The Environmental Noise Policy in megacities of China

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Abstracts：

With the fast-paced city expansion and growing communication, the noise pollution is becoming a severe problem, especially in some metropolis, such as Beijing, shanghai, Guangdong in China, which has a considerable disturbance to the development of city and people's daily life. The relative laws and regulations on the noise pollution have been issued in these three cities (Beijing, shanghai, Guangzhou) according to the noise features of every city in those years. The noise pollution current situation in such cities will be introduced. Then the policies and regulation, such as Environmental Noise Pollution Control Act in three cities are presented deeply and comparison the diversity on the policy.

Key Words: City noise pollution Noise classification Control measures

1. Introduction

1.1Classification of urban noise pollution

With the rapid development of China's economy, especially in large cities such as Beijing, Shanghai and Guangzhou, the noise in the city has become increasingly noticeable, seriously affecting the health and normal life of urban residents. Urban noise includes traffic noise, construction noise, industrial noise, and the noise of social life. The scope and extent of the noise greatly affected people's living environment, and it became one of the urban environmental issues of concern. To improve the living condition of urban residents, Beijing, Shanghai, Guangzhou has released their local environmental noise control policies. In this paper, the noise pollution situation in the three cities is discussed, with their main sources evaluated, and corresponding defensive measures promoted. Urban noise is mainly divided into four categories: traffic noise, industrial noise, construction noise, and the noise of social life. First, traffic noise refers to the noise produced by all kinds of

transportation, including road noise, aircraft noise, railway noise, ship noise. Among them road noise is the most harmful, and vehicles are the major sources. Second, industrial noise, different from traffic noise, is one with fixed sources, therefore making it the main cause of environmental litigations. Aerodynamic noise is the most powerful noise in this category. Third, construction noise only exists in the construction duration and therefore is a temporary pollution. But because of the high sound pressure level, this kind of noise also causes severe pollution. Fourth, noise of social life refers to sound generated in daily life, such as firecracker burst, radio and television, piano and strings practicing, children frolicking, water pipe noise, floor percussion, dour closing percussion, steps etc. A study of Chinese citizens' complaints against environmental noise shows that the most annoying item is social life noise, with 65.4% of the complaints; the second annoying item is construction noise, with 25% of the complaints; the least disturbing item is traffic noise, with only 2.2% of the complaints. (Fig. 1)

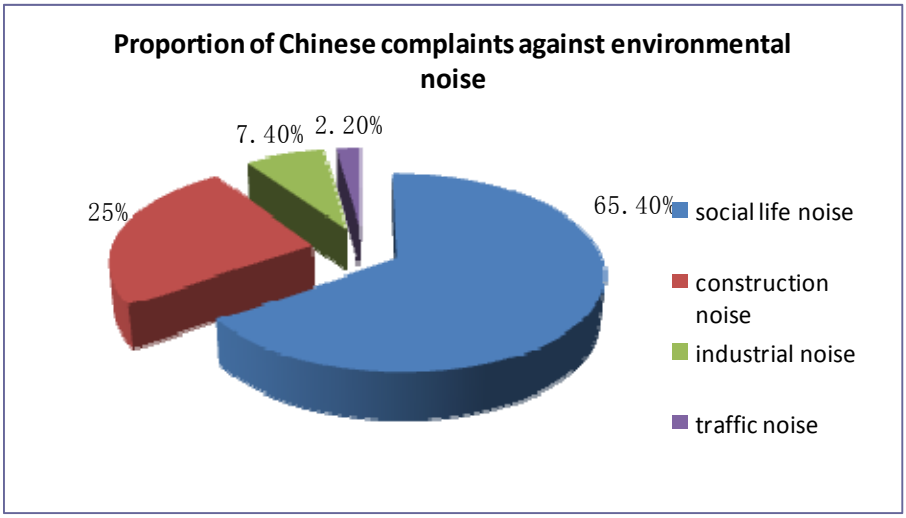

Figure 1. Proportion distribution of Chinese complaints against environmental noise

1.2. Current urban noise pollution situation

Among various noise sources in cities in China, transportation contributes to more that 30% of the noise (35% in global statistics). According to different transportation, traffic noise can be subdivided into road noise, railway noise, and aircraft noise, among these the road noise is the most severe one. There are many factors concerning road noise, such as the traffic flow, road conditions, vehicle types and speed, etc, among these factors traffic flow has the major impact. In recent years, China's thriving economy has stimulated people's motivation of purchasing private

cars, which boosts the amount of vehicles owned in the city. Beijing has an amount of vehicle ownerships that is way beyond Shanghai and Guangzhou, therefore suffers a heavier traffic noise problem.

Figure2. Vehicle Numbers in Beijing, shanghai, Guangzhou

In China, industrial and construction noise contributes to approximately 27% of the city noise, including mechanical vibrations, frictions, impact, and flow disturbance generated through industrial production and municipal construction. Construction noise contributes to roughly 7.4% of the city noise in China. Municipal, architectural, and city renewal constructions could greatly interfere with the neighborhoods for a long period of time (from months to several years), especially the night construction in the summer. At a distance of 15m away from the construction spot, the received SPL of a pile driver could reach 110 - 116 dB(A), a concrete mixing machine could produce a SPL of 86 - 100 dB(A), a truck transporting and loading materials could produce a SPL of 80 dB(A)

Table1.The emission standard for environment noise in the construction field boundary

Daytime	Night
70dB	55dB

Noise of social life refers to sound generated in daily life, constituting approximately 44% of the city noise, and this proportion tends to increase. Firecracker burst, radio and television, piano and strings practicing, children frolicking, water pipe noise, floor percussion, dour closing percussion, steps etc. Recently years, the population has increased fast in those big cities, which cause much life noise problems. According to

the statistic in 2011, the population in Beijing, Shanghai, and Guangzhou has grown seriously.

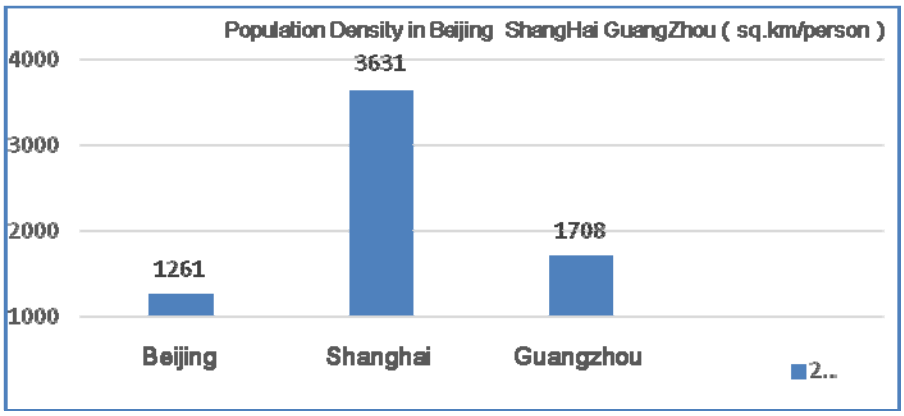

Figure3. Population Density

2. Measures of city noise pollution elimination

2.1 Compulsory regulations

To develop and implement a mandatory noise control and regulation is the most powerful measures to guarantee the city environment quiet. n addition, because of some residential area environmental noise level is close to or even higher than industrial, construction noise, it must have a strictly control measures for the administration, including to strengthen the environmental awareness of citizens, social morality education.

2.2. City planning

Carefully planning the city ahead has a strategic significance to the future development and the noise control of the city. We may take the following aspects into account. (1) The population density. A report from the US Bureau of Environmental Protection states that the relationship between the population density and the city noise follows this equation: $L = 10 l_g \rho + 26$ (dB). ρ is the people density. According to this equation, it is necessary to control the population density in order to keep the city noise below a certain level. A number of countries start to build satellite cities and ribbon-pattern cities. (2) Optimizing the functional distribution and the transport system of the city. The development of economics and transports in the city has added to various sources and the noise level. Useful measures include: avoid mixing the resident zone with shopping centers and industrial zones, place the resident zone away from airports, railways and other places where strong noise

occurs, use green fields, repertory to separate them if possible. For instance, Tokyo has placed its major factories around the airport. (3) Anticipation and evaluation of the noise impact to nearby environments of new construction projects, especially when they are close to places that are sensitive to noise, such as schools, hospitals, and etc.

2.3 Technical Measures

China's emphasis on environmental noise control has shifted from eliminating noise from fixed sources to that of floating sources, from controlling noise in vast spaces to that in small spaces. China has suffered from a severe city noise issue for a long time. The scope and extent of the noise greatly affected people's living environment, and it became one of the urban environmental issues of concern. Effective technical measures have to be taken to reduce the noise pollution.

(1) Design of the building. To create a more comfortable acoustical environment, a lot of factors must be carefully scrutinized, such as the outline of architectural complex, the electrical, mechanical, and HVAC systems in a single building, the insulation of floors and walls, etc.

(2) Acoustical barriers. Acoustical barriers are simple but effective methods to reduce the noise. Acoustical barriers have been widely applied in Japan. The total length of acoustical barriers in Japan had reached 3300km in 1993.

(3) Traffic management and conduction. Whistling from cars, trains, and ferries should be restricted. For certain part of the roads where heavy traffic breaks the noise standards, we could set destination boards to guide the traffics.

2.4. Policies for city noise control

China has released the Environmental Noise Pollution Regulation of People's Republic of China in 1996. The regulation contains six aspects:

(1) Supervision and management of environmental noise pollution. (2) Prevention of industrial noise pollution. (3) Prevention of construction noise pollution. (4) Prevention of transport noise pollution. (5) Prevention of social life noise pollution. (6) Legal liabilities. However the regulation merely presents a general framework in noise control, with no detailed clauses to be followed. In 2001, the Guangzhou government published has released Environmental Noise Pollution Regulation of Guangzhou. In 2006, Beijing has released the Environmental Noise Pollution

Regulation of Beijing. In 2012, The Environmental Noise Pollution Regulation of Guangzhou and the Environmental Noise Pollution Regulation of Beijing have amended the national regulation from the following aspects:

a. Supervision and management of environmental noise pollution: specifies the liabilities of different offices in county.

b. Prevention of industrial noise pollution. The regulation specifies the procedures and measures of construction work at night, constructions in special periods such as the national college entrance exam, and special constructions such as rescue work. Guangzhou has determined the time period for carrying on construction: 6:00 – 22:00, excluding rescue work and emergencies.

c. Prevention of traffic noise pollution. The regulation states that the built, rebuilt, and expansion of roads should consider nearby buildings that are sensitive to noise, and take necessary measures to control the noise emission. The noise emission from vehicles should not exceed the national standards. Certain zones, time period, and standards are claimed for vehicle whistling. Parking lots and bus stops should consider their impact to nearby neighborhoods and take certain measures. Aircraft launching and landing should follow the flying procedures.

d. Prevention of social life noise pollution. The use of audio equipment of corporation or individual in public spaces and in places easy to be disturbed by noise should follow certain rules. House decoration construction should be carried on at certain time period. The vehicle alarm system should follow regulations.

e. Legal liabilities, stating the punishment and penalty of breaking the regulations.

Different from the regulations of Guangzhou and Beijing, the Shanghai regulation only concerns social life noise. 1. Business activities that generate noise pollution: manufacture in resident zones, bars and Discos in places sensitive to noise. 2. Facilities in business activities that generate noise pollution: advertising through loudspeakers along the street, fans, air conditioning, and dynamotors etc. 3. Noise regulation in public spaces: no audio equipment permitted in parks, green fields and public squares. Performances should be authorized by the government offices (22:00-6:00 the next day).

4. The vehicle alarming system: To avoid disturbing the neighborhood.5. Public facilities in the resident zone: the mechanical and electrical facilities in the resident zone should qualify the national environmental noise emission standards. Newly-built

residential buildings should clearly state the noise condition and level within the neighborhood on the sales contract, especially if there is any significant noise source near the building.

6. Family entertainment activities and pets: It should not disturb the neighborhood.

7. House decoration construction: during 18:00 to 6:00 in the morning of working days, and anytime of weekends, construction cannot be conducted in residential buildings that have been delivered.

8: Schools: It should not utilize audio equipment that generates high-level sound.

The Social Life Noise Pollution Regulation of Shanghai promotes detailed regulations on social life noise as well as a complete legal supervision system. The whole process from discovering the problem, to handling complaints, to penalty and punishment is well stipulated. Noise has an increasing impact towards the city. We need sophisticated regulations and rules to protect the environment around us from being disturbed by noise. It also requires everyone's endeavor to make the acoustic environment better.

3. Conclusion

In the 21th century, urbanization has been a challenging issue of China. China should insist a rational city planning, take full advantage of the current infrastructures and eliminate the city noise to the maximum.

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