of the first applicable system in Turkey in terms of noise management. Under the light of the applications in two cities, it has recommended that improving and installing the environmental noise monitoring system as a communicative tool in noise policy applications may be beneficial especially for the recreational noise pollution control in order to achieve effective noise complaint management and to provide dynamic noise maps. Moreover, designing quiet areas as buffering zone by using the soundscape approach has been individuated as an innovative way in mitigating the noise annoyance due to recreational noise pollution in residential areas.

## **5.2. Russia**

According to the State Report 'On the environmental state and protection in the Russian Federation in 2017' (25), in 2017, as in previous years, the main contributor to the whole set of physical factors (noise, vibration, EMF) is acoustic noise. Its contribution to the factor load is 47.7%. In second place is the vibration factor, the contribution of which is 25%. In third place in importance are electromagnetic fields with a frequency of 50 Hz, the contribution of which is at the level of 9%. Analysis of the dynamics of the number of facilities that are the priority sources of physical factors in the period 2015-2017 shows that in 2017, in comparison with the previous year, there is an increase in facilities - sources of noise by 2.95%. The specific weight of the facilities where the discrepancy between the levels of physical factors and the requirements of sanitary legislation was revealed in the dynamics in the period 2012-2017 remains consistently high, from 21.2 to 16.0% of measurements - in terms of noise level exceeding sanitary norms (25). Intensive work to promote the idea of creating noise maps of the cities is currently underway the Russian Federation. Thus, in 2006-2007 the first in Russia noise map of St. Petersburg was developed. Unfortunately, updates to this map have not been made to date, but work on the development of this direction in the country is in progress. The issue of creating a system of continuous noise monitoring in the cities and development of dynamic noise maps with possibility to monitor changes in the acoustic environment in the 'on-line' mode has also been repeatedly raised in the country, but this matter is also at the stage of approval.

One of the largest implemented projects was the development of the 'Environmental strategy of the city of Moscow for the period up to 2030'(26), which outlined the goals, objectives and principles of the environmental policy, including equal attention to the economic, social and environmental components of sustainable development and the recognition of impossibility to develop for the city of Moscow if the environment degrades; preservation of production facilities within the city boundaries only if they implement environmental protection plans aimed at gradual reducing the impact on the environment through the introduction of environmentally-oriented and innovative technologies; priority of production facilities, machinery, technology with little impact on the environment, ensuring better compatibility with the environment; availability of environmental information. Noise reduction in Russian cities, including recreational areas, is largely carried out by installing noise barriers. In addition, standard measures are used to reduce urban traffic noise in the source of its formation by reducing its emissivity through modernizing structures, using low-noise equipment, etc. In order to reduce noise in recreational areas, the following measures can also be applied: restricting truck traffic on the central streets and along park areas, assigning special aircraft courses, green planting. In addition, in the summer there are so-called 'singing' fountains, including those in places with high passenger flow, for instance, in the Moskovskaya square, which is an interchange transport hub between the city and the suburbs, as well as in the Finland station, the largest in the city, which was originally created for aesthetic and entertainment purposes, but they also

perform the function of replacing urban noise. So, in the repertoire of sound-and-light fountains there are masterpieces of classics, works by Andrei Petrov, Vladimir Solovyov-Sedoy, Paul Moria, hits of the 1960s, as well as marches and waltzes. The average duration of each show is 20 minutes. Major music festivals, such as the annual rock festival 'Invasion', with the number of visitors of about 150-200 thousand people, are usually held away from major cities and at a distance of at least 500 m from nearby settlements and villages.

### 5.3. China

The problem of hearing impairment among young people in China is also extremely relevant. Thus, to increase education and awareness level of people in this matter, the National 'Love the Ear' Day was established in China on March 3, when the Chinese media tell about hearing disorders, noise exposure, prevention and treatment of the widespread diseases connected with hearing disorders (4).

According to the Report on prevention of environmental pollution in China of 2018 (27), approximately 185 resolutions, provisions and documents concerning prevention and monitoring environmental pollution, were issued in 2017. The division of functional zones of the acoustic environment was completed for the first time in seven cities and adjustment of the functional zones of the acoustic environment was completed in 29 cities, which are under jurisdiction of 16 provinces (districts). According to the same report, three main objectives on monitoring the quality of the environment, namely, quality of the acoustic environment of a functional zone, quality of the acoustic environment of day time and quality of the acoustic environment of day traffic were implemented at the level of prefectures and higher in 2017. Measurements were taken in 79,669 points. The general indicator of the environmental acoustic monitoring compliance in urban functional areas across the country was 92.0%, and the general level of night monitoring was 74.0% (27). In 2017 environmental protection departments at all levels received a total number of 550,000 complaints about environmental noise (which makes 42.9% of the total number of complaints about the environment) with the coefficient of completion of 99.7%. Among those there were complaints about manufacturing - 10.0%, about construction noise - 46.1%, about social noise - 37.7% and about transport noise - 4.2% (27).

## 5. CONCLUSIONS

The legislation of Europe, Russia and Asia in terms of noise protection, in particular in recreational areas, attention to which has increased significantly in recent years, have been studied as part of preparing this article. Thus, the scientific community recognizes the importance and need to regulate and normalize noise levels not only in the workplaces, residential areas and from industrial and transport hubs, but also in recreational areas, parks, specially protected areas. The significance of addressing this issue is associated with the strong negative impact of the physical factor under consideration on the body as a whole, including the cardiovascular system, as evidenced by the reports on the morbidity of the population of each country, unfortunately, with quite high figures. In 2018, WHO published a review (6) with a special emphasis on recreational noise.

In the countries under consideration, the issue of reducing recreational noise is addressed in different ways and develops at different rates, as shown in this article. However, the desire and trends to improve the legislative framework are observed in each of them. Nonetheless, at present moment this issue is less developed in Russia in comparison with Europe and China.

In connection with the 'novelty' of the issue and its 'active' stage of development at present time, it should be noted that in order to determine and maintain the correct noise reduction strategy to preserve health and comfort of people, it is extremely important to maintain international cooperation and take into account the experience of each other.

## REFERENCES

1. JRC. Annual Report (2011), available at [https://ec.europa.eu/jrc/sites/jrcsh/files/jrc\\_ar\\_2011.pdf](https://ec.europa.eu/jrc/sites/jrcsh/files/jrc_ar_2011.pdf).
2. Hannah Keppler, Ingeborg Dhooge, Bart Vinckl. Hearing in young adults. Part II: The effects of recreational noise exposure. *Noise & Health*, September-October 2015, Volume 17:78, 245-252, DOI: 10.4103/1463-1741.165026.
3. Ottoz E, Rizz L, Nastasi F. Recreational noise: Impact and costs for disturbed residents in Milan and Turin. Proc 22nd International Congress on Sound and Vibration 2015 (ICSV 22); 12-16 July 2015;

- Florence, Italy 2015. p.1972-80.
4. Shi Yongbing , William Hal Martin. Noise induced hearing loss in China: a potentially costly public health issue. *Journal of otology*. 2013 Vol.8 No 1, p. 51-56
  5. Munzel T, Schmidt FP, Steven S, Herzog J, Daiber A, Sorensen M. Environmental Noise and the Cardiovascular System. *J Am Coll Cardiol*. 2018;71(6):688-97
  6. WHO - Regional Office for Europe (2018). Environmental Noise Guidelines (2018), available at: [http://www.euro.who.int/\\_data/assets/pdf\\_file/0008/383921/noise-guidelines-eng.pdf?ua=1.2](http://www.euro.who.int/_data/assets/pdf_file/0008/383921/noise-guidelines-eng.pdf?ua=1.2).
  7. WHO. Hearing loss due to recreational noise exposure to loud sounds - A review (2015), available at [https://apps.who.int/iris/bitstream/handle/10665/154589/9789241508513\\_eng.pdf?sequence=1](https://apps.who.int/iris/bitstream/handle/10665/154589/9789241508513_eng.pdf?sequence=1)
  8. SN 2.2.4/2.1.8.562-96 ‘Workplace noise in the premises of residential, public buildings and in the residential development areas’
  9. Federal law of 14.03.1995 No. 33-FZ ‘On specially protected natural areas’
  10. Federal law of 10.01.2002 No. 7-FZ ‘On environmental protection’
  11. The Constitution of the Russian Federation (was Adopted at National Voting on December 12, 1993)
  12. Federal law of 30.03.1999 No. 52-FZ ‘On sanitary and epidemiological welfare of the population’
  13. Law of the Moscow region No. 16/2014-OZ of March 7, 2014 ‘On ensuring quietness and rest of citizens in the Moscow region’
  14. Law of St.Petersburg ‘On administrative offenses in St.Petersburg’
  15. Law of the city of Moscow No. 42 of July 12, 2002 ‘On observance of rest of citizens and quietness in the city of Moscow’
  16. Environmental Protection Law of The People's Republic of China (Adopted at the 11th Meeting of the Standing Committee of the Seventh National People's Congress on December 26, 1989. 8th Meeting of the Standing Committee of the Twelfth National People's Congress on April 24, 2014), available at: [http://zfs.mee.gov.cn/fl/201404/t20140425\\_271040.shtml](http://zfs.mee.gov.cn/fl/201404/t20140425_271040.shtml)
  17. Law of the People's Republic of China on Prevention and Control of Environment Noise Pollution (Adopted at the 22nd Meeting of the Standing Committee of the Eighth National People's Congress on October 29, promulgated by Order No. 77 of the President of the People's Republic of China on October 29, and effective as of March 1, 1997), available at: [http://zfs.mee.gov.cn/fl/201901/t20190111\\_689250.shtml](http://zfs.mee.gov.cn/fl/201901/t20190111_689250.shtml)
  18. Guidelines on enhancing pollution prevention and control and improving the quality of urban and rural acoustic environments, 2010, available at: [http://www.mee.gov.cn/hjzli/zswrfz/201101/t20110124\\_343740.shtml](http://www.mee.gov.cn/hjzli/zswrfz/201101/t20110124_343740.shtml)
  19. Notification of measures for establishing a quiet residential community, Huanfa [2002] № 169, available at: [http://www.mee.gov.cn/gkml/zj/wj/200910/t20091022\\_172142.htm](http://www.mee.gov.cn/gkml/zj/wj/200910/t20091022_172142.htm)
  20. Law of the People's Republic of China on environmental taxes (the 25nd Meeting of the Standing Committee of the Twelfth National People's Congress on December 25, 2016, Adopted at the 6th Meeting of the Standing Committee of the Thirteenth National People's Congress on October 26, 2018), available at: [http://zfs.mee.gov.cn/fl/201811/t20181114\\_673632.shtml](http://zfs.mee.gov.cn/fl/201811/t20181114_673632.shtml)
  21. <http://www.opensourcesoundscapes.org>
  22. Melloni A, Pecchioni G, Luzzi S, Bartalucci C. Il paesaggio sonoro come strumento per la regolamentazione e la valorizzazione dello spazio pubblico urbano. Italian National Congress of Acoustics; 29-31 May 2019; Pesaro, Italy 2019.
  23. Gallo E et al. Analysis of leisure noise levels and assessment of policies impact in San Salvario district, Torino (Italy), by low-cost IoT noise monitoring network. *Proc Euronoise 2018*; 29-31 May 2018; Crete, Greece 2018.
  24. Akbulut Coban et al, Smart solutions for recreational noise pollution in Turkey. *Noise Mapping Journal*. 2018; 5:21-32.
  25. State Report ‘On the environmental state and protection in the Russian Federation in 2017’, available at: <https://gosdoklad-ecology.ru/2017/>
  26. The project of ‘Environmental strategy of the city of Moscow for the period up to 2030’, available at: [https://www.mos.ru/upload/documents/files/2075/prilozhenie\\_k\\_proektu\\_postanovleniya\\_pravitelstva\\_moskvy\\_ekolstrateg.pdf](https://www.mos.ru/upload/documents/files/2075/prilozhenie_k_proektu_postanovleniya_pravitelstva_moskvy_ekolstrateg.pdf)
  27. China Environmental Noise Prevention and Control Annual Report, 2018. Ministry of Ecology and Environment of the People’s Republic of China, available at: <http://dqhj.mee.gov.cn/zshjgl/201808/W020180903349599583171.pdf>, [http://dqhj.mee.gov.cn/zshjgl/201808/t20180803\\_447713.shtml](http://dqhj.mee.gov.cn/zshjgl/201808/t20180803_447713.shtml)