

Gaetano Licitra

# Special Issue on Environmental noise aspects in EU funded projects

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As stated by the European Environmental Agency in the report “Noise in Europe 2014”, noise pollution is a growing concern in Europe with severe health, social and economic drawbacks.

With the Directive 49/2002/EC (END 2002), the European Community (EC) has provided a tool to assist the Member States in the evaluation and management of the environmental noise. The aim is to improve the protection of the environment and the citizens’ quality of life in relation to the noise exposure from transport infrastructures and industrial activities. The Directive is intended to align the various state regulations by:

- new acoustic noise evaluation indices ( $L_{den}$  and  $L_{night}$ ) and specific calculation methods based on long-term exposure assessment;
- acoustic mapping and strategic noise mapping for agglomerations and for major transport infrastructures;
- action plans, intended as management tools and land use planning aimed at reducing the noise pollution level;
- take in serious consideration the feedback provided by the consultation of the public, whose participation is considered key to the programmatic and sustainable resolution of the problems of noise pollution;
- introduction of requirements to identify and preserve quiet areas.

The EC is accompanying the implementation of the END by establishing working groups, promoting reference documents (position papers), funding projects with the available financial instruments (Horizon 2020, LIFE, Interreg Europe, etc.). This should provide useful tools to the

noise experts who will have to apply the END to reduce the noise emissions both through mitigation actions and through new technological solutions on the sources.

In order to properly assess the noise issue, the European Commission has funded or is still funding several research projects aimed at:

- reducing emissions from roads (e.g. SILENCE, CityHush, QUIESST), railways (e.g. Quiet-track, ACOUTRAIN), airplanes (e.g. COSMA, OPENAIR), ships (e.g. MESP, SILENV);
- optimizing the management and planning of noise issues (e.g. HUSH, NADIA);
- defining and protecting quiet areas (e.g. QSIDE, QUADMAP);
- using sustainable or innovative solutions to tackle noise pollution (e.g. HOSANNA);
- evaluating the effect of noise on human health (e.g. QUIET);
- increase citizens’ awareness (e.g. HARMONICA).

On this regard, scientists who were or are currently involved in any EU funded project on environmental noise were invited to share the results of their researches with the readers of the journal. This will enhance the general awareness of what has been done and foster the discussion about future objectives on EU noise policies.

The international journal *Noise Mapping* has decided to dedicate a special issue to the research activities promoted by the EC funded projects just completed or on going. The publication of articles in the journal is preceded by review procedure (peer-reviewed), performed by international experts, ensuring the high quality of the final work.

The present special issue, downloadable for free via open access system, collects 16 articles related to 10 European projects as well as a review that analyses how much was produced over the recent years. The international profile of this collection of papers is evident and is expressed by the number and variety of authors, coming from the different Member States, and the choice of more than 50 referees, some even coming from the United States and Australia. Their work has contributed to the quality of the published works.

**Gaetano Licitra:** Gaetano Licitra: Coordinator Coastal Area of ARPAT, Environmental Protection Agency of Tuscany Region; Adjunct Professor of Applied Acoustics, Physics Department, University of Pisa



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## Road traffic noise

Seven of the papers regard road traffic noise. Samuele Schiavoni, Francesco D'Alessandro and Alessandro Conte in "The contribution of LIFE+ NADIA project on the implementation of the European Directive on Environmental Noise" [1] reported a summary of the activities performed in NADIA (Noise Abatement Demonstrative and Innovative Actions and information to the public) European Project, funded as part of the announcement Life+ 2009 between October 2010 and June 2014. In this project, five Italian partners (Provinces of Genova and Savona, Municipalities of Vicenza and Prato, University of Perugia) performed the actions required by the Environmental Noise Directive, *i.e.*, noise mappings of major roads for the provinces and of the agglomerations for the municipalities and the consequent noise action plans.

Konstantinos Vogiatzis and Markus Petz in "Noise score rating models for Q-Zones and embedded parks" [2] describe the CITYHUSH project action "Noise and vibration control at source – Acoustically green vehicles". Particular attention is given to powered two-wheeler in quiet zones, that were evaluated proving that the noise levels in a Q-Zone and embedded parks may be reduced if low frequencies noise is reduced or specific speed limits are introduced.

Sonia Alves, Laura Estévez-Mauriz, Francesco Aletta, Gemma M. Echevarria-Sanchez and Virginia Puyana Romero in "Towards the integration of urban sound planning in urban development processes: the study of four test sites within the SONORUS project" [3] tested in real test sites the holistic approach developed within the SONORUS project. The innovative techniques developed resulted in improved urban sound planning tools.

Keith Attenborough, Imran Bashir and Shahram Taherzadeh in "Exploiting ground effects for surface transport noise abatement" [4] through laboratory experiments, outdoor measurements at short and medium ranges and predictions, explored the potential traffic noise reduction arising from use of acoustically-soft surfaces and artificial roughness. Replacing acoustically hard ground with acoustically-soft ground (with or without crops) and introducing artificial roughness configurations could help in achieving noise reduction along surface transport corridors without breaking line of sight between source and receiver, thereby proving useful alternatives to noise barriers.

Maura Smiraglia, Roberto Benocci, Giovanni Zambon and Hector Eduardo Roman in "Predicting Hourly Traffic Noise from Traffic Flow Rate Model: Underlying Con-

cepts for the DYNAMAP Project" presented an analytical model to predict the hourly traffic noise from the simulated normal traffic flow by making a comparison between predicted and measured traffic noise levels. They performed a statistical analysis on the recorded values and used the so-called normal traffic flow rate for the simulations in order to find the best agreement between them.

Francesco Borchì, Monica Carfagni, Lapo Governi, Salvatore Curcuruto, Rosalba Silvaggio, Raffaella Bellomini, Sergio Luzzi, Gaetano Licitra, Diego Palazzuoli and Arnaldo Melloni in "LIFE+2008 HUSH project results: a new methodology and a new platform for implementing an integrated and harmonized noise Action Plan and proposals for updating Italian legislation and Environmental Noise Directive" [6] showed the methodology defined and the interventions realized in two pilot areas in Florence. The authors also suggested proposal for the revision of National legislation and END Directive and for supporting competent authorities and policy makers.

## Port Noise

Concerning port noise, Corrado Schenone, Ilaria Pittaluga, Davide Borelli, Walid Kamali and Yara El Moghrabi in "The impact of environmental noise generated from ports: outcome of MESP project" carried out validation tests to assess a procedure for designing a guideline on methodologies, good practices and measurement assessments, adaptable and transferable in different port contexts. Real cases tests in noise sector pilot projects in the ports of Patras, Greece, and Tripoli, Lebanon, were implemented. The work is related to the ENPI CBC MED project MESP (Managing the Environmental Sustainability of Ports for a durable development), which addressed the pollution reduction from port activities through the implementation of a multidisciplinary approach in air, noise and water sectors, encompassing technological, regulatory and administrative solutions to ensure natural and urban sustainability and high level of life quality in surrounding territories.

Also Davide Borelli, Tomaso Gaggero, Enrico Rizzuto and Corrado Schenone in "Holistic control of ship noise emissions" [8] presented a holistic approach for evaluating and for managing ship noise by considering noise emissions in air, water and indoor. The work aimed to find the best solutions in order to set limits to the ship emissions. The authors finally proposed the "Green Label" as a set of requirements that could be applied for each case considered to limit noise emissions.

## Outdoor acoustic comfort, smart tools and quiet areas

Some author dealt with the outdoor acoustic comfort, smart tools and quiet areas. Itziar Aspuru, Igone García, Karmele Herranz and Alvaro Santander in “CITI-SENSE: methods and tools for empowering citizens to observe acoustic comfort in outdoor public spaces” [9] designed and deployed tools that apply the concept of citizen observatories and empowering citizens in the assessment of acoustic comfort in public places. Demonstrative experiments carried out in situ are presented as part of the CITI-SENSE project. A step forward in the research into developing solutions for assessing acoustic comfort is acquired.

Gwenaël Guillaume, Arnaud Can, Gwendall Petit, Nicolas Fortin, Sylvain Palominos, Benoit Gauvreau, Erwan Bocher and Judicaël Picaut in “Noise mapping based on participative measurements” [10] proposed the OnoM@p system as tool for obtaining by non-experts updated crowd noise data for noise mapping. The presented method consists in using opportunely equipped smartphones as both geographical positioning system and environmental sensors.

Xavier Sevillano, Joan Claudi Socoró, Francesc Alías, Patrizia Bellucci, Laura Peruzzi, Simone Radaelli, Paola Coppi, Luca Nencini, Andrea Cerniglia, Alessandro Bisceglie, Roberto Benocci and Giovanni Zambon in “DYNAMAP – Development of low cost sensors networks for real time noise mapping” [11] described the DYNAMAP (Dynamic Acoustic MAPPING) project, which consists in developing a dynamic noise mapping system able to detect and represent in real time the acoustic impact of road infrastructures by means of low cost sensors.

Sonia Alves, Joachim Scheuren and Beate Altreuther in “Review of recent EU funded research projects from the perspective of urban sound planning: do the results cope with the needs of Europe’s noise policy?” [12] presented a review of European noise projects in order to understand the European funding strategy. It included urban sound planning topics and relative results that could be useful for stakeholders.

Itziar Aspuru, Igone Garcia, Chiara Bartalucci, Francesco Borchì, Monica Carfagni, Lapo Governi, Raffaella Bellomini, Sergio Luzzi, Henk Wolfert and Piotr Gaudibert in “LIFE+2010 QUADMAP Project: a new methodology to select, analyze and manage Quiet Urban Areas defined by the European Directive 2002/49/EC” [13] described the QUADMAP project, which takes into account the methodology introduced for the selection, analysis and management of Quiet Urban Areas (QUAs). The main

aspects of this work regarded not only the definition of a QUA, but also the evaluation of the benefits that QUA could provide in term of health and safety.

## Airport noise

Even airport noise has 2 papers dealing with it. Umberto Iemma in “Multi-disciplinary, community-oriented design of low-noise aircraft: the COSMA project” [14] reviewed the cross-disciplinary research of EC-funded project COSMA (Community Oriented Solutions to Minimize aircraft noise Annoyance, 7<sup>th</sup> Framework Programme) from the point of view of the aircraft designer by putting attention on the Optimisation of Airport Noise Scenarios. COSMA started in June 2009, with the aim of improving the understanding of the annoyance induced by aircraft noise on the population and identifying the engineering guidelines to establish appropriate design strategies and operational procedure to reduce these effects.

Lorenzo Trainelli, Massimo Gennaretti, Giovanni Bernardini, Alberto Rolando, Carlo E. D. Riboldi, Matteo Redaelli, Luca Riviello and Alessandro Scandroglio in “Innovative Helicopter In-Flight Noise Monitoring Systems Enabled by Rotor-State Measurements” [15] investigated the rotorcraft noise abatement during the approach procedures. The proposed methodology takes into account the Pilot Acoustic Indicator (PAI), a new cockpit instrument based on both pre-calculated and measured acoustic data, which enables the pilots to perform quieter manoeuvres.

## Noise in schools

Last, but not least, a paper sheds light on noise in schools. Marco Chetoni, Elena Ascari, Francesco Bianco, Luca Fredianelli, Gaetano Licitra and Liliana Cori in “Global noise score indicator for classroom evaluation of acoustic performances in LIFE GIOCONDA project” [16] showed a novel method to evaluate the acoustic performances of a classroom based on the use of a global noise indicator. This work is part of the on-going LIFE GIOCONDA project, whose goal is to provide a useful methodology for managing environmental and health issues by involving young people.

I hope that the reader will have an exhaustive overview of the recent research on environmental noise, developed thanks to the EU funds.

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