Designing tools to support noise action planning on a large scale: the role of a regional noise observatory

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ABSTRACT

The 2002/49/EC European directive and its transposition into French law require agglomerations of more than 250,000 inhabitants to make noise maps and action plans.
Since the Paris agglomeration isn't an administrative entity, about 240 local authorities are in charge of its implementation in this area. The multiplicity of the stakeholders involved has required from Bruitparif, the Regional Noise Observatory, a reinforcement of the technical assistance it already provided.

In the framework of its local authorities support mission, Bruitparif has elaborated a global methodology by creating new tools to incite noise action plan implementation:

- A web-site space dedicated to public authorities with a Geographical Information System tool crossing their noise maps and land use information

- A pre-filled noise action plan framework containing a methodology based on our GIS enabling the local authorities to identify the potential priority areas and their potential quiet areas thanks to their noise mapping

- A workbook summarizing good practices for both administrative staff and representatives in order to give them a better understanding of noise issues and highlighting practical measures falling within their competence.

This article aims to present the tools developed to support action planning at a large scale.

Keywords: Action plan, Support.

1. INTRODUCTION

Bruitparif was created in 2005 as a regional agency for assessing and monitoring noise in Ile-de-France, one of the twenty-six French regions. In 2006, the transposition into French law of the 2002/49/EC European directive required the councils of agglomerations with more than 250,000 inhabitants to produce noise maps and action plans. Not the entire Ile-de-France region is concerned by this directive, however, only the Paris agglomeration, which represents more than 250 competent local authorities.

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Due to the significant delays in the production and publication of strategic noise maps and action plans, France entered a pre-litigation phase with the European Commission in November 2011. In this context, since 2012, Bruitparif has reinforced its assistance and support for the local authorities concerned in Ile-de-France that want to produce their environmental noise action plans in order to promote the fight against noise on a large scale.

2. A REGIONAL NOISE OBSERVATORY TO BRING TOGETHER THE DIFFERENT PLAYERS

2.1   Ile-de-France region

The French administrative structure is quite fragmented and the Ile-de-France region, which is mainly composed of the Paris metropolitan area, is one of the 26 French regions. It is the most populous region in France with 11 million inhabitants representing 19% of the French population and it is also the richest region.

The Ile-de-France region is also characterized by the number and density of its infrastructures: more than 40,000 km of roads including 1,000 km of motorways and expressways), more than 1,800 km of railways. The region is also characterized by an aircraft network that is unique in Europe, with two international airports: Roissy in the North of Paris and Orly in the south, as well as numerous private airfields.

Consequently transportation noise is a particularly sensitive issue in this region.

2.2   Bruitparif: a regional noise observatory

Bruitparif was created in 2005 because studies showed that noise was one of the main concerns of inhabitants in Ile-de-France and also because there was a multiplicity of players involved in noise management with no real coordination. That is why Bruitparif is in charge of bringing together the numerous players involved in noise management in Ile-de-France, of centralizing all the available data and of informing the public on noise issues.

As a non-profit organization, it aims to answer to the legitimate expectations of Ile-de-France inhabitants to get reliable information on the noise levels they are exposed to and carries out a mission of general interest in accordance with the principles of independence, reliability and transparency focused on three main missions:

- Measurements and assessment of the acoustic environment (monitoring network, noise exploitation and analysis laboratory, research and development).

- Support for public policies (implementation of the 2002/49/EC European Directive regarding environmental noise, Forum of Entities in Ile-de-France for better management of the acoustic environment).

- Raising awareness among inhabitants of Ile-de-France on the importance of the quality of the acoustic environment and hearing risks related to amplified music.

The observatory also wants to bring together all the entities in order to determine, improve and assess public policies to prevent and fight against noise nuisances in the "Paris Region". Indeed, the 2002/49/EC European directive and its transposition into French law require the Paris agglomeration to make noise maps and action plans. However, this area is not an administrative entity but only an area defined by a uniform urban density, which represents 396 towns. Since some of them are grouped into cooperation structures for noise issues, there are about 250 entities in charge of the application of the European Noise Directive in the Paris agglomeration.
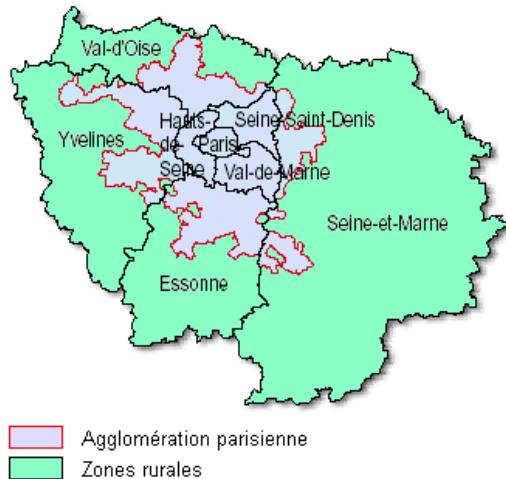
Figure 1 – Paris agglomeration area within the Ile-de-France region

2.3   Context of the creation of free support tools

Due to the significant delays in the production and publication of strategic noise maps and the action plans, France entered a pre-litigation phase with the European Commission in November 2011. In this context, since 2012, Bruitparif reinforced its mission to support local authorities, preparing a comprehensive methodology to reinforce technical assistance for local authorities. This strategy consists above all in creating new tools to promote the implementation of a noise action plan:

- A pre-written noise action plan template containing a methodology based on our Geographical Information System (GIS) enabling the local authorities to identify their potential priority areas and quiet areas thanks to their noise maps;

- A web-site space dedicated to public authorities with a GIS tool crossing their noise maps and land-use information;

- A workbook summarizing best practices for both administrative staff and representatives in order to give them a better understanding of noise issues and highlighting practical measures falling within their jurisdiction.

These three tools are part of an overall methodology to promote the integration of noise in urban planning and are available to download from the "forum" section of Bruitparif's website for those that register (http://forum-des-acteurs.bruitparif.fr/espace-de-travail/ppbe-accompagnement-renforce).
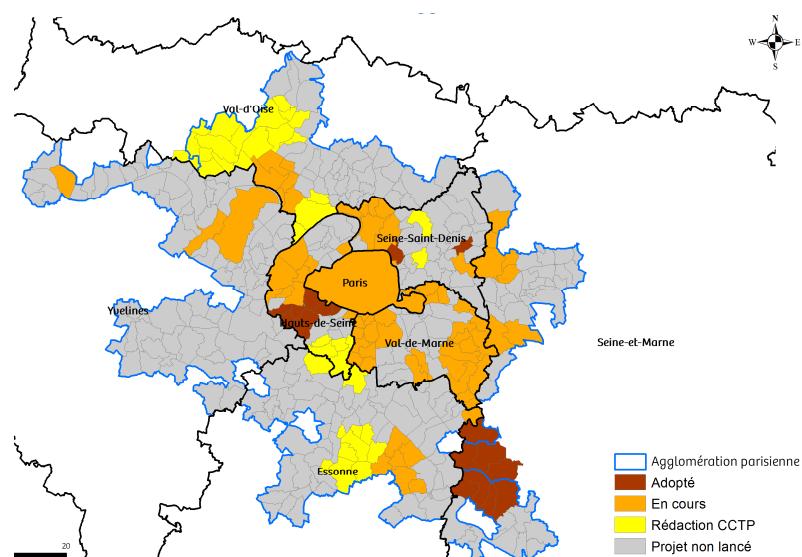

Figure 2- Review of the implementation of noise action plans in the Paris agglomeration (January 2013).

Only four local authorities have published their noise action plan (in red)

3. CREATION OF A PRE-WRITTEN TEMPLATE OF AN ACTION PLAN AND ANNEXES REQUIRED FOR THE FINAL IMPLEMENTATION

3.1 Pre-written template

The pre-filled noise action plan template created by Bruitparif aims to help the local authority to better understand the methodology required to implement of a noise action plan and also to highlight the links between noise issues and the way how the local authorities can act. It is composed of three main parts.

The first one concerns the legal context and is mainly pre-written. It is an explanation of the European noise directive and it also includes a territory description scheme for the local authority producing its noise action plan. This section is mainly destined for a "wider public" to make them better understand the framework of a transportation noise action plan.

The second one is dedicated to the analysis and the ranking of priority areas regarding noise issues (current issues and potential issues due to future buildings projects). At the end of this second part, the local authorities are able to rank their priority areas with respect to the number of people exposed and also regarding the criticality of threshold values.

The last part of this pre-written template is dedicated to action planning, with some reminders concerning the impact of the urban planning documents in the acoustic environment. Then this section is divided according to the different noise sources.

For each transportation noise source, the main orientations of concrete actions that could be implemented to solve the problem are listed in different tables. For example, the traffic noise section is composed of five types of main actions broken down into wide orientations that are divided into more concrete actions. For example: Reduce traffic / Orientation: access prohibited to certain types of vehicles / Actions: road closed to heavy vehicles or to motorcycles.

This methodology provides the local authority with a good overview of the different ways to prevent or to fight against noise, in particular concerning the traffic-related noise. And concerning the other noise sources, it gives them overall knowledge about the technical issues of these noises (railway noise, for example). Even if the local authorities are able to solve this issue alone, the document contains explanations on the different ways to contact infrastructure managers.


Figure 3- Pre-written template snap-shot

3.2 Annexes gathering information on overall situation

The annexes provided by Bruitparif gathered overall noise information to facilitate the work of the local authority realizing their noise action plan. It is composed of a non-technical summary in the format required for feeding information back to the European Commission; of the various statistical tables to be completed in the action plan template; of suggested letter templates to be sent to the infrastructure managers in order to collect the information for their own action plan (in particular the noise reduction measures carried out over the last ten years on the infrastructures they are responsible for, as well as those planned for the next five years); of a file containing all the official documents (noise exposure maps and noise disturbance maps) for all three Paris airports; of two documents for using the web-GIS tool available on the Bruitparif website (a tutorial presenting how to locate priority areas and a help document for using this tool); and finally, various complementary support documents, like the list of studies carried out by Bruitparif in the Ile-de-France region.

4. PROVIDING AN EXPERT MAPPING TOOL TO LOCAL AUTHORTIES GATHERING NOISE INFORMATION FROM THE PARIS AGGLOMERATION

The expert mapping tool at the local authorities' disposal is a powerful instrument to make them aware of the current and future issues on their territory.

4.1 For the ranking of priority areas in noise action plans

For ranking the issues related to the different sources of environmental noise (road, rail, air), Bruitparif has specially created a model map within the expert mapping part of its website's "forum" section.

Thanks to the mapping tool "dynmap", which is used like a web-GIS, and by using the tutorial, which explains how to locate priority areas, local authorities can zoom into their territory and select the noise layer that interests them (Lden or Ln indicators that exceed the threshold values for different noise sources, areas exposed to multiple sources of noise, etc.). In order to complete the information, local authorities can then superpose other layers of information, for example the type of land occupancy (housing, teaching or health establishments, etc.). The map obtained by superposing this information allows them to locate "difficult" zones, where noise levels are excessive, for an initial identification of the issues in their territory.
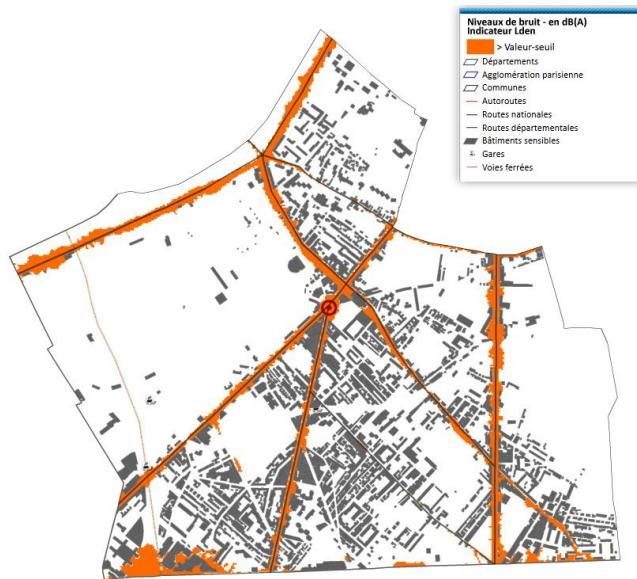

Figure 4 – 1st step in the methodology proposed: Buildings and threshold road values (Lden)
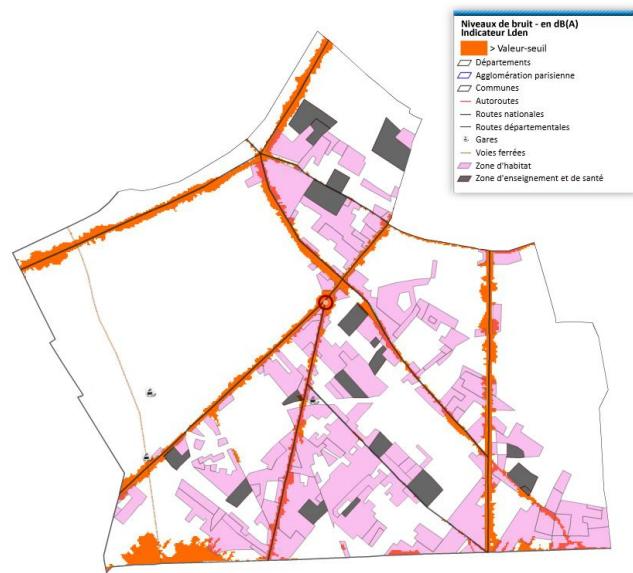
Figure 5 – 2nd step: Crossing of the "above Threshold values –Roads" map with the "Land use" information
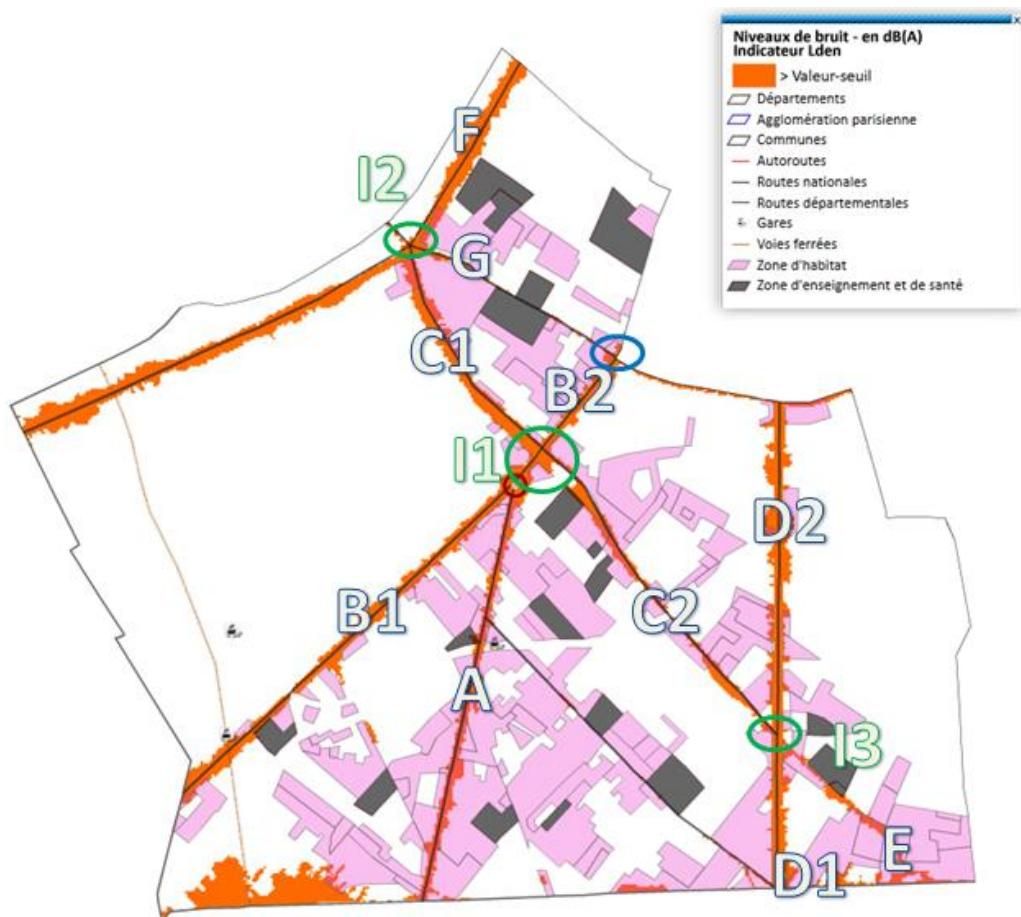
Figure 6 – 3rd step: Select residential areas or sensitive buildings in areas above threshold values for road noise in Lden

Table 1 – 4th step: List the different problem areas spotted in a table in order to rank them

Area description	Infrastructure manager	Population impacted (estimated)	Ranking of these areas
A. District road	District manager	3800-3900	1
B1. District road	District manager	600-700	5
B2.Municipality road.1sensitive building	District manager	77 (+56 in sensitive building)	…
C1.Municipality road …	Town manager	…	2
G. National road	State manager	…	3

For the prioritisation of these issues, Bruitparif has prepared an agglomerated index for the population exposed to critical noise levels. Created using data from strategic noise maps and population data estimated at building level, this tool allows users to view sectors where the population is most exposed to transportation noise, or which are priority targets for action.

The index appears in the form of a "honeycomb mesh" and allows you to prioritise areas by putting forward the number of inhabitants per building and also ranking the building according to by how much threshold values are exceeded. The closer "the mesh" is to a red/brown colour, the higher the index is, which indicates a high-priority area.
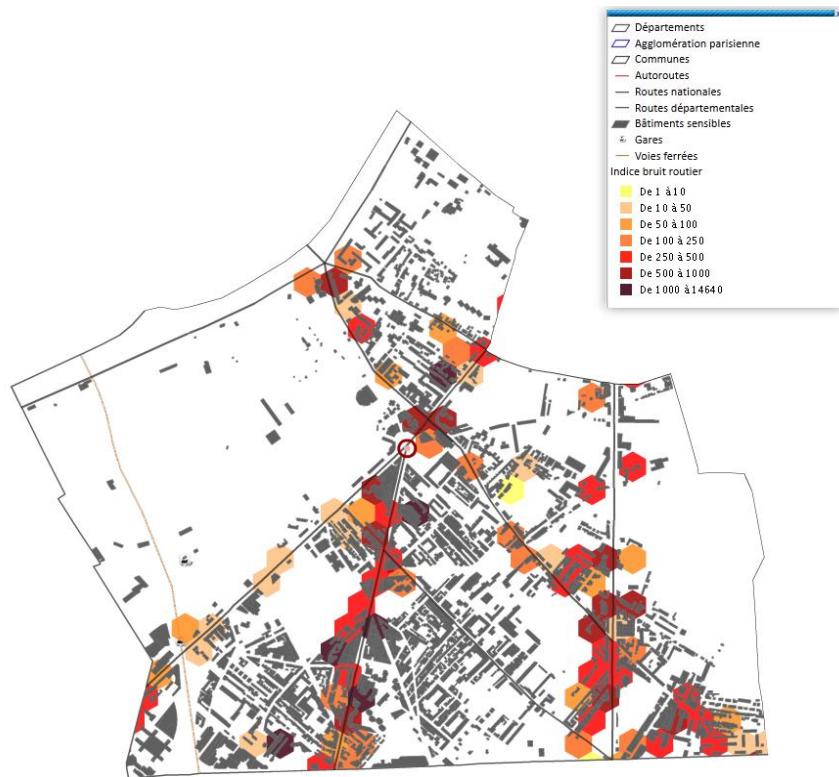
Figure 7 – Representation of the road index for populations exposed to critical noise levels

To go deeper into the analysis, the relevant authorities that have access to GIS layers can download them using the tool and create a private workspace. It can be particularly useful to add information concerning town planning or areas that are to be urbanized. For those that do not have GIS data, it is also possible to annotate the map with simple design software.

This function can be particularly useful concerning future building projects or their urban planning strategy.

4.2   To locate potential quiet areas

Bruitparif has created a layer of information with noise levels below 55 dB(A), for all sources of noise transport. Thus, if you select it, areas that could be considered as "potentially quiet" from an acoustic point of view will appear. By combining this information with the "parks and gardens" layers (including natural protected areas) or the "Public spaces" areas, if the town has any, it is possible to view the areas with low noise levels, which it would be useful to preserve.

Of course this method of localization isn't sufficient to determine definitive quiet areas but it provides a first basis for discussion.

Figure 8 – Areas in both light green and dark green: potential quiet areas

5.   IMPROVING THE LOCAL AUTHORITY'S KNOWLEDGE CONCERNING THE REDUCTION OR PREVENTION OF NOISE THANKS TO INFORMATION SHEETS

To go further when the issues have been identified, Bruitparif started preparing a series of information sheets with concrete elements for studying opportunities to implement certain types of actions in a given area. The work focused in particular on sheets concerning "Reducing road noise" and "Taking noise into account in town planning".

All of these sheets will be made available in a folder for Bruitparif members in 2013. The first sheets concerning the fight against road noise, called "Action on speed" and "Action on road surfacing" have been available on the Bruitparif website since 2012, and they are intended to give technical support to local authorities for the preparation of their environmental noise action plan.
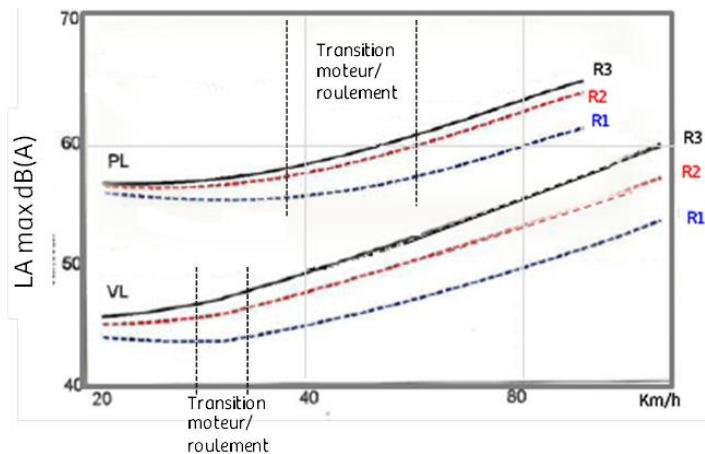
Figure 9 – Technical elements concerning the link between speed limit/traffic composition and noise summarized in the "Reducing speed" sheets

Figure 10 – Examples of other concrete actions detailed in the sheets

6. CONCLUSIONS

The tools provided by Bruitparif to local authorities in charge of implementing their noise action plan are free to download or use in our website. Moreover, to make them easier to handle, Bruitparif has been setting up training sessions explaining the three tools and particularly the GIS methodology for defining priority areas. At the end of April 2013, more than 70 local authorities attended our training sessions and more than half decided to use it to produce their noise action plan.