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

I-INCE Classification: 7.6

TOOLBOX FOR THE INTEGRATED PLANNING AND MANAGEMENT OF ROAD TRAFFIC NOISE TO THE USE OF URBAN LOCAL AUTHORITIES

C. Bourbon*, E. Nicolas*, R. Mummenthey, E. Wetzel*****

* Brussels Institute for the Management of Environment, Gulledelle 100, 1200, Bruxelles, Belgium

** Niedersächsischen Landesamt für Ökologie, Göttinger Str.14, 30449, Hannover, Germany

*** Wölfel Gmbh, Vervierser str 43, 4700, Eupen, Belgium

Tel.: 32 2 775 77 76 / Fax: 32 2 775 76 79 / Email: cbu@ibgebim.be

Keywords:
MAPPING, ROAD TRAFFIC, TOWN PLANNING

ABSTRACT
Four cities confronted with similar problems, interested in pooling their experience in order to find common solutions, have come together to design a set of integrated, cross-sector, progressive city management instruments to apprehend the parameters that influence road traffic noise. These instruments, intended for land use planners, urban planners, managers of public streets and mobility, will consist of guides and recommendations adapted to various users. Among these instruments, the use of sound maps on the scale of a city will be given special focus. These various instruments should be transferable to an entire urban unit whatever the size and level of expertise on the traffic noise problem.

1 - INTRODUCTION

Several surveys have shown that noise pollution caused by traffic, economic activity or leisure activities constitutes a major disadvantage to living in town for a large part of the population. Because of its complexity and its very subjective nature, noise pollution has not had the priority it deserves until now. In 1996, the European Commission launched an integrated reflection with the publication of its Green Paper "Future Noise Policy" [1]. This first step should lead the European Union to adopt a coherent strategy on noise reduction, particularly in an urban environment. In September 1998, the Copenhagen Conference officially constituted 7 working groups to prepare the future European directive on noise in the environment.

Recognizing the importance of sound pollution in the urban environment and the need to improve the quality of the sound environment of the population of Brussels, the Government of the Brussels-Capital Region adopted a Proposal for a Plan [2] for reducing noise in the urban environment on 17 December 1998. This proposal for a plan was developed by the Brussels Institute for Environmental Management (IBGE-BIM), in collaboration with the Administration de l'Equipement et des Déplacements (AED − Administration for Infrastructure and Travel) of the Brussels-Capital Region.

The LIFE-Bruit project corresponds to regulation number 11 of this plan. It began in January 1999 for a period of 3 years in the context and with the financial support of the European Union LIFE program.

2 - OBJECTIVES OF THE BRUSSELS RESEARCH PROJECT

The instruments designed and validated during the project should give a clear idea, at various levels of detail, of the parameters that influence noise, with a view to sustainable management integrating aspects of both traffic management and street planning (street surfaces, zones with a 30 km/hour speed limit, speed reducers ...) in the urban landscape.

Instruments and methodology will be adapted initially to the Brussels Capital Region. Transposition will be envisaged to any local urban authority desirous of taking on a planning process and integrated traffic management.

In collaboration with various European Commission working groups, the project will attempt to assess feasibility, costs and benefits of the various proposals by those groups.

3 - ORGANIZATION OF THE PROJECT

This research project groups four European cities: Brussels, Hanover, Birmingham and Lyon. The IBGE-BIM for the Brussels region is the contracting authority for the research project. The city of Hanover is represented by the NLOE, Niedersächsisches Landesamt für ökologie. This body has considerable experience in sound mapping and uses a cross-sector, preventive approach in managing conflicts by means of cartography. It takes part in the design, experimentation and validation of the modelisation tool. The English and French experiences are represented respectively by the cities of Birmingham and Lyon. They take part in the concertation, the follow-up of the instruments designed and the sharing of experience.

4 - DEVELOPMENT OF A SET OF DECISION-TAKING AIDS

4.1 - Drafting a technical manual for managing traffic noise in the city

After the various studies done with all the agents concerned, it appears that in most urban planning schemes the noise parameter is not considered for the following reasons: awareness of noise problems is still low, technical aspects are not well known; project development tends to neglect exchanges of skills. As a result of these observations, we felt that it is indispensable to draft a technical manual that is both precise and educational, giving a concrete overview of a large number of situations encountered. This manual is now being drafted. It is broken down into five independent chapters organized using a consistent approach. A particular effort has been made for content, adapted specially to the Brussels context, wording and the practical presentation of the various themes discussed, with reference to experiments that have been successful in other European cities. This manual will be distributed periodically. Each of these 5 publications will be accompanied by a presentation seminar with the players concerned.

4.2 - Development of a methodology for sound mapping

Sound mapping is the main tool developed in this project. The objective is to do a sound map for the Brussels region, to develop a methodology to use it in an integrated management and planning tool, and to assess its advantages, limits, disadvantages, costs and benefits.
The Brussels Capital Region represents an entity of 19 municipal districts with a total population of 950,000, covering 160 km^2 and having a road network of 1870 km of penetration, transit and main thoroughfares.
The modelisation work used has the following characteristics:

- Development of a map of noise emitted using the standard European calculation methods and calculation software adapted to working with large data bases.
- Consideration of traffic noise exclusively given the complexity and specificity of the various sources of noise in the city (industries, railways, aircraft, road traffic).
- Use of IMMI 5.0 software for Windows from the company Wölfel Messsysteme Software. This software has the advantage, among others, of allowing the various means of calculation and the use of large data bases.
- Calculations done currently using two European methods of calculations−the German standard RLS 90 (3) and the French standard NMPB (4). The RLS 90 has already been used widely for sound mapping. On the other hand, the NMPB seems better adapted to an urban environment.
- The calculations will be done using an L_{DEN} indicator. This indicator is recommended by WG1 for the preparation of the future directive. In addition, it is perfectly adaptable to the situation in Brussels where major differences in traffic or speed, for example, can be observed in 3 daily periods.

The first stage in developing the methodology consisted of making a digital model. This model, developed using the Arcview GIS software, includes all the indispensable geo-reference data to make a model of road traffic. They include:

- Description of the topographical data: the natural relief and obstacles related to constructions of railways, major highways and tunnels.

- The 220,000 buildings with their respective heights.
- The various obstacles to propagation (anti-noise walls, etc.)
- Traffic data: the values used correspond to modelised data for 1997 of about 35% of the road network in the region.
- The data on speed correspond to values measured at rush hour. The same value was used for the Daytime and Evening periods. For the Night period, the authorized speed limit was used.
- Other data such as the road surface materials, the type of traffic (continuous, stop-and-go, ...), the percentage of lorries, the slope of the roads, complete this data base.

The first calculations with the IMMI 5.0 software were done for a few municipal districts in the Brussels region (figure 1). The final map, representing all 19 districts should be presented in July 2000.
The first work done on the conflict-solving maps comparing the level of noise calculated, the levels of disturbance for the Brussels region and the percentage of the population affected. Various action plans will be tested on the basis of these results.

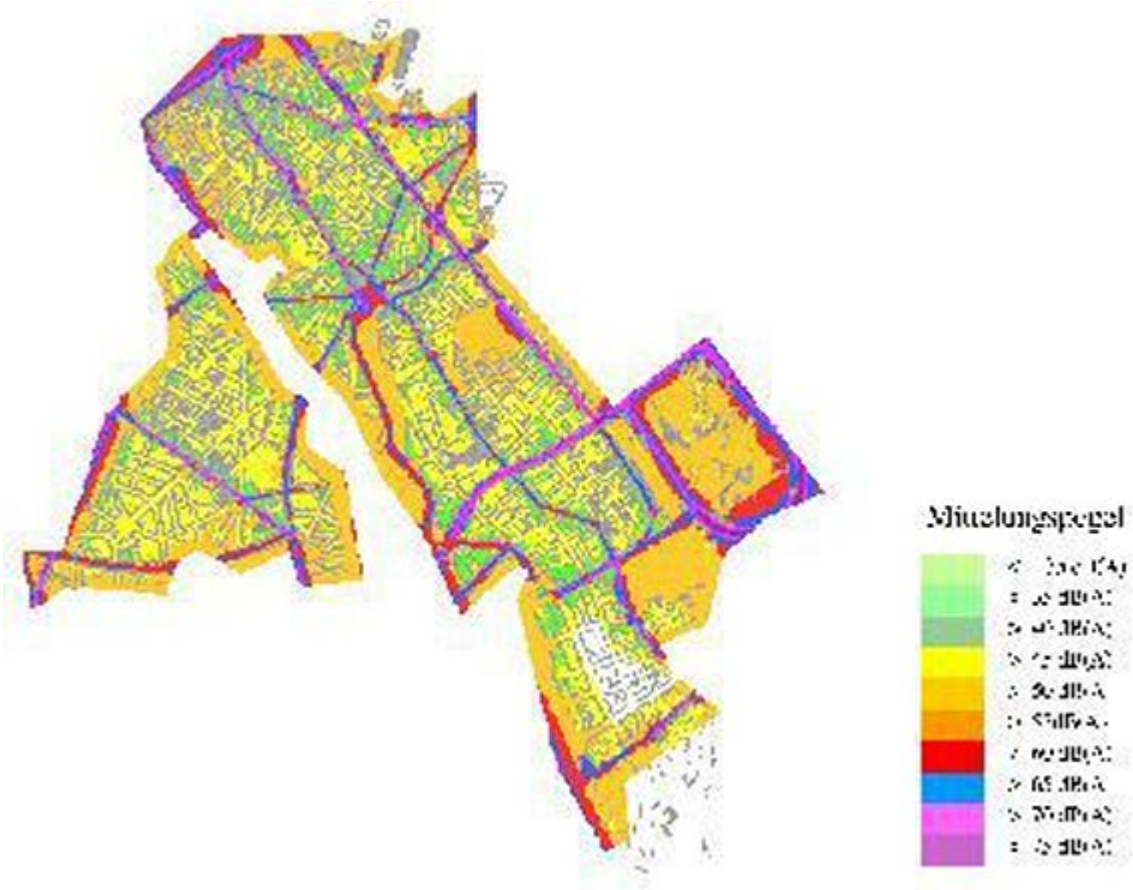

Figure 1: Noise Level for Ixelles (a commune of the Brussels Capital Region): Day Variant, RLS 90, IMMI 5.0 for Windows.

4.3 - Developing a methodology to manage congested areas

The map of noise emissions presented above will give an exhaustive, objective list of the priority action areas. A process is now being developed including the definition of a congested area, the identification of the agents concerned, the implementation of an improvement.

4.4 - Distribution of instruments

Various means will be apprehended to communicate this methodology. Concertation meetings will be organized with the regional and municipal authorities to facilitate distribution of the tools and recommendations proposed, with the final objective of defining a certain number of concerted management and planning actions.

A web site will present the Brussels experience in sound mapping and all of the tools tested during the project. An interactive part of the site will be used as a tool to build awareness and for training and communication with the competent administrations or municipal districts.
The project will close with the organization of an international presentation seminar for the entire research project

ACKNOWLEDGEMENTS
We thank the European Commission for its financial support of this project and the Wölfel Messsysteme Software GmbH & Co KG company for its technical support.

REFERENCES

1. **European Commission**, *Green Paper "future noise policy"*, 1996
2. **Brussels Capital Region**, *Plan de lutte contre le bruit en milieu urbain*, 2000
3. **NN**, *RLS 90 Richtlinie für den Lärmschutz an Strassen*, 1990
4. **NN**, *Bruit des infrastructures routières NMPB - routes - new method*, 1996