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ACOUSTIC CLIMATE IN POLISH CITIES IN VIEW OF LOCAL AND EU LEGAL REGULATIONS

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ABSTRACT

Inhabitants of big world cities, including Poland, suffer from excessive noise for which road transport bears chief responsibility. Polish regulations concerning the permissible noise emission, in force since 1998, are comparable with EU regulations. Political system changes in Poland, dating back to 1989, have encouraged economic activities and brought about a rapid increase in the number of cars, unparalleled in any other European country. However, insufficient number of ring roads, as well as a small number of expressways and motorways (ca. 1%), cause transport difficulties in cities and the level of permissible noise is often exceeded by up to 20 dB.

1 - INTRODUCTION

Noise is a common element of environment pollution. Currently, over 20% of the area in Poland and 33% of the population [1] are endangered by an overnormative noise level. Nearly 13 million Poles are exposed to noise which exceeds the permissible level. In countries such as Germany, Great Britain or Holland, the respective index equals 20-28% [2]. Road transport is chiefly responsible for this status quo. Dependent on the type of environment and the degree of urbanisation, the percentage of population exposed to transport noise equals: big cities – 30%, small cities – 40%, towns – 20%, villages – 7% [1].

**2 - POLISH REGULATIONS AND EU COUNTRIES REGULATIONS CONCERNING
ROAD-DERIVED NOISE IN ENVIRONMENT**

Limits on the level of permissible road noise which have been introduced by several countries since the beginning of the 1970's is the first step to combat its excessive propagation.

Permissible levels of noise that enters the environment from road infrastructure differ in various countries. At the moment, Polish standards are closest to the Italian standards (Table 1). An analysis of these figures shows that, in keeping with current regulations, land use zones in Poland and Italy should be situated 600-1200 m off motorways (10 000–100 000 vehicles per day), 100-900 m off state roads (2 000-20 000 vehicles per day) and 12 m off local roads. French norms are more liberal and the respective values for land use zones are: 100 m off motorways, 20 m off state roads and 5 m off local roads. German regulations are the strictest.

Land use zone	Poland		France		Italy		Germany	
	Day 6 ⁰⁰ - 22 ⁰⁰	Night 22 ⁰⁰ - 6 ⁰⁰	Day 6 ⁰⁰ - 22 ⁰⁰	Night 22 ⁰⁰ - 6 ⁰⁰	Day 6 ⁰⁰ - 22 ⁰⁰	Night 22 ⁰⁰ - 6 ⁰⁰	Day 6 ⁰⁰ - 22 ⁰⁰	Night 22 ⁰⁰ - 6 ⁰⁰
Health resorts	50	40					45	35
Hospitals outside cities	50	40	60(57)	55	50	40	45	35
City hospitals	55	45	60(57)	55	50	40	45	35
Day care centres	55	45	60	55	50	40	45	35
Recreation areas	55	45			50	40	55	45
Schools	55	45	60		50	40		
Housing estates	55	45	60	55	55	45	50	40
Combined housing estates (services and shopping centres)	60	50	65	60	60	50	55	45
Farming estates	60	50	65	60	55	45	60	50
Central city zones (dense infrastructure of housing estates and concentrated administrative buildings, services and shopping centres)	65	55	65	60	65	55	65	55

Table 1: Permissible noise level from road traffic expressed as equivalent sound level L_{aeq} dB(A) [3], [4], [5], [6].

3 - TRANSPORT CONDITION CHANGES IN POLAND IN THE LAST DECADE

One of the effects of political changes in Poland dating back to 1989 was a rapid increase in the number of cars on Polish roads. Table 2 shows the dynamic character of this increase in comparison to other countries and the world. The growth in the number of cars exceeds an average level by 50% for passenger cars and by almost 30% for lorries. The respective figures for the world during the period in question were 5% for passenger cars and 7% for lorries [7]. Changes in the ratio between passenger cars and lorries are also conspicuous.

Such a significant increase in the number of cars brought about an increase in the road-related level of noise. However, due to a greater number of technologically better cars, mainly German, French, Italian and Japanese, and a simultaneous decrease in Polish and Eastern European cars, the increase in the noise level is relatively smaller than the sheer number of cars would suggest.

Road infrastructure, owing to the delayed programme of motorway construction in Poland, does not match the increase in the number of cars. Congested streets in many Polish cities, chiefly major ones, and overcrowded through roads in towns are the results of it, caused mainly by the insufficient number of ring roads.

Moreover, due to the increase in urban population in Poland by 25% in the last 25 years, road and passenger traffic has accumulated in cities.

	Poland	France	Italy	Germany	the world
Passenger cars %	53	8	16	15	5
Lorries %	28	5	13	3	7

Table 2: Growth in the number of cars in various countries between 1990-1996 [7].

4 - CURRENT ACOUSTIC CONDITIONS IN POLISH CITIES

Acoustic climate measurements have been carried out in Poland for many years, mainly by Province Environment Protection Inspectorates [8]. Their reports over the last few years confirm a distinct increase in the noise level in cities, not compatible with the increase in the number of cars. Through roads and outbound roads, as well as central city areas with high density of administrative and service buildings,

are mainly affected by it. The latest reports pertinent to noise level measurements in the biggest cities (population over 200 000), carried out on outbound roads, revealed equivalent noise levels that exceeded 78 dB/A. For cities such as Lodz, Kielce, Gdansk or Gdynia, permissible values were exceeded by 9-16 dB in the first line of building infrastructure. Permissible values were exceeded by up to 19 dB in city hospital areas (Lodz, Kielce).

Smaller cities (population 20 000-200 000) are also similarly affected. The equivalent noise level along through roads reaches 76 dB. In towns (population less than 20 000), over half of the population is exposed to overnormative noise zone. Permissible values in the most affected areas are exceeded by 11 to 20 dB.

5 - NOISE PERCEIVED BY CITY INHABITANTS

Car and tram noise – traffic noise – tops up the list of most negatively perceived outdoor noise by city population (33%). In contrast, only 3% of inhabitants complain of outdoor industrial noise produced by nearby factories (Table 3 – Centre for Opinion Poll Research, CBOS [9]).

Type of noise	Percentage of positive answers
Street, road	33
District (noisy behaviour outdoor, car alarms, church bells)	23
Household (television, household equipment, noisy behaviour)	16
Neighbours (parties, arguments)	14
Nearby playgrounds, leisure and sports centres	6
Railway	6
Installations (sewerage and water supply systems, other noise in the building, e.g. lifts)	5
Aircraft	4
Industrial (nearby factories or construction sites)	3
Other types of noise	4

Table 3: Exposure to various types of noise in cities according to opinion polls in 1999.

The degree of exposure to excessive street and road noise in the place of residence in relation to the size of the city is shown in Table 4. Table 5 documents the perception of the frequency of exposure to noise of village inhabitants. Apartments (29%) and work places (25%) are the places where noise is perceived as most tiresome (Chart 1).

	village	cities with population			
		Up to 20 000	20-100 000	101-500 000	501 000 and more
% of respondents: Are you exposed to excessive street and road noise in your flat? (1999, COBS), [9]					
Yes	17	36	46	41	42
No	82	64	53	58	58
Do not know	0	0	1	1	0

Table 4: Citizens' perception of the exposure to street and road noise in the place of residence.

Citizens' own efforts to combat the noise level is emphasised by them. According to analyses conducted by the National Hygiene Institute, up to 27% people claim they would like to improve acoustic conditions moving house, 17% cut down on walks due to excessive noise. Other activities include taking sleeping pills, closing, insulating or replacing windows.

	village	cities with population			
		Up to 20 000	20-100 000	101-500 000	501 000 and more
% of respondents: How often are you exposed to tiresome and annoying noise? (1999, COBS) [9]					
Very often	12	15	27	19	24
Often	13	21	15	27	22
Sometimes	14	13	20	15	18
Rarely	17	11	19	19	18
Very rarely	39	38	19	16	15
Don't know	5	3	0	4	3

Table 5: Residents' perception of noise depending on the size of the city/town.

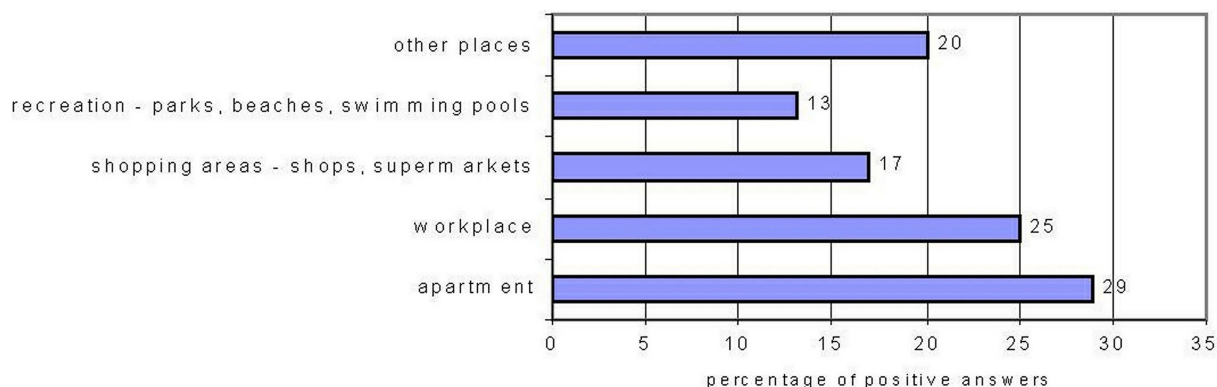


Figure 1: Residents' perception of most tiresome places (1999, CBOS).

6 - CONCLUSION

Road transport derived noise, both perceived by Polish city population and exposed in analyses by Polish ecological forces, significantly exceeds permissible values. One of the possible and necessary solutions of the problem is the construction motorway and ring road infrastructure that would remove car traffic from land use zones and would thus limit the number of citizens exposed to the overnormative noise level.

REFERENCES

1. **J. Sadowski**, Kształtowanie klimatu akustycznego środowiska i jego ochrona przed hałasem i wibracjami, *Building Research Institute (ITB)*, Vol. 2-3 (110-111), pp. 50-61, 1999
2. **Tjeert ten Wolde and Brian Ross**, In *Inter-noise 99 Conference, Fort Lauderdale, Florida USA*, 1999
3. **Minister for Environment Protection, Natural Resources and Forestry**, Resolution of 13 May 1998 on permissible noise levels in environment, *Journal of Laws no 66*, pp. 2558-2560, 1998
4. **Le ministre de l'environnement**, Arrêté du 5 mai 1995 relatif au bruit des infrastructures routières, *Journal officiel de la République française du 10 mai 1995*, 1995
5. **DPCM 1/3/91**, Limiti massimi di esposizione al. rumore negli ambienti abitativi e nell'ambiente esterno, *Gazzetta Ufficiale, no 57*, 1991
6. **DIN 18005**, Schallschutz im Städtebau, Beiblatt Schalltechnische Orientierungswerte für die städtebauliche Planung, 1987
7. **Centralny Urząd Statystyczny**, *Rocznik Statystyczny R.P.*, 1999
8. **PIOS**, *Raporty o stanie środowiska w 1998r.*, 1990

9. **Central Statistical Office**, *Environment 1999*, 1999
10. **B. Lebiedowska**, *Halas wokół autostrad-metody prognozowania*, Wydawnictwa Politechniki Lodzkiej, 1998