

inter.noise 2000

*The 29th International Congress and Exhibition on Noise Control Engineering
27-30 August 2000, Nice, FRANCE*

I-INCE Classification: 5.2

NOISE ABATEMENT IN TOWN PLANNING; CONCLUSIONS

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Keywords:

URBAN NOISE, TOWN PLANNING

ABSTRACT

Based on three abstracts that I have received for the session, I draw the following conclusions. Urban noise continues to be a major problem. Town planning has to be used more effectively both in urban renewal and when planning for new urban areas. Even though each city has its own specifics in terms of topography, population density, building traditions, public transport, etc. the noise problems in different cities are very similar. Therefore, different cities can learn from each other and use the same tools both hardware and software. But it is indeed a long-term enterprise for planners and authorities in each major city to solve the urban noise problem, if at all possible within any reasonable time. It is often argued that noise is a local problem. This is a very questionable statement and may lead to wrong conclusions and non-optimal solutions. On the contrary, urban noise must be treated considering that it is a global problem. Local actions can only deal with the noise problems in the micro-scale. This is not sufficient to solve the problems. Action is also urgently needed on the macro-scale. Concerted actions from authorities in cities and countries are needed to enforce the introduction and common use of much quieter transportation vehicles than those used today. Transportation systems and needs must be analyzed from an environmental point including the noise.

These conclusions are based on the abstracts for the papers in this session and also on some additional papers found in the reference list.

1 - ALL CITIES ARE SIMILARLY NOISY

Noise is a major problem in big cities. The main source is ordinary traffic with cars, trains and airplanes that comply with international standards on noise emission. A good acoustic environment in urban areas would demand $L_{DEN} < 40 - 45$ dB. Present levels are frequently above 65 or 70. Therefore, it has been a great difficulty to formulate noise immission standards. $L_{DEN} < 55$ dB was set as goal in some countries in northern Europe already two or three decades ago. It corresponds to a situation where some 5 % or so of the population is highly annoyed so it is not a satisfactory goal from the health point of view. Nevertheless, $L_{DEN} < 55$ dB in all residential areas is without reach during a foreseeable time period.

The city noise problem is very much the same in all major cities. This is evident from several of the papers in the session. There is a close link between traffic density and noise. It is obvious that traffic planning is one of the most important factors when dealing with the urban noise problem. Big cities in developed countries have a surprisingly equal traffic density – the urban area, not the total population – is the most deciding factor for the total traffic work. The average traffic work amounts to approximately 2×10^7 vehicle km per km² and year with a spread of minor importance for the traffic noise emission, [2], [4]. Sprawled cities are no quieter than compact ones. Compact cities have several advantages being more robust constructions for the future demanding less total traffic work, offering better possibilities for public transport and saving land for food production

The observations about the traffic in cities should not be looked at as an unimpressable law to be used as a firm fundament for predictions. It is a very mechanistic model of the traffic system. But they reflect a cultural pattern and such patterns have a considerable inertia. To change them demands very broad

strategies and actions. It demands a strong conviction of the citizens and a closure of the information gaps between the politicians, actors in planning and building processes and the citizens.

The force of the car drives the development of the big cities towards a high and more or less constant traffic density. This is very unfavorable for the environment and the use of natural resources. I think it is a consequence of mutual interactions between road-owners, politicians, complaints by the citizens leading to road and street expansions and improvements, "consumers" who given the improved roads commute over longer distances and thereby fill the new roads with traffic up to their capacity rather than saving time,

If we also take into account the average time budget of 80 minutes or so for daily personal transportation, sometimes referred to as Zahavi's law, see e.g. [7], the consequence is that the average transportation speed is inversely proportional to population density. Increased speed leads to increased noise levels and higher fuel consumption for any type of vehicle, so urban sprawl potentiates the environmental problems in the urban area. In addition, it also reduces the possibilities to serve the urban area with public transportation, which, if adequately designed may be one way of conserving the environment.

Given the traffic density, the actual noise situation and a vision of cities with good acoustic climate a simple subtraction indicates that cars and trucks are 20 – 30 dB too noisy in ordinary traffic. Much effort has been spent on noise reduction at the source but simultaneously we have had a development towards more powerful vehicles. The noise emission from cars and trucks in ordinary traffic has been reduced by only 1 or 2 dB during the last 25 years, [5], so it is a reasonable forecast that the noise problem in cities will not be solved through sufficient noise reduction at the source side during our or our children's lifetime.

We therefore have to spend much effort on decreasing the problems by different tools applied in the city and building planning, but neither there we find any simple solutions if we aim at a reasonably good acoustic environment or even if we only try to get an acceptable situation.

As cities are so equal in terms of the noise situation the same set of tools to reduce the noise problems can be used in all cities. These tools should be presented in guidelines and guidebooks easy to use by planners. It is important to illustrate the guidebooks with good examples. The guidelines must also contain noise prediction methods with reasonable accuracy, not only for the very simple situation with houses directly facing a busy street. It is also important that the prediction methods can be used to predict and guarantee the low levels which are achievable in well shielded situations. The ongoing work to develop an EU noise policy with a directive on ambient noise includes work in a couple of working groups improving the prediction methods, the publication of a noise abatement handbook and the publication of good examples.

Noise mapping is one part of the EU ongoing work. In its simplest form noise mapping gives an overview of the noise situation in a city, illustrates the magnitude of the difficulties and – when regularly updated – shows if the situation is getting worse or improved. In this form it is mainly a communication tool for politicians and town planners, but of limited interest to the citizens. However, detailed noise mapping which shows the real noise situation for individual dwellings is a worthwhile tool for the citizens in their role of consumers. Such noise maps – provided they have a good quality and are communicated to the citizens in an understandable manner – makes it possible for market forces to be effective in the noise abatement in cities.

2 - NOISE SHOULD NOT BE CALLED A LOCAL PROBLEM

Noise is often referred to as a local problem. I do not understand why and I am afraid that it leads to thinking in wrong directions. Noise is local in the meaning that it does not reach very far from each individual source. Therefore, noise can be reduced by locally adapted abatement means, such as barriers in the form of nonsensitive buildings or artificial screens, depressed roads instead of elevated, keeping a fare distance between roads and buildings, using quiet road surfaces etc. Local authorities can influence the noise situation when buying busses, trams, subway trains, garbage trucks, etc. If the local authorities form consortia together with other local authorities they can be powerful customers and demand vehicles that are substantially quieter than those which just fulfil international limits. Local authorities can apply good city planning with adequate zoning, introduce local traffic calming and other traffic restrictions. Local authorities can also enforce a good internal planning of the houses and set requirements on the sound insulation of facades and windows.

But some of the local actions are contraproductive. Increased distance between roads and dwellings as a noise reducing mean leads to longer travelling distances and thereby to more traffic, higher speeds, less support for public transport and less favorable conditions for walking and bicycling as transportation modes.

Local authorities can do very little to set noise emission limits on ordinary vehicles. Such limits may be set on European level. For airplanes international agreed emission limits are necessary. On a European level we may forbid chapter 2 airplanes but we can not even on European level do much to get quieter airplanes than those defined by chapter 3. Local authorities can do very little about the traffic on major roads. Local authorities would maybe like to use the polluter pay principle by noise related road or streets charges, but how could they do that considering the uselessness for this purpose of the test method ISO 362 for type testing.

My conclusion is that the noise problem can neither be solved on local, nor on regional, nor on international level. Actions are needed on all these levels if the goal is a good acoustic environment or even an acceptable situation. Therefore, I think we should avoid to refer to noise as a local problem.

3 - DO SOLUTIONS EXIST?

The appropriate local actions are comparatively straight forward when planning new urban areas, but it is then extremely important to incorporate the noise abatement and considerations from the early planning stage and onwards. If so, a reasonable environment can be reached at marginal or even no additional cost.

When it comes to the noise situation in existing situations, not least in city centers and when historical buildings have to be taken into account the problems can not be totally eliminated. There is no chance to create a good or even acceptable situation everywhere for all existing dwellings within a decade or two. The costs would be very high and the solutions would demand greater changes of the traffic system and physical environment than a majority of the population would find attractive. However, the problems may gradually be decreased by firm local actions.

It is important to adapt a long term strategic thinking and acting. Start immediately and act at every opportunity with the long term effects and goals in mind. A long term noise abatement strategy must be applied at each urban renewal project, at each time a building is renewed or remodelled, at each time a traffic route is changed, at each occasion a city buys new vehicles or services.

Noise problems are often tough in the city zones, but observe that compact cities of European type have several advantages from a noise point of view with their closed blocks with quite sides of the buildings. We must make systematic use of the big local variations in the soundscape of the city due to the shielding effects of the buildings. Quiet spots are common. More quiet spots and quite zones may be developed. Traffic calming and other very strict speed limits may be applied. The abatement work can in a time span of a few decades lead to a reasonable fraction of the dwellings having at least one quiet side. This is a possible goal to reach and possible also at low cost and it would mean a substantial relief for many citizens. [6] It is important that this point gets strong promotion in the planned EU Directive on Ambient Noise.

But all this is not sufficient. The cars must be quieter in typical traffic. We need to develop a new attitude to the car not only for noise reasons but for several environmental reasons. This will take a very long time and will demand hard efforts. We need not only technical but also social inventions here. We need incentives so that we can get international agreements on an absolute top speed of cars of approx. 100 km/h. This would improve the possibilities to decrease the tire/road surface noise. General use of external speed control everywhere is also highly desirable.

Local authorities can be forerunners by making the public transportation systems quieter and quieter, but they need public support for this. Cities should be developed so that they are attractive to pedestrians and bicyclists. Develop town planning so that the citizens get attracted to spend their travel time on low emission/low consumption travelling.

Observe that there is no conflict between solutions for low noise, other environmental factors and traffic safety, but win-win situations demand the correct selection of solutions.

And at last, observe the traffic noise problems, the traffic density law and their implications in the development of the rapidly growing mega cities, so that the old mistakes do not get repeated there.

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