



**REPORT ON UQA SURVEYS AND DATA
ANALYSIS**

Actions A.2-A.3-A.4-A.5

final version 31/12/2012



QUADMAP LIFE10 ENV/IT/407

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INTRODUCTION

The aim of the current report prepared by UNIFI during action B.6 is to realize a summary of the previous document “Report of the state of the art – merged version”, in which each QUADMAP partner has provided with a description of national and locally experienced methodologies of selection, analysis and management of quiet areas. This work has been made in order to succeed in developing a new and common strategy for selection, assessment (combining quantitative and qualitative parameters) and management (noise mitigation, increasing of usability of areas and users satisfaction) of Quiet Urban Areas (QUAs).

Final analysis of the state of the art based also on the questionnaire submitted to stakeholders (database of stakeholders surveys will be completed by January 2013) is foreseen in a next report, foreseen in February 2013, about the proposed methodology for selection, analysis and management of QUAs.

1. SYNTHESIS OF QUAs DEFINITIONS AND CRITERIA

Before reporting different methods of selection, analysis and managing of QUAs developed in different European nations it's useful to understand which is the real meaning given to the term QUAs in different contexts described by QUADMAP partners. In general they could be formal definition of Quiet Area and/or characteristics that a Quiet Area should have got.



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partner	nation	city	formal definition	qualitative aspects								quantitative aspects	documentation/legislation
				urban/rural area	local area	public and social accessibility	green/natural area	natural sounds (birds, rustle of the leaves)	presence of water	safe	clean and well-maintained	n	
DCMR	The Netherlands	Amsterdam	n	u		x	x					noise levels ≤ 50 dB Lden	
		Utrecht	n	u			x		x	x	x	n	
		Rotterdam	n	u			x		x	x	x	n	
	Belgium	Brussels	y	u			x					n	action plan
		Flanders	open rural area where silence (which often coincides with darkness) is a quality to be preserved as much as possible	r								n	
	Norway	Oslo	n	u	x	x						noise levels ≤ 50 dB Lden	
	United Kingdom	England	open spaces which provide significant and important benefits because they are quiet				x	x					action plan
		Wales	n	u			x			x	x (pleasantness)		
		Scotland	n	u			x					noise levels ≤ 50 dB Lday & at least 9 ha of size	



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VIENRO SE	Italy	several municip ality	END definition	u/r								noise levels Laeq (6- 22) ≤ 50 dB(A) and Laeq (22-6) ≤ 40 dB(A)	D.M 29/11/2000
	Germany		some definitions from stakeholder' s questionnai res										Law 37 2003- Decree 1367/2007 (national definition of QA)
TECNAL IA	Spain	Bilbao	areas intended for recreation or natural interest										
		Pamplona	areas with reduced noise levels and predominan tly pedestrian use and recreation										
		Madrid										Lday and Levening < 60 dbA	
		Tenerife -La Laguna and Canarias										Lday < 60 dbA	
		Vigo	areas used for recreation or cultural interest										

		Zaragoza	areas with sound quality and public use for leisure										
	Portugal			u/r									Law Decree 146/2006, 31 July (national definition of QA)
BRUITP ARIF	France		external spaces notable by their low exposure to noise, where the authority in charge of the plan wants to control the evolution of this exposure considering the current or future human activities	u/r									article L 572-6 of the Code of the Environment (national qualitative definition with no distinction between QA in agglomeration or in open country)

Table 1: synthesis of contribute to the state of the art from QUADMAP partners

2. SYNTHESIS OF QUAs SELECTION METHODOLOGIES

2.1 DCMR

2.1.1 The Netherlands

In the noise action plans of the Netherlands, quiet areas are mostly identified based on noise maps and criteria.

In the action plan of Rotterdam there is a study conducted by the DCMR Environmental Protection Agency regarding the identification and criteria for QUAs in the city of Rotterdam. A first step to consider in the procedure were noise measurements in three selected pilot areas, selected from parks within the agglomeration. The following steps were taken in the identification process of QUAs in the city of Rotterdam (Weber, M.; Luzzi, S., 2010):

- quiet area mapping;
- measuring noise levels (short period or longer period within the area (unmanned));
- field survey on perception of visitors of the area.

2.1.2 Belgium

There is only a method or approach regarding the identification of QUAs used in the West Flanders Region. This is based on impressions and on existing plans of green destinations. No measurements were performed except in 2 areas to confirm the boundaries. The environmental and Spatial department were involved in designating and delineating the QUAs. In the action plan of the Brussels Region, a specific procedure or approach was not presented in the action plan except the following statement: “On the basis of the results of noise maps and definition of quiet areas referred to in article 1.b, sensitive areas will be identified and quiet areas will be considered to be designated for particular areas. For this purpose, identification and protection process will be done in consultation with the competent authorities”.

2.1.3 Norway

It was found out that three strategies were stated in selecting QUAs after filtering candidate quiet areas with the defined criteria from the noise action plan of Oslo 2008 - 2013¹. These three strategies stated to be based on regulations, criteria, measurements, noise mapping, and participation in the urban districts of Oslo and discussion meetings with relevant agencies in the action plan of Oslo.

¹ Action Plan against Noise in Oslo 2008 – 2013 (Handlingsplan mot støy i Oslo 2008 – 2013)

2.1.4 United Kingdom

2.1.4.1 England

In England quiet areas are identified through the following procedures:

1. The Competent Authority cooperates with local authorities in order to obtain information on the open spaces within the municipality.
2. The Competent Authority then decides whether any of the open spaces should be 'formally' identified as quiet areas as required by the Environmental Noise Regulation 2006. If agreed, the identified quiet areas will be published.
3. In this identification process, the Competent Authority emphasizes the cooperation with the local authorities and the consideration of the key attributes of the open spaces for formal identification. The Competent Authority pays attention to areas where the primary purpose is quiet and how quiet contributes to the overall quality of the open space.

Indicators being used so far are natural sounds (birds, rustle of the leaves,...), the function (park, natural area, etc.) but certainly not on the noise levels. However, it should be relative quiet. The pleasantness plays an important role.

2.1.4.2 Wales

In Wales candidate quiet areas are nominated through the following procedures:

1. Local authorities are invited to nominate public open spaces within the relevant agglomeration as candidate quiet areas. All candidate quiet areas then are assessed regarding sound, nature and visual/aesthetic pillars of urban tranquillity as a minimum criterion before they are considered further by the Welsh Ministers for full quiet area designation. Welsh Government considers these three pillars to be the ones that contribute most directly to a perception of quiet.
2. Candidate quiet areas other than public open spaces may also be nominated. However, the decision for these areas nominations are made on a case-by-case basis.
3. Site specific tranquillity assessment consists of the local authority identifying an open space that has merit in terms of the sound, nature and visual/aesthetic pillars has to fill in a form specifically developed for this purpose, providing a short qualitative account of how well the space measures up in those terms. The authority has to provide some additional information regarding well-being benefits, air quality and disabled access. These additional criteria will not affect the space's eligibility for quiet area status and providing information in these is voluntary. However, the information facilitates the Welsh Government to develop policy in these areas in conjunction with the local authorities and other stakeholders.
4. The assessment is checked by the Welsh Government, and criteria are checked.
5. A list is published showing a map with all candidate quiet areas. View of the public is sought for the suitability for formal quiet area status in case there are potential quiet areas where members of the public may also wish to emphasize in this phase of the identification. Following the public and local consultation, the Welsh Ministers amend the agglomeration action plans stating the designated candidate quiet areas within an agglomeration.
6. Following this candidate quiet areas may be nominated later and designated as quiet areas in the agglomeration action plans if they meet the relevant criteria mentioned in the assessment form. Also there can be new nominations to consult on new candidate quiet areas.

7. The Welsh Government reviews the list of quiet areas in consultation with local authorities at least once every five years to ensure that quiet areas still meet the requirements.
8. Local authorities are invited by the Welsh Government to submit tranquillity assessment forms for all the open spaces that have been nominated and given candidate quiet area status, for formal designation as quiet area.

2.1.4.3 Scotland

In Scotland the following procedures are applied:

1. The first step taken in the process of identification of quiet areas in Scotland is a review process to Candidate Quiet Areas in order to check whether these areas should be labelled as quiet areas.
2. In this review process a technical guidance which provides guidance to stakeholders in determining whether or not an identified candidate quiet area within the Edinburgh and Glasgow agglomeration should progress to a quiet area status or whether the declaration of a quiet area would not be appropriate in the circumstances.
3. Then in identifying candidate quiet areas for both agglomerations, a source dataset comprising of historic parks and gardens, public or other open spaces and metropolitan open land taken from them land use constraints dataset as well as relevant Scottish Natural Heritage designations was identified. This source dataset was developed by the local authorities, and then subjected to a series of filter specifications based on that developed by the Transport Research Laboratory. These specifications concern noise levels below 50 dB Lday and following a filter on 9 hectares. The outcome of this filter process was a list of candidate quiet areas.
4. Prior to any candidate quiet area being promoted to a quiet area status, the list of candidate quiet areas is subject to detailed scrutiny applying the following questions: is the area already identified for an alternate use within the local plan?; are alternate uses for the area currently being developed for a future local plan?; are there any developments planned in close proximity to the area that would be compromised? and are any significant changes to nearby roads proposed which would impact upon the area?.

2.2 VIENROSE

2.2.1 Italy

Most of Italian cities neither have an Action Plan nor have identified QUAs. The only distinction is the urban destined use (ex. urban park, green areas, public gardens, etc...)

In some cases, as the city of Florence, a methodology for QUAs definition and management has been developed. Below a short summary and the main steps of Florence proposal are listed:

1. preliminary investigation phase (site description, analysis of the urban characteristics, materials, orientation, vegetation, predominant colors, sound sources, etc...);
2. measurement phase (sound pressure level, binaural measurements etc...);
3. multilayer mapping phase;

4. psychological and social analysis (interviews and questionnaires to users about all the aspects of the comfort according to the principles of Participatory Design);

The subjective data collection has been developed on the basis of:

- references to design methodologies;
- specific structure of questionnaires;
- interviews with a representative sample of subject;
- statistical elaboration and sociological analysis of collected data;
- report detailing results to support the requalification actions.

Questionnaires have been divided in three sections:

- general data about interviewed people (in order to assess sample's heterogeneity) and about mode and timing of their attendance of the investigated area;
- perception of the area quality level, referring to six general aspects (facilities, air quality, cleanliness, security, green, soundscape);
- annoyance assessment relative to several specific noise sources (voices, road traffic, railway traffic, natural sources as twittering, etc.)

The interviewed have been requested to indicate favorite sub-area, expressing reasons, and to give some suggestions to improve the general comfort of the space.

The questionnaire investigates the reactions of people who use the space. Questions relating to each aspect of the environment have been reported and quantified as level assumed by variables. Some examples: perceived noise, acoustic comfort, acoustic preference, noise tolerability, visual perception, visual preference, visual tolerance, air quality tolerance, environmental impact.

2.2.2 Germany

Down here follows the QUAs selection methodologies applied from the main urban agglomerations in Germany.

BERLIN: The selection of Quiet Areas in Berlin has to:

- Comply with the requirements of the Environmental Noise Directive,
- Be ascertainable with the existing database in Berlin,
- Comply with the (subjective) requirements of the persons searching recreation.

This is the background for the definition in an iterative process of the criteria for selection represented in the following Table 1. The areas are differentiated in:

- *Quiet areas in an agglomeration* according to the Environmental Noise Directive: are large continuous open areas, that allow sojourning and also long walks without crossing noisy areas;

- *Urban recreation areas* that not necessarily have low noise levels, but possess a high sojourn quality in the neighbourhood of the dwelling locations and are large enough so that their core is considerably quieter than its periphery.

Table 1- Selection criteria

	Quiet Areas (Continuous Open Areas)	Urban Recreation Areas
Characteristic	Forest, green spaces, parks, fields, farmland and meadows. A continuous natural expanse connected with green spaces in the neighbouring landscapes	Green areas and recreation areas near residential areas within walking distance
Absolute limit level value ¹	$L_{den} \leq 55 \text{ dB(A)}$	--
Relative limit level value	--	-6 dB(A) in the core area in relation to the most exposed area
Limit value of extension	$\geq 100 \text{ ha}$	$\geq 30 \text{ ha}$

It has to be pointed out, that some quiet areas are crossed by important noise sources (motorways, railway-lines). There is no possibility to take measures to protect these areas due to the lack of financial means. For the expansion of the motorway A 100, intended to relieve the inhabited inner city area, no noise insulation measures to protect the recreation areas will be funded by the road construction state agency.

STUTTGART: Three categories of "Quiet areas" can be individuated:

1. Big contiguous free areas that allow a sojourn and long walks without crossing noisy zones (Aim: $L_{DEN} \leq 50 \text{ dB}$).
2. Free areas that have a high quality for recreational purposes that are in walking distance to residential areas. In their core they are considerably quieter than in their limits that are often characterized by streets with much traffic and noise (Aim: $L_{DEN} \leq 55 \text{ dB}$).
3. Relatively quiet but important ways for pedestrians and cyclists apart from main streets (Aim: $L_{DEN} \leq 60 \text{ dB}$).

MUNCHEN: Recreational areas of (relative) quietness and a minimum size which are without potential conflicts concerning future development. They are easily accessible to a minimum

population of the neighborhood. Adjacent areas were merged into bigger units, if this seemed reasonable.

Three categories of areas which meet certain specifications have been classified.

- “quiet areas” (defined in current noise action plan): minimum size of 20 hectares, recreational use;
- “urban recreational areas” (potential “quiet areas” in future noise action plans): minimum size of 10 hectares, recreational use, within walking distance for a population of 60.000.
- “rural recreational areas” (potential “quiet areas” in future noise action plans): minimum size of 100 hectares, specified recreational use.

BREMEN: Two Categories have been classified:

1. Quiet areas in open country, 30 hectare or more, $L_{DEN} \leq 50$ dB(A), greenland, meadows, forests etc.
2. Quiet areas in the city, 1 hectare or more, target is $L_{DEN} < 50$, parks, recreation and allotments areas.

AACHEN: Public use: zones < 55 dB(A) – more assessment not defined yet.

BONN: According to the recommendations of the EU, the criteria followed are $L_{den} \leq 50$ dB(A) and area-size > 4 km².

QUAs are generally defined as area for recreation and IFS-Integrated Free-space system.

DUESSELDORF: Main focus lies on leisure areas and recreation areas which are regularly accessible to the public and can be used for recreation from the high noise levels in the residential areas in the town. Two QUAs categories are considered:

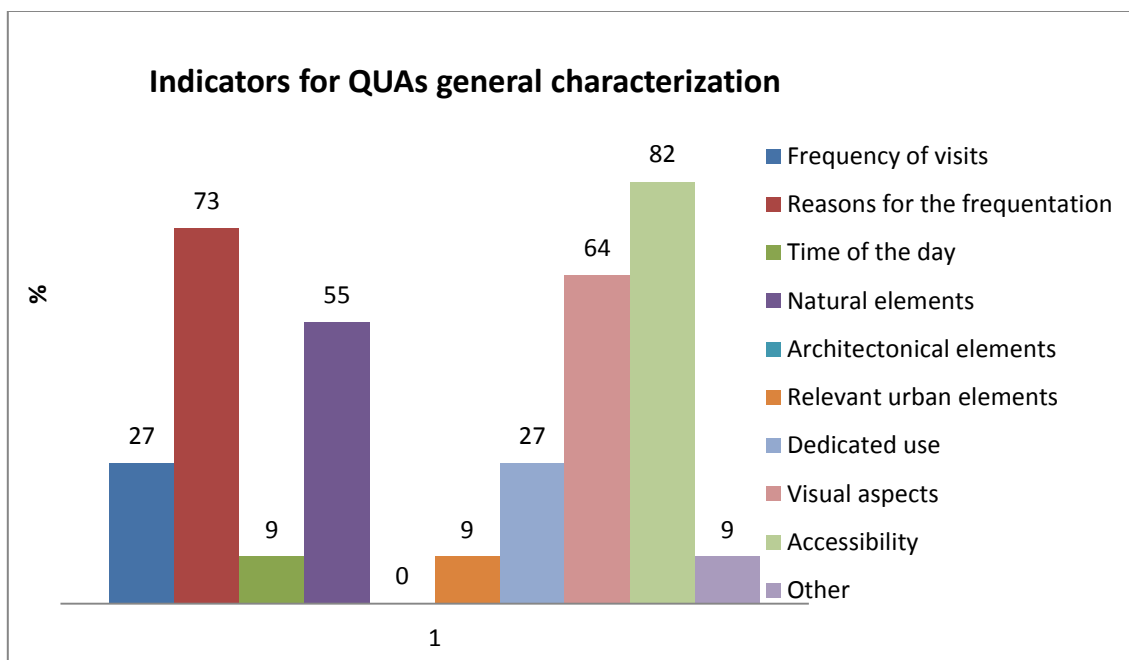
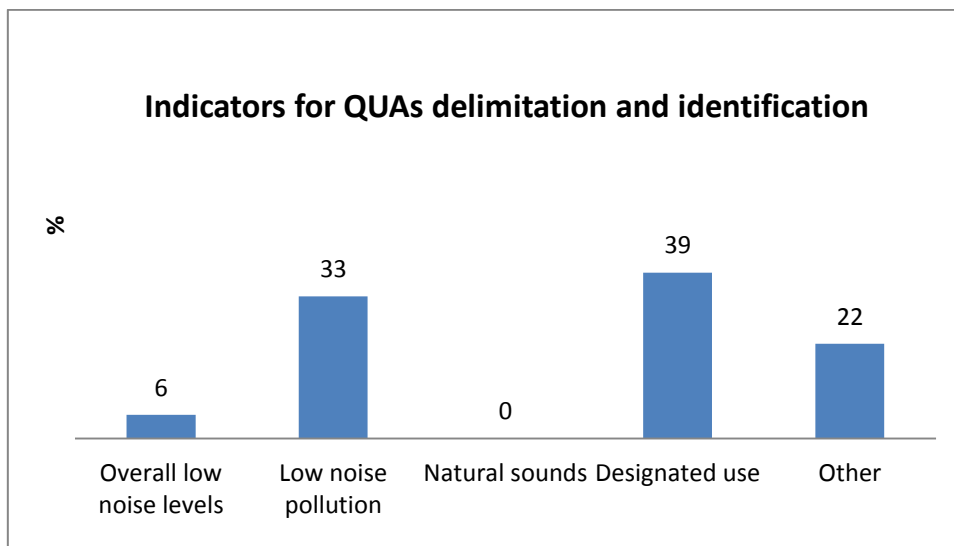
1. great quiet areas (wide areas > 4 km²) with natural open spaces, where predominantly a noise load of $L_{DEN} \leq 50$ dB (A) is a fact.
2. smaller areas in the central city, mostly formed as recreational zones, felt by the population as quiet. Aim is to protect them against increasing noise levels.

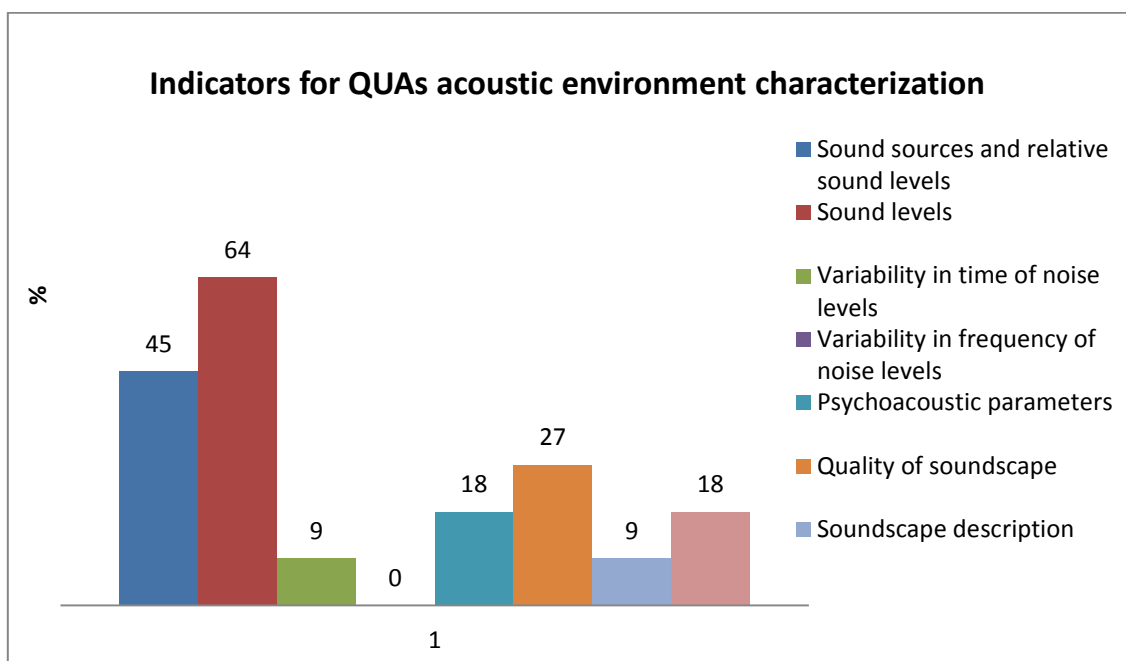
LUEBECK: The individuation of QUAs is based on the landscape plan of the nature conservation authority.

At the Moment they have three kinds of quiet areas:

1. “Recreation areas”: large areas (mostly natural finish or agricultural areas or woodland);
2. “Urban oases”: quiet areas of the inner-city;
3. “Quiet axes”: ways between “Urban oases”; close to nature and attractive for bicycle rider and walker.

In the following charts are represented the results of the Questionnaire about the indicators for the delimitation and identification of quiet areas and for their general characterization considering or not the acoustical parameters.





2.3 TECNALIA

2.3.1 Spain

The applied methodologies are related with the Strategic Noise Mapping process and usually involves the calculation approach (prediction). The indicator of “Low sound levels” is the common one, Nevertheless other no acoustical issues are taken into account: accessibility, aesthetic, natural value, etc. The importance of UQA for citizens quality of LIFE is highlighted by the most part of agglomerations that must deal with END calendar, but the analysis and management process are usually derived to the Noise Action Plan definition and development.

Granada- The methodology consider for the Quiet Areas analysis is the calculation of noise levels using prediction methods. Nevertheless these data are tested developing sound levels measurements during 7 complete and consecutive days. This evaluation methodology is coincident with the one that was applied to identify the areas most exposed to noise.

Sevilla- protection of quiet areas is part of the noise action plan, and some management actions are described: areas free of heavy vehicles and restrictions on access times and tonnage of heavy vehicles, especially during night.

Zaragoza- the criteria used to identify a quiet area are the following:

- Having a surface that allows having an internal sound environment without remarkable environmental noise (sound from traffic or industries). The minimum area that should have these areas is estimated at about 90,000 m².
- Being for public use and free access.
- Having a use or function that requires a tranquil sound environment. For example: urban parks for recreation, natural corridors, natural protection areas, etc..
- Being part of the preservation and improvement of acoustic quality plans, of the municipality. This variable depends on the acoustic analysis but is related to the objectives municipal, city design and modification plans that exist in each area.

Considering these criteria, there are 7 areas in Zaragoza municipality, that are considered suitable for their declaration as Quiet Areas. The analysis in these areas combines:

- the results of Noise Mapping: surface that is exposed to more than 60 dBA (L_{day}). Considering that the target level for an UQA is $L_{day} < 60$ dBA.
- the results of sound level measurements of: L_{Aeq} , L_{Amax} , L_{10} , L_{50} , L_{90} , L_{95} y L_{99} .

Bilbao- The criteria used to identify a quiet area are the following:

- Having a surface that allows having an internal sound environment without remarkable environmental noise (sound from traffic or industries). The minimum area that should have these surfaces is estimated as about 50,000 m².
- Being for public use and having public access.
- Having a use or function that requires a tranquil sound environment: Green Areas of Bilbao and public spaces.
- Being part of the municipal plans for preservation and improvement of acoustic quality. This variable depends on the acoustic analysis, but it is related to the municipal objectives, to the city design and to modification plans that exist in each area.

An initial proposal was set with a total of 8 areas identified as possible QUA's. As a future action of the Plan, it will be detailed the need of analysing these areas. One pilot case was defined and studied to define the methodology for analysing the areas:

- Noise prediction tools were applied to identify areas that are exposed to less than $L_{day} < 60$ dBA.
- Some sound measurements were developed (of 15 minutes) to obtain L_{95-L5} as an indicator of the quietness of the area. The less the indicator is, the quieter the area is supposed to be.

This approach is considered as a first possibility to include other aspects apart from the noise pollution for the identification and study of QUA's.

2.3.2 Portugal

In this case, the national legislation definitions (closely in connection with the END concepts) is the general reference. Only in the case of Oeiras the concept deals with perception considering confort as a variable for the definition of a QUA.

2.4 BRUITPARIF

2.4.1 France

QUAs selection methods by the national guide "French referential for the definition and establishment of quiet areas" (Faburel, Gourlot, 2008)

Acoustic is often one of the first ideas for defining and identifying quiet areas. If a quiet area is a zone of less exposure to noise (especially in relation to transport), debates to select an indicator and a threshold value demonstrates the need to consider not only quantitative aspects of the sound environment, but also the environment in general, its uses, functions of the space, representations and feelings, etc.

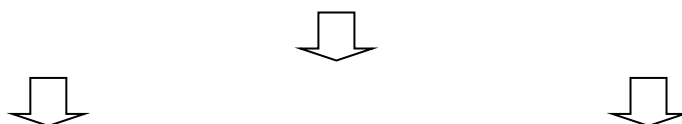
The relationship between people and their everyday environment is major and lent to a specific spatial identification of quiet areas, inviting us to diversify the approaches and qualifications of those areas. The quiet areas are multi-dimensional objects: they are inherently multi-functional (any type of space can be quiet) and multi-sensory (the quietness is as much visual, olfactory...). This excludes the possibility of using a single and homogenous standard at a national level.

The following table, made from returns of foreign experiences, summarizes the key perceptual elements may reflect the tranquility of a space, and their possible interpretation of quantitative criteria. However, in order to translate the feelings, expectations and practices in operational criteria for the territorial action there is a significant number of difficulties due to several gaps. Therefore, it is necessary to adopt a multi-criteria approach open to qualitative dimensions, only to qualify themselves spaces specially thought for resting and wellness.



First operational identification of quiet areas

Quiet or tranquility areas = Spaces for resting and wellness ?



Perceptual factors	Quantitative criteria	Gaps
Capacity to talk	Time of « silence » / Ambient noise	Not
Capacity of movement	Size, topography, density	Not
Representation of sound types (natural, human...)	Sound sources	Globally, not
Safe atmosphere	Cleanlyness (equipment), incivillity	Globally, not
Value called natural (panorama, water features, green spaces, wildlife)	Land use, urban form, official classifications of protected areas (eg. areas of architectural conservation, urban forests)	Globally, yes (eg. river banks)
Opportunity to be in quiet place	Accessibility spaces	Globally, yes (eg. habitat types and population)
Sound comfort	Noise level	Yes (desired / undesired character)

Expectations for quiet	Distance of infrastructure, industrial activities	Yes (eg. healing, urban rhythms)
Sensitive and sensory quality of space		Yes (eg. landscapes, quality of life, feeling of well-being)

Source : Translation of Faburel, Gourlot, 2008 – Updated by Gourlot, 2012

This gap justifies complete observations, investigations, experiments and discussions between different stakeholders

The quiet areas are qualified by stakeholders as places dedicated to rest and relaxation, having in fact an agreement function. These spaces would be identified as such by their specific sound environment, and more broadly by the pleasantness of their site and its peripheries, revealing a certain urban atmosphere (lack of industrial, furniture and relaxing social relations ...). If the green space types are the most mentioned, all space would be eligible, however quiet area status.

In order to identify quiet areas and to overcome the shortcomings of a mapping approach, three tracks are proposed:

- Consider the places where there is already a pending or potential a singular experience of « calm » « quietness » or « tranquility »
- Ask people to gather feelings, experiences and practices;
- Seek advice from local stakeholders (including politicians and technicians).

The authors consider that there is an important risk to define too precisely quiet areas at a national level. Local initiatives and projects (urban planning, environmental project...) should be encouraged in order to promote and protect quiet areas.

This identification methodology is actually a dynamic plan, formulated in the light of existing and adaptable over time, in contrast to a predetermined plan and imposed (often by zoning).

Quiet areas could be another way to enhance and territories to improve the quality of life and well-being. On the need for a diversity of actors, their skills and experience, then discuss local projects (requirement of transversality and interdisciplinary) is the need to take into account practices, feelings and experiences of people themselves. To analyze and characterize is essential to use methods in Human and Social Sciences.

The majority of agglomerations made the identification of potential quiet areas, in noise action plan, through noise mapping and a threshold values $<55\text{dB (A)}$ or $< 50 \text{ dB(A)}$. Noise maps are used as a negative picture for selection of QUAs on the territory. The thresholds are typically $<55 \text{ dB(A)}$, but I can change to $< 60 \text{ dB(A)}$ to find some space in urban area context. Usually the identification is done through a second filter around the green space on the territory of the agglomeration. Some Noise action plan have leaflet with observations (qualitative and quantitative) for each potential quiet area. In complement, the identification of potential quiet area is made with questionnaire to the technical staff and local associations of the city. There is other some focus group to exchange. This kind of document suggests all the different kind of potential Quiet Area can possibly encounter (Parks, Woods, Cemeteries,...) identified by the provider.

The issue of quiet areas often interest authorities but the main objective is to achieve the Noise action plan. Local authorities have the consciousness of the limit of this approach and they put in their noise action plan the need to address this issue in the future. They intend to go further.

Example of methodology by providers when the local authorities ask to focus on the quiet area issue. (Impedance)

In 5 steps:

- To select the most peaceful areas of the territory according to strategic noise mapping; areas exposed to noise modeled according to the daily index (LAeq (6h-18h)) or below 55 dB (A) have been identified, but it is not a restrictive condition selection zone, as discussed later.
- To review the potential area with local authorities, to determine their criterion of selection ; these criteria, and other proposed in the previous chapter, are included in the following steps.
- To develop a synthesis of eligible areas and prioritized them, and these areas are selected for reconnaissance work;
- To conduct a review of the nature of these areas in the field: quality of the physical environment and noise characteristics of proximity, access, security, etc..
- To make a proposal of eligible areas that could be used as quiet areas, the areas have been prioritized according to their different quality selection but this hierarchy can course be questioned by the local authorities.

Some criterion could be:

- Distance between two quiet areas (not too close but less than 2 km)
- Visual quality of site
- Noise level present

QUAs selection and analysis in Paris city : A participatory and progressive approach with the concept of relative noise or acoustic contrast (Paris city, Bruitparif, Acoustique&Conseil)

The Paris environment is not exactly made for quiet. Beside its 2.19 million inhabitants – with 21,000 inhabitants per km², it is one of the densest cities in the world –, 4 million people enter Paris every day through its many road infrastructures, the six passenger stations or the regional train network. The mixed-use development and the overlap of the different lifestyles and rhythms of the inhabitants unavoidably create noise annoyances and expectations of peace and quiet at the same time. The interpretation of the strategic road noise maps shows that 65% of the inhabitants are exposed to a noise level (expressed with the European harmonized indicator Lden) above 55 dB(A

Two complementary typologies of potential quiet areas are define:

- Big (> 3 ha), emblematic areas such as the main Paris parks, the woods, the historical cemeteries, or with a very strong attractiveness. Like the banks of the Seine or the canals, with an area of influence that can exceed one kilometer. Unfortunately, these areas do not follow a very homogeneous spatial distribution on the Paris territory since they are completely dependent on historical and natural factors.

- Local areas, available to everybody with a five minutes' walk (500 m). These areas aim to cover all of Paris for every inhabitant to have a quiet area close to them.

The cartographic pre selection of the quiet areas with the use of “relative noise” or “acoustic contrast”

Bruitparif built maps with ARCGIS representing the energetic combination of the road and rail noise maps for the Lde indicator.

In the context of dense urban environment usually close to traffic nuisances, limiting the definition of quiet areas only to the criterion of absolute noise level seems particularly restrictive. It is sensible to introduce for the two typologies of spaces a new notion, “relative noise,” consisting in also identifying areas of lesser noise within every neighborhood. This way, the “quiet” aspect of a site is appraised in this step not only with its absolute noise level, above or below 55 dB(A), but also with its difference with the surrounding areas (like a “haven” of quiet).

To come close to this notion of “relative noise” or “acoustic contrast,” Bruitparif made another map from the combined road and rail noise map in order to represent the moving average of the noise level assessed in the surrounding neighbourhood. This neighborhood is represented by a circle or buffer of 250 m around every point of spatial coordinates (x,y).



Definition of the neighbourhood with a circle of radius 250 m.

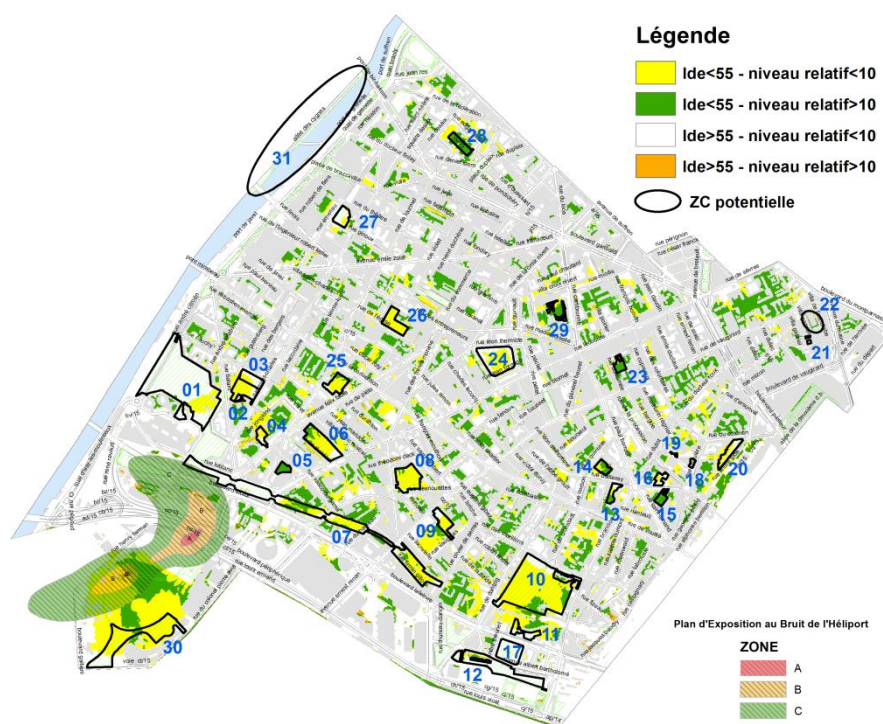
A 10mx10m mesh is built. For every mesh point, the arithmetic average of the noise values of the mesh points located in the circle is calculated. A circle of radius 250 m seems relevant to define the notion of neighborhood surrounding a point of the territory.

Based on the map of the moving average of the surrounding noise levels, it is possible to make a comparison between this average value representative of the neighborhood and the “absolute” noise value taken from the combined Lde map (2mx2m mesh resolution). This Δ difference obtained for every mesh point highlights the areas where the noise gradient $\Delta = \text{Lde average (R=250m)} - \text{Lde}$ is the highest.

With this formulation, $\Delta > 0$ corresponds to a point less noisy than the average level of the surrounding neighborhood. Thanks to this approach, we can make up 5 categories of Δ noise gradients in dB(A), from the quiet area notable in comparison with the atmosphere of the neighborhood ($\Delta \geq 20$) up to the noisiest area ($\Delta < -10$).

Making an acoustic contrast map highlights the areas quieter than the average level of the neighborhood and brings appreciable new information. To be fully effective, the analysis must however take into account the combined noise map in Lde in order to characterize the areas where the exposure to noise is either $>$ or $<$ 55 dB(A) and with a Δ acoustic contrast $>$ or $<$ 10 dB(A).

The first list of areas pre-selected with the noise maps comes from the crossing of the combined road and rail noise maps and the acoustic contrast maps for each Paris district. At this level of the analysis, two more important filters are going to be used. First, the public space layer: this data is complex to obtain since it is different from the delimitation of public property, which is better known. Second, the nuisances related to air traffic: this nuisance exists in Paris even though it is not identified as predominant. There are flights over the capital with airliners or related to the activities of the Paris – Issy les Moulineaux heliport.



Map of the pre-selected quiet areas in the 15th Paris district.

Once the potential sites are identified, it is necessary to start a consultation in the field with the population. Indeed, whatever the quality of the data used in the pre-selection step, it cannot take into account all noise sources, such as the emergences of powered two-wheelers, the sirens of emergency vehicles, the noise nuisances related to shops and small businesses and simply the sound reality of the different neighborhoods. The objective is to confront the local feelings with the acoustic analysis.

The semi-consultative approach chosen consists in presenting the potential quiet areas to Parisians through several tools in order to enrich and share the reflection. Three complementary tools have been used to gather the local feelings: an online questionnaire, an interactive map and consultation meetings in the field.

All the criteria, acoustic and perceptive, are then combined for all the sites in order to reach the most comprehensive vision possible. Many field visits complete this analysis; the lack of strong on-site obstacles like security or insalubrity is duly noted. The last discussions with district halls lead to a shared validation on a reasonable number of quiet areas.

A research experiment about the concept of acoustic contrast with the classical edge filter (P. Delaitre C. Lavandier, Laboratory MRTE, University of Cergy Pontoise, Cergy Pontoise)

In 2011, workshops with inhabitants of Paris and Cergy Pontoise showed that quietness is always compared with other situations in space or in time. A reference situation is necessary to estimate the degree of quietness.

Actually when people are asked about quiet areas, some of them use comparisons to describe them: “With regard to the boulevard, it is quieter”.

In order to represent this contrast on noise mapping, the use of the gradient derived from image analysis (edge detection) has been tested and experimented on the map of the 17th district of Paris. In soundscape research, this feeling of contrast has been revealed by various studies. A study on quiet areas showed that they can be defined by four characteristics: the absence of sound event, a low acoustic level, a pleasant sonic environment and a contrast with outside environment. In 1995, the CRESSON laboratory wrote a book in which the authors described “l’effet de coupure” (the break effect) 3. This effect is a sudden decrease (or increase) of noise. According to this study, the effect allows people to structure their perception in space and in time because they feel differences between areas.

The theory of edge detection has been developed in the seventies and eighties. In 1976, D. Marr⁵ proposes a first primitive descriptor which he calls “the primal sketch”. This descriptor is constructed on the intensity changes in a picture. A filter which passes over the picture detects the variations by calculation of the derivatives. The intensity changes correspond to a peak in the first derivative of the signal and they correspond to a zero-crossing in the second derivative of the signal.

In image analysis, there are various types of filters⁶: Roberts, Prewitt, Sobel, etc... These various filters are based on the first derivative but the second derivative can be also calculated with a rotation of $\pi/2$. The second derivative is often used because it simplifies the detection of the intensity changes by detecting the negative and positive areas. However, these filters are applied in one direction and according to their directions, the results may be different. The only orientation-independent second differential filter is the Laplacian, which is presented in figure 1.

This study shows that sudden variations calculated with the classical edge filter of acoustic levels reveal the masking effect but do not reveal the expected contrast. Different filters are then tested and new calculations are proposed to reveal this particular feeling.

3. SYNTHESIS OF QUAs ANALYSIS METHODOLOGIES

3.1 DCMR

3.1.1 The Netherlands

In general the approach for analysis and assessment of quiet urban areas applied in the cities of Amsterdam, Utrecht and Rotterdam consisted of noise measurements and field surveys. Both approaches aimed at collecting and assessing data on selected criteria as well as identification of relevant criteria to be applied in future research regarding quiet urban areas.

3.1.1.1 Amsterdam

In the action plan of the city of Amsterdam, criteria used were mentioned for identifying quiet areas. There was a criterion for the noise level which should be lower than <50 dB Lden for quiet areas (natural sounds, parks, playgrounds, picnic areas etc.). However, it was also mentioned that areas with a higher noise level than 50 dB Lden may be a candidate quiet area precisely because of other non-acoustical factors, such as pleasantness. Other criteria applied in the analysis were public accessibility, social accessibility, and preferably a green area.

3.1.1.2 Utrecht

Criteria stated in the noise action plan of the city of Utrecht for identification of quiet areas are the following: cleanliness, safety, and presence of green and/or water.

3.1.1.3 Rotterdam

The Noise Action Plan of the city of Rotterdam does not state specific criteria for QUAs but refers to reasons for visiting these areas, such as reading a book or newspaper, having a lunch, relaxing. During the field surveys the following criteria were identified as relevant for characterising and assessing quiet urban areas: safe appearance, clean and well-maintained, green and nature, water features, other people.

3.1.2 Belgium

Hardly applicable nor provided by the competent authorities. Only West Flanders has used a criterion which is 'no influence of human induced noise' of any sound source (indicator). Openness and green have been used for the characterization of QUAs. However, a 'Multicriteria Approach' has been proposed by Botteldooren and De Coensel (2006) from Ghent University, that differentiates between different types of quiet areas. The following criteria are proposed:

- Criteria based on physical measurements: criteria used are noise indicators to quantify disturbance by sound events. Measurements are done with a trained listener and with easy-to-measure indicators.
- Criteria based on observations by a trained listener. Cost-effective observations by a trained listener.

- Criteria based on the appreciation by the visitors: The trained listener is supposed to be a conscious listener(decisive mind), since she/he is aware of the study/research. Therefore, surveys are recommended to be done with passers-by with direct questions such as “When you think about the area where you are walking, cycling, how silent would you say this area is” and this leads to a rating quality criterion. However, stating that this question leads to ambiguous results, an assessment based on a semantic differential is suggested. E.g. sharp-low, loud-silent, unnatural-natural, stressing-relaxing, rough-soft.
- Non-acoustic criteria are suggested to be included as separate criteria. Related to the multi-sensory perception of the environment and to the function of the quiet area.

3.1.3 Norway

Quiet areas are assessed based upon the criteria on accessibility, suitability for all age groups and noise level below 50 dB Lden. This is assessed by maps studies, noise measurements and field surveys on user experience and ratings of the criteria. After assessment areas with potential for designation as quiet area are selected. In addition soundscape is assessed based upon sound sources (categorised as traffic sounds, nature sounds, industrial sounds, temporary sounds, human sounds) and the dominance of sound sources.

3.1.4 United Kingdom

3.1.4.1 England

In England in the procedure of identification of quiet areas the document Good practice in open space planning has been applied. Specific attributes considered are the following:

- accessibility by walking, cycling and public transport has to be promoted, and facilities should be accessible for people with disabilities;
- intensive recreational use has to contribute to town centre vitality and viability;
- significant loss of amenity to residents, neighbouring uses or biodiversity should be avoided;
- quality of the area has to be improved through good design;
- open space in commercial and industrial areas should be provided;
- security and personal safety should be considered, specifically for children;
- regeneration needs of areas, using brown fields in preference to green field sites;
- impact of facilities on social inclusion should be considered;
- recreational needs of visitors and tourists should be considered.

3.1.4.2 Wales

In Wales a guideline published by the Welsh Government provides the procedure for the designation of quiet areas in agglomerations applying five ‘pillars’ of urban tranquillity prior to formal identification of quiet areas. Open space where all these five attributes are found, may be considered quiet by urban standards. The five pillars of urban tranquillity are: sound, presence of nature, visual or aesthetic quality, sense of personal safety, culture and freedom of place. In addition air quality, disabled accessibility and noise levels below 65 dB Lday for traffic noise are assessed.

In the subsequent step local authorities fill in a form entitled “Site-specific tranquillity assessment” which provides a qualitative view of the area which is not directly related to quiet but related to health and well-being benefits. However, this assessment does not affect the eligibility of the area, but will be applied in future policies regarding QUAs protection.

3.1.4.3 Scotland

In Scotland the first step before applying criteria to candidate quiet areas was forming a dataset including historic parks and gardens, public or other open spaces. After this dataset was formed, criteria developed by Transport Research Laboratory (TRL Ltd, 2006) were applied, that is noise levels below 55 dB Lday and minimum of 9 hectares falling within the noise band below 55 dB Lday.

3.2 VIENROSE

3.2.1 Italy

As no action plans except from the City of Florence have been carried out, below is described, as example, the method proposed by the above mentioned city.

In the experience of strategic action plan of the agglomeration of Florence, quiet areas have been studied and relative actions planned according to a soundscape based approach, considering measured noise levels as well as the overall quality of how places sound.

The adopted procedure moves by a quantitative analysis for determining a priority ranking similar to the hotspots’ one and then goes on with the soundscapes approach. The first step is a mapping of quiet areas with a LAeq simulation in a 10x10 m grid of points. The resulting level has been compared with the quality level for the area provided by Florence noise zoning map. For the quiet areas with values over the limits and, more generally for critical quiet areas all the possible actions for noise reduction are added and integrated to the hotspots referred actions of the macro-area to which the quiet area belong.

Then a single area or sub-area is investigated applying to it procedures that identify, recognise, characterise and localise the different types of sound, contributing to the multisource mixed sound environment. Not only measurements of the overall effects of noise, in terms of sound level and frequency are considered, but also levels of perceived annoyance are considered. In fact the Florence action planning integrated methodology aims to maximise the usable surface of “living” quiet areas as well as the number of area’s users more than to reduce the noise levels of “dead” quiet areas.

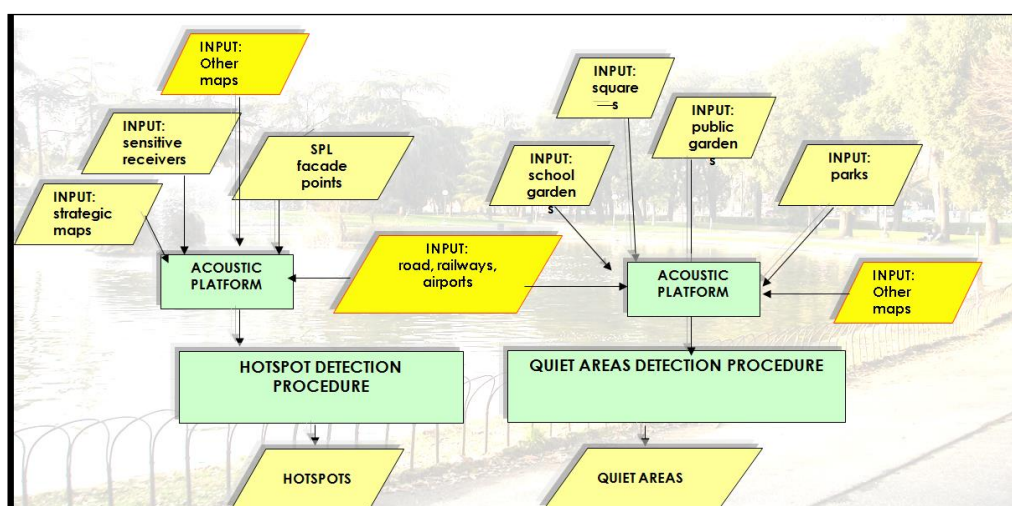
Quiet areas in Florence have been conducted to several categories of areas having different use (squares, gardens, routes, open spaces, schools, parks) but the same characteristic of being part of action plan’s macro-areas, surrounded by urban noise sources, largely used by citizens. The

application of soundscape method provides several data about the real sound scenarios. During measurements each area is divided in several acoustically homogeneous sub-areas considering criteria like use, distance from the source, urban furniture and other structural and-or functional aspects. These data suggest possible interventions to improve the quality of environmental sound.

The acoustic survey is composed of:

- SPL measurements in a grid of point corresponding to the different sub-areas;
- Sound walks, recording audio events by means of micro-track recorder and binaural system;
- interviews for subjective survey, collecting expectations of the users.

In Figure 1 the general procedure for developing an integrated action plan is shown. Both the strategic Action Plan and each operative Action Plan must consider the satisfaction not only of END Directive requirements but also those that come from the other Plans. All the plans concerning noise must converge in the joined “framework” Action Plan.



Flowchart of the procedure for Action plan development – phase 1

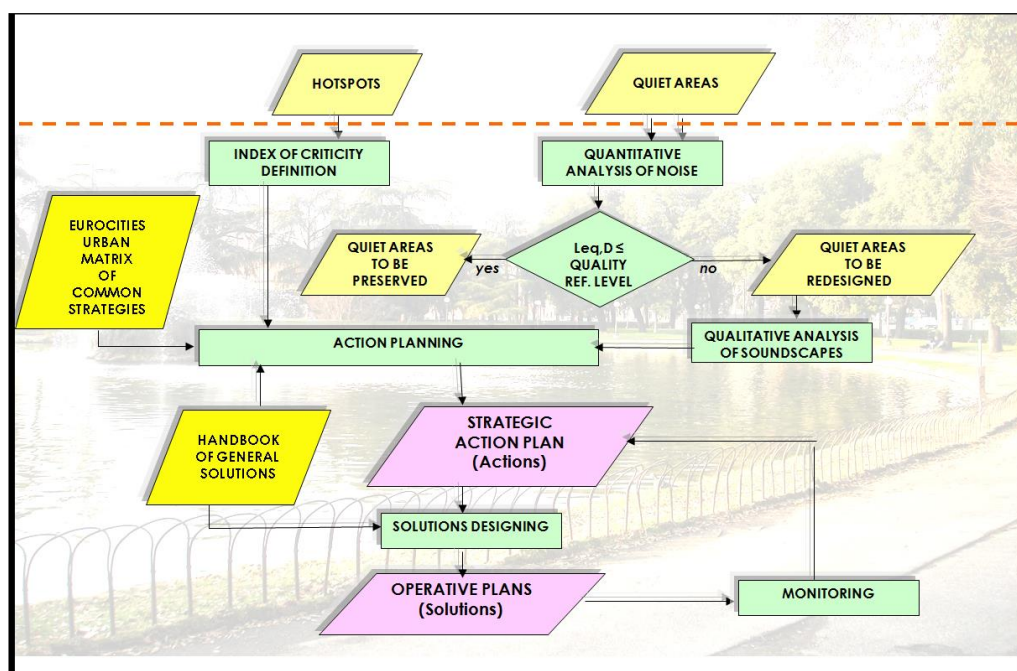
The procedure considers four decreasing levels of possible integration:

- integration of strategic action plans with urban strategic plans and other plans for noise reduction;
- integration of operative plans for the optimization of the decision making roadmap: actions, actors, deadlines;
- integration of planned actions - i.e. all different plans must contain (or have to be referred to) the same integrated action;
- integration of direct single actions.

The higher the level of integration, the lower the critical points that could bring to duplication of actions and solutions or to useless actions.

In the Florence experience, strategic actions are defined on a territorial macro-areas division basis, each macro-area being characterized by all the contained hotspots and quiet areas as well as by all the requirements coming out from the different plans and regulations that can be applied to it.

One significant part of the Florence strategic action plan is the Handbook of General Solution, a systematic collection of two-page records containing good practice suggestions, strategic and technical solutions for planners and for citizens too.



Flowchart of the procedure for Action plan development – phase 2

3.2.2 Germany

All the agglomerations and Municipality seems to have followed the indications of the 2002/49/EC Directive, no other legislative or methodological indications have been reported in the questionnaires.

3.3 TECNALIA

3.3.1 Spain

In some cases sound level measurement is part of the methodology but more in connection with the selection than with the analysis. No experiences that include citizens perception evaluation are reported.

3.3.2 Portugal

see previous section

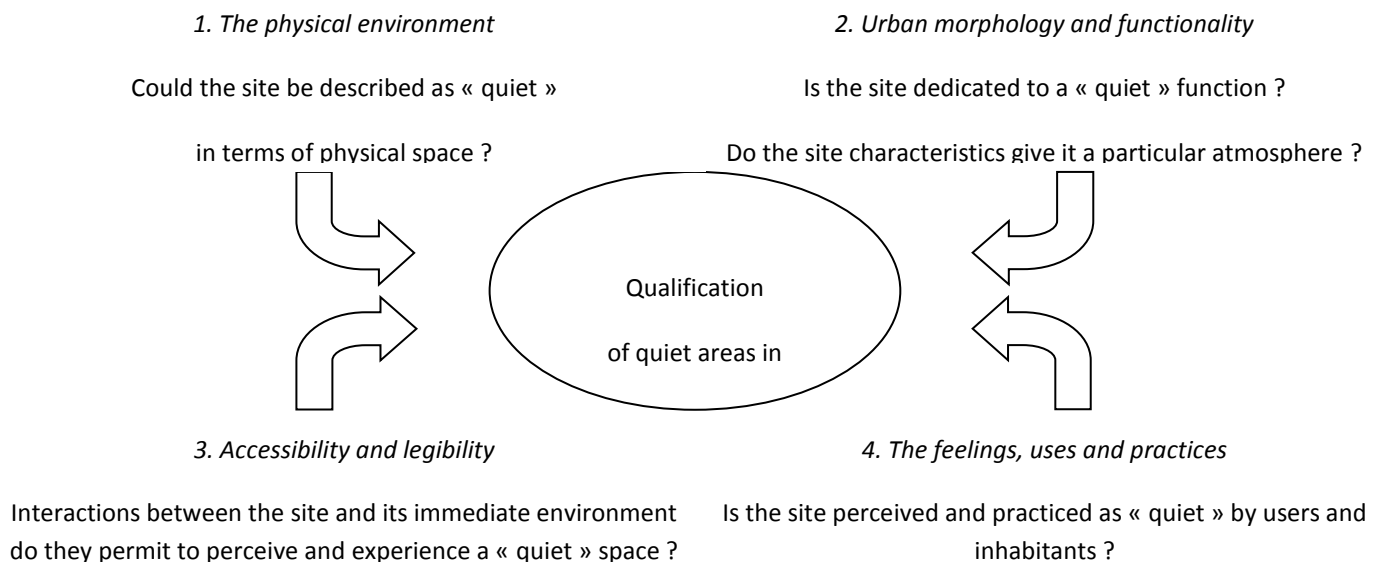
3.4 BRUITPARIF

3.4.1 France

Examples of experiment QUAs analysis in Paris region with the methodology from the French referential for the definition and establishment of quiet areas (Faburel, Gourlot,)

Six sites were selected by local stakeholder from four groups of criteria (see figure below). Every family is a series of questions whose answers can help qualify a quiet area or not, taking into account the intentions of local projects. These criteria were used to better understand the « calm » « quietness » or « tranquillity in the territory, but also to choose a variety of sites: two sites called natural, three mixed places with a dominant function, a social housing neighborhood, located in four departments of the first suburb of Paris , one in Grenoble, and one in Lyon.

Four groups of criteria for the qualification of quiet areas



Source : Translation of Faburel, Gourlot, 2008

An experiment was performed in situ. This work includes for each place: a qualitative description of the site, 10 questionnaires with users and residents, acoustic measurements. Results from territorial assessments, interviews with residents and users, and acoustic measurements showed that calm is

important, or more precisely the possibility to have moments of calm, at least temporarily, is proving key to feeling well every day. The feeling of calm that is independent of acoustic phenomena, but especially to the satisfaction of a place, expressed in terms of: the functional aspect (eg accessibility, amenities, layout); the human / relational (conviviality, solidarity, cohesion); sensitive atmosphere (natural elements, ambient sounds, aesthetics) and use the comfort of the place (activities, cleanliness, safety), the morphology of the space (relationship with the city, imaginary country).

In this context, each of the six sites surveyed identified a different figure from the calm in urban area.

- source of relaxation and healing at the park Sausset (Seine-Saint-Denis);
- source of renewing and disorientation on the place called "The Beach" Champigny-sur-Marne (Val de Marne);
- source of social relationships and a place to live around the place Sathonay (Lyon);
- source of mixed-use and landscape atypia on the Esplanade de La Défense (Hauts de Seine);
- source of living space and appropriate in the zone 30 for the city of Grenoble;
- source of peace and social cohesion for the City of Bobigny (Seine-Saint-Denis).

QUAs analysis with different methods in Greater Lyon (Greater Lyon and Acoucité)

QUAs analysis in Greater Lyon with comparison of results from calculated noise map, user questionnaire, Audio recording, acoustic measurement, observation of the site.

The choice of study areas is as follows:

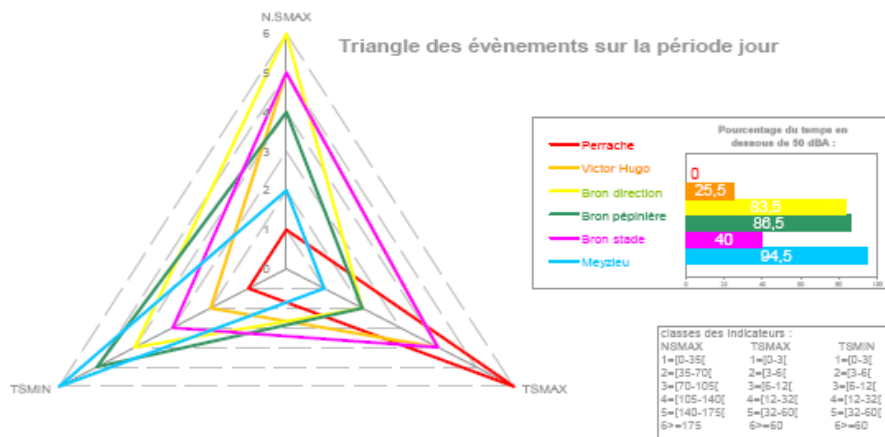
- Park: it is possible to identify quiet areas in considering potential the remoteness of some areas compared to noise sources as are defined in the Directive. It is thus likely to encounter areas quiet in the large urban parks, (three different spaces inside the BRON park)
- Pedestrian street: it seems also interesting to look at areas pedestrians in urban areas, the sound sources are dominant in the presence human, and are not taken into account in the mapping, (VICOR HUGO)
- Residential Zone: where the measured sound level can be largely below 50dBA during the day,(MEYZIEU)
- Proximity to a highway: site chosen for comparison because it seems certain it cannot be called quiet area. (PERRACHE)

Tools and analytical methods to study and define those areas quality, quiet areas which are part, already exist or are to develop and adapt, among these:

- observing, listening, knowledge of the territory,
- acoustic measurement,
- the user survey,
- the audio recording,
- calculated noise maps

Studies on sites of Lyon by the association Acoucité have developed tools and methods opens a possibility to evaluate and map the sonic qualities of land, such as the Diagnosis of Acoustic Neighborhood (DAQUAR) developed in partnership with the laboratory of CRESSON or calculation software for processing acoustic cues of sound samples, Quartus developed by CSTB.

For acoustic measurement, Acoucité use the “delta radar” representation with 3 axes.



Example of the “delta radar” representation

The results of the study concerning the whole territory of Lyon’s agglomeration confirmed that a univocal approach was insufficient. This kind of approach was based on energetic noise levels calculated for noise maps according to the END. For example, the evaluation of pedestrian areas only through noise levels due to transportation noise led to a quiet area. Measurement or a simple walk-over had discredited this diagnosis. Moreover, we had to consider the variation of noise levels during time (day or seasons), and others statistic ratings. For example, one of the parks doesn’t appear as a quiet situation: calculated noise levels and measurement give a too high Lday value. But if we consider quiet periods and number of audible events, this area presents some parameters of a quiet area.

Sites	Simulation	Mesure	Prise de son	Enquête	Observation
Bron direction	■	+	+	?	+
Bron stade	■	■	■	?	■
Bron pépinière	+	+	+	+	+
Meyzieu	+	+	+	+	+
Victor Hugo	+	■	■	■	■
Perrache	■	■	■	■	■

+ calme
 ■ pas calme

It appears that different types of area are definable

- areas that appear calm with all criterion,
- areas that appear calm according to certain criteria,
- areas that don't appear calm with all criterion

This perception is confirmed by user's words and by behaviours we have observed. Analysing the quality of audio recordings is difficult because there is no objective, technical or scientific values. However, this tool brings many qualitative elements and largely exceeds the only informative value of physical measurement: For example identification of the numerous components of natural noise sources, highlighting certain effects, calling upon the auditive memory or creating sound images whose richness. Moreover this practice allows establishing a relation between the place of study and inhabitants.

The qualitative investigation is a relevant tool even if the quotation of the road noise is very often omnipresent, even for low energy levels. It seems that noise levels define partly the appreciation of quiet quality of the place. It is often difficult to highlight sound elements with a positive quality. Thus it appears important to specify that environmental noise approach should not be reduced to "quiet / not quiet". Example, a busy pedestrian area should not be reducing to a "noisy" characterization according to measurement, nor to be considered as calm, according to calculation. This kind of street has other qualities, for example the prevalence of human noise sources and the adequation between acoustic environment and the use of the place.

QUAs Analysis in with the use of acoustic measurements to build a new index to characterize the area. (Paris city and Bruitparif)

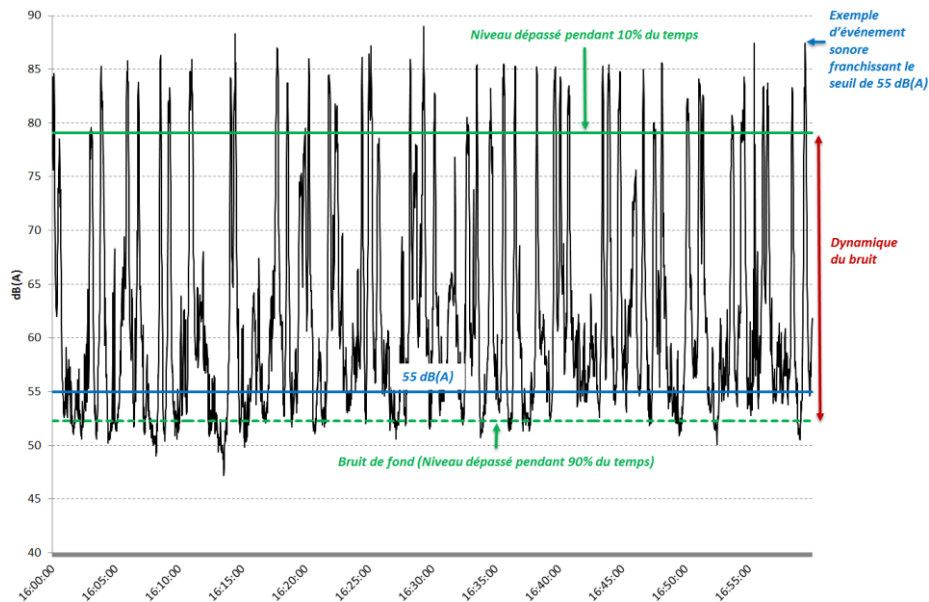
Perceptual factors other than acoustic factors come into consideration in the assessment of a quiet area : landscape, aesthetics, cleanliness, lighting, security, customs ... There is no need to assess the character acoustically "calm" of an area, if it is inaccessible to the public, unsafe, insecure or even inappropriate in recreation and leisure. These discriminating factors condition the implementation of the acoustic measurement campaign and the use of the new index. They must therefore be considered in the first phase of selection of potential quiet area. The method proposed aims to characterize the sound environment of a site by the implementation of acoustic measurement and the use a new index.

The method to characterize the area involves several steps:

- Observations on site and perception with a survey among the user on the area
- Identifying sector of a relatively homogeneous in terms of the sound environment of the area sought to be described
- Acoustic measurement campaign for a period sufficiently representative of each sector (typically one week): acquisition of LAeq, 1s spectrum or audio recording
- Calculation of an hourly index for every sector studied
- Calculation of an average index by frequentation period for every sector studied

If it be a city park for example, we'll do the median indices calculated over the period is open to the public: 9-19h, for example.

- Calculation of an overall index grade for the area



The new index is based on two physical components:

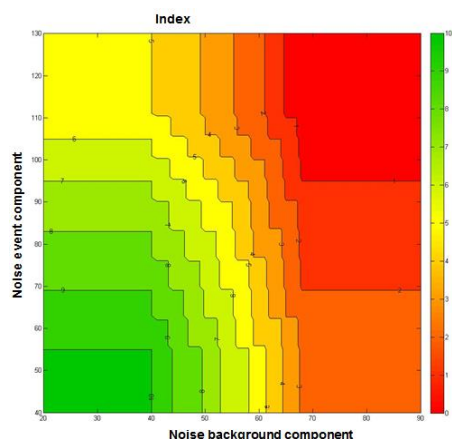
Noise background component BGN L90

Noise event component EVT with two parameters:

- Sound level dynamic: L10-L90
 - Events were disrupted sound environment of “calm” periods
- It's Number of events exceeding 55 dB (A) noted NNEL55

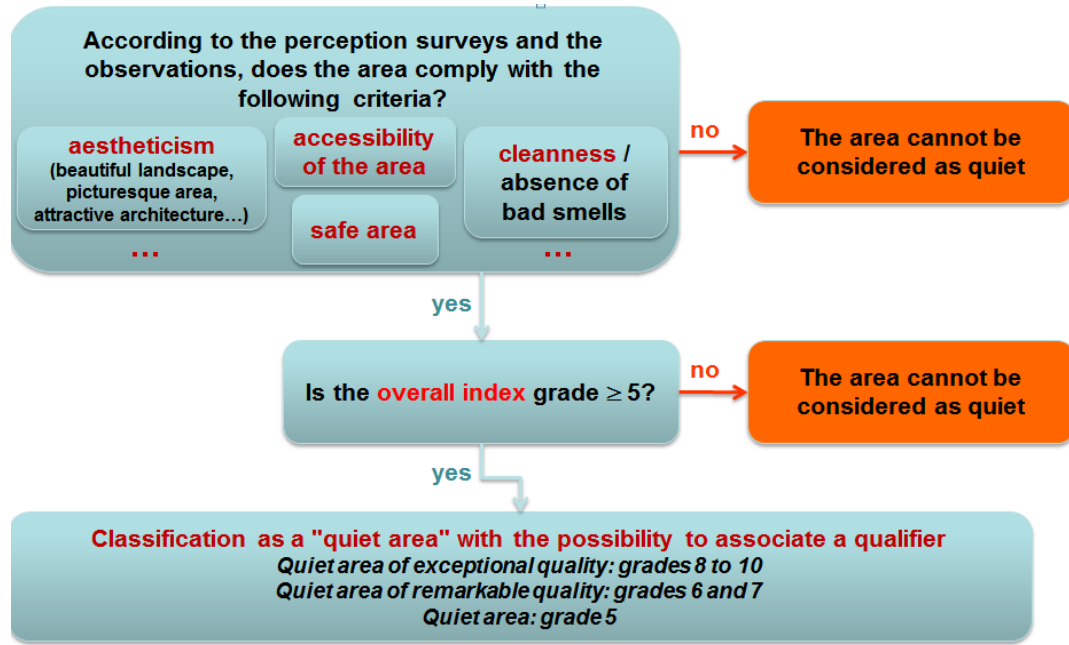
This index is one of the 4 index will be assess by target audience in the Harmonica project :

www.harmonica-project.eu



The index values (hour index for each sector, index for a sector and global index for area) will be represent on a scale going from 1 (horrendous) to 10 (excellent quality).

The new index



Decision tree with the overall index

QUAs analysis in Rennes agglomeration with a quality index

(The local Urban Agency of Rennes agglomeration AUDIAR Philippe Woloszyn, architectural acoustics CNRS.)

The research is based on a multi-functional approach as recommended in the guide “the French referential for the definition and establishment of quiet areas” (Faburel and Gourlot 2008). A survey campaign was used, to trace the feelings and practices of the inhabitants. The results of the survey have been crossed with data analysis of field visit: visual and auditory perceptions, accessibility.

The new quality index : « indice de qualité » IQ

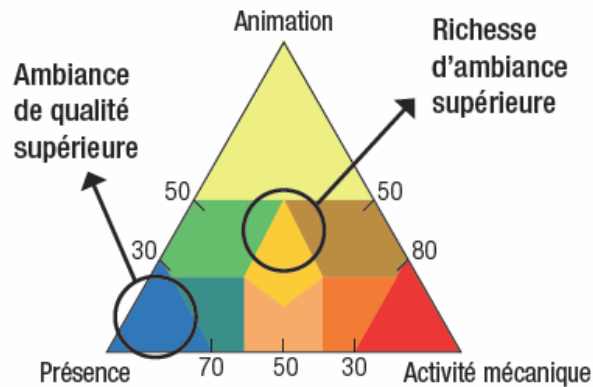
Quality Index evaluates the potential of each space for recharging one's for the maximum number of inhabitants. The quality index estimates the perception of calm and well-being. The value of the new index is based on the combination of values of 4 criterion:

- the physical environment of the place (visual perception),
- the sound perception,
- practices and customs
- and finally accessibility.

The sound perception parameter is composed of three criterion:

- the noise level coming from the noise map
- the analysis of the quality of sound environments
- the analysis of the richness of sound environments.

The last two criterion value (quality and richness) come from the “ambiance sonore” delta model (triangle des ambiances sonores, SACSSO model proposed by A. Léobon)



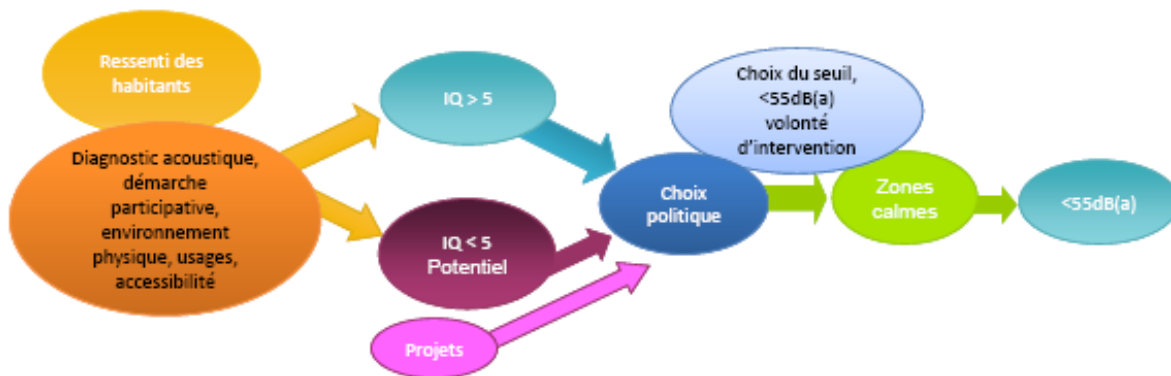
Triangle des ambiances sonores

If the IQ (visual perception, sound perception, practices and customs, accessibility) > 5 , the area is called “zone d’épanouissement notoire” = ZEN

The use of noise maps is only present at the end of the method to set objectives for the area selected.

If the area is ZEN, and noise level < 55 dB (A) the objective is do not to increase this sound level. Protection of the area.

If an area is ZEN and noise level > 55 dB (A), the objective could be to reduce the sound level.



Decision tree

QUAs analysis in Mont Valerien with a simple classification (A,B,C,D) (Acoustique & Conseil)

As a first step, Acoustique & Conseil proposes a questionnaire to the technical staff and local associations of the city. This document suggests all the different kind of potential Quiet Area we can possibly encounter (Parks, Woods, Cemeteries,...).

As a second step the provider proposes to rate these potential Quiet Areas.

The experience of the provider has led us to consider 5 equally-weighted criteria to describe the concept of quietness: Noisiness, Accessibility, Safety, Maintenance and Cleanliness, and landscape beauty.

The following board shows the classification of each criterion from A (very good) to D (very bad).

Criterion	A	B	C	D
Noisiness (modelling or sound measures)	Lden < 55 dB(A)	55 < Lden < 60	60 < Lden < 65	Lden > 65
Accessibility	Handicapped	Pedestrian	Transports only	Non accessible
Safety	Guarded Space	Non guarded space	Obscure zones, without lighting	Dangerous zone (persons, traffic,...)
Cleanliness and Maintenance	Regular maintenance	Partial maintenance	Regular degradation / badly maintained	Non maintained / unclean
Landscape, view from area's center (greenery, water, specific view, architecture ...)	the 4 directions (N, S, E, W) are pleasant.	3 / 4 directions (N, S, E, W) are pleasant.	2/4 directions (N, S, E, W) are pleasant.	None or only 1 direction is pleasant

The global rating is obtained by the rating of the worst criterion. Then, as a complementary indication, the worst rating of other criterion is given between brackets “()” : this indicates the potentiality of the area. Hence we can then easily classify areas and work on them: excluding them or improving the negative points.

For Example :

- *Quiet Area D(A) : corresponds to an area that has only 1 very negative criterion, but with a very good potentiality. If this worst criterion is enhanced the area could become a very pleasant Quiet Area.*
- *Quiet Area D(D) : corresponds to an area that has, at least, two very bad criteria. At the present moment this area could not be considered as Quiet.*

4. SYNTHESIS OF QUAs MANAGEMENT METHODOLOGIES

4.1 DCMR

4.1.1 United Kingdom

4.1.1.1 England

In England the following procedures are proposed for the management of quiet areas:

- After being formally identified as quiet areas local authorities have to adopt policies to manage the local noise environment in order to protect the quietness of these quiet areas and avoid increases in noise.
- Expected approach is that local approaches should be integrated with policies for securing Government approaches on sustainable development. The expected objective from adopted policies is the realization of the benefits of quiet areas and their contribution to the quality of life such as meeting community needs for affordable homes and jobs.
- In this policy adaptation process, the Competent Authority will cooperate with the local authorities to determine how this objective is best achieved. Noise levels for the management of these quiet areas will be set in consultation with local authorities.
- Surveys with open en closed question are being conducted. A public questionnaire can be found at the DEFRA website.

4.1.1.2 Wales

In Wales the protection of quiet areas is foreseen to complement existing policies on managing open space and noise. The planning system will have to contribute to urban tranquillity, and as a consequence will support the aim of quiet areas and will offer a certain level of protection.

4.1.1.3 Scotland

In Scotland's action plans of Edinburgh and Glasgow proactive measurements will have to ensure that no change in noise levels will occur. Therefore quiet areas should be part of local authority's policy plans and be protected through development management and traffic management with the assistance of Environmental Health.

4.1.1.4 North Ireland

In Northern Ireland the management of Quiet Urban Areas is based on the noise policy, the health policy and the quality of life policy. However it these policies are currently in progress among other issues as well (definition, criteria, ect).

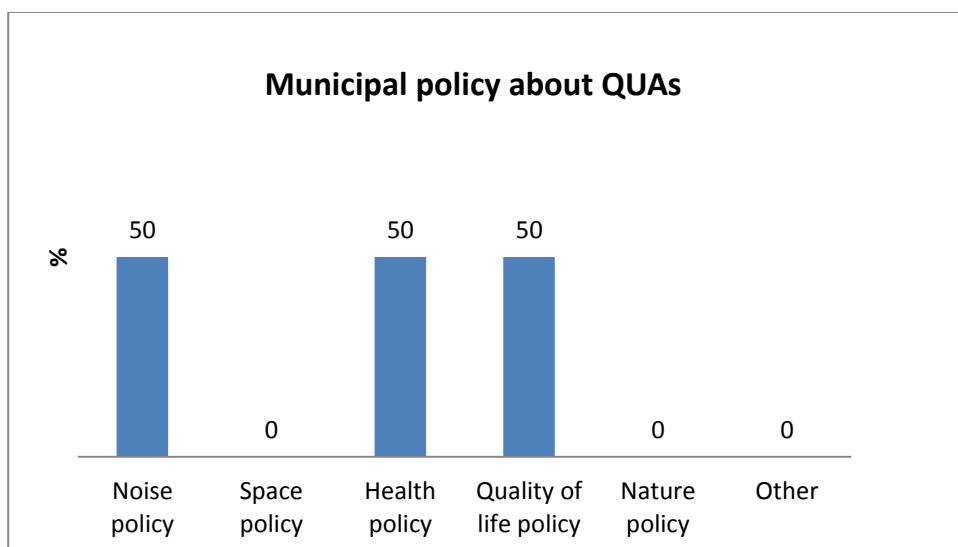
4.2 VIENROSE

4.2.1 Italy

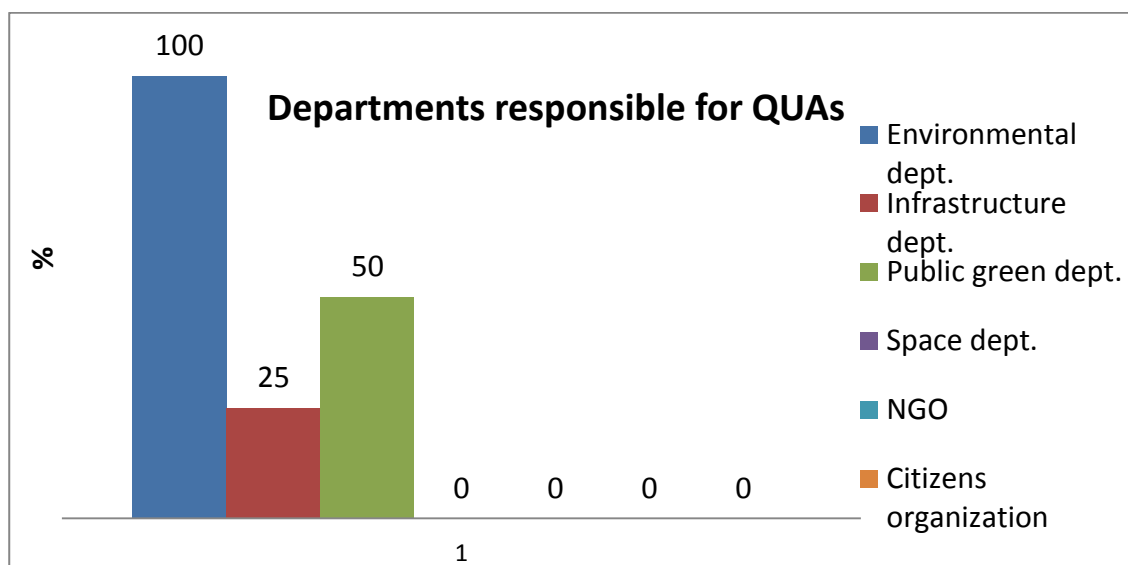
In Italian agglomerations, no procedures for quiet areas management are in place (yet).

In general the responsible department of QUAs is environmental department and the public green department.

In the following chart answers about the policy on which goals are based are represented.



Concerning Stakeholders involved in the management of Quiet Areas, following the results about which department(s) are responsible or involved in the management of QUAs are represented.



4.2.2 Germany

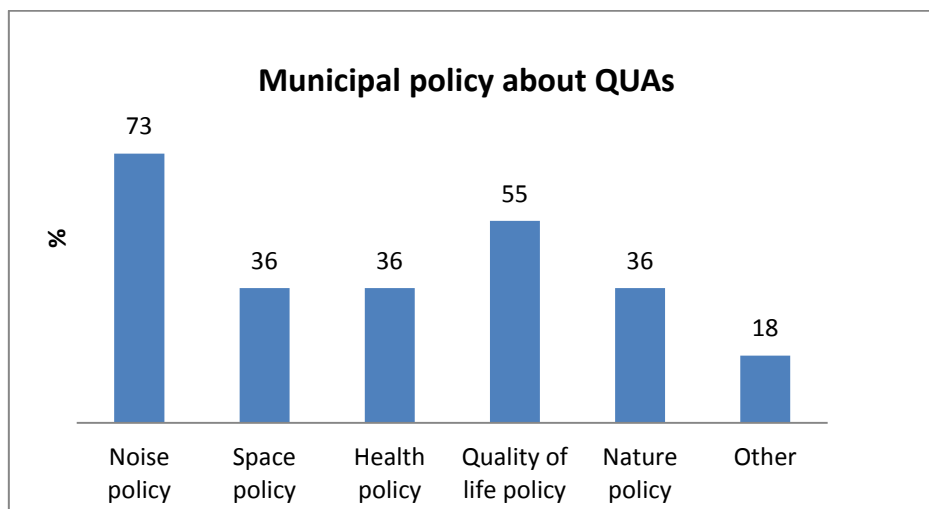
Concerning Management of Quiet Areas, has been asked to the stakeholders what are the municipal policy goal (target) with respect to the designation, improvement and/or preservation of quiet areas and on which policy are them based.

Only two cities gave details about it:

MUNCHEN: noise policy concerning the European directives and national regulations for Noise Action Plans; an additional goal is seen in the benefit for the quality of life in the city, qualified recreational areas within the city limits should be protected from increasing noise.

CHEMNITZ: The goal is to connect the protection of nature and landscape with the protection of the citizens against traffic noise pollution to avoid health damages and improve the quality of life in the city and to decrease the traffic coursed emissions of carbon-dioxide.

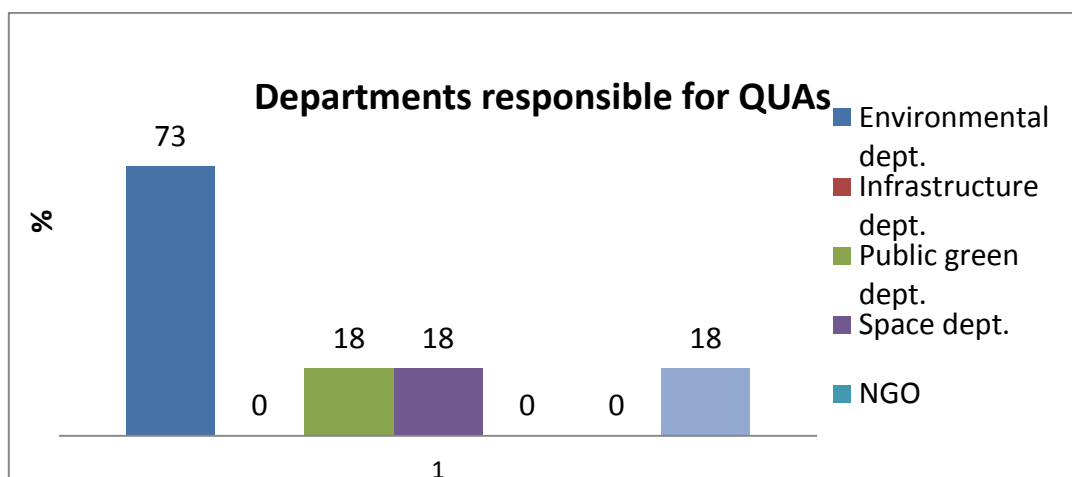
In the following chart are reported the given answers about the policy on which goals are based.

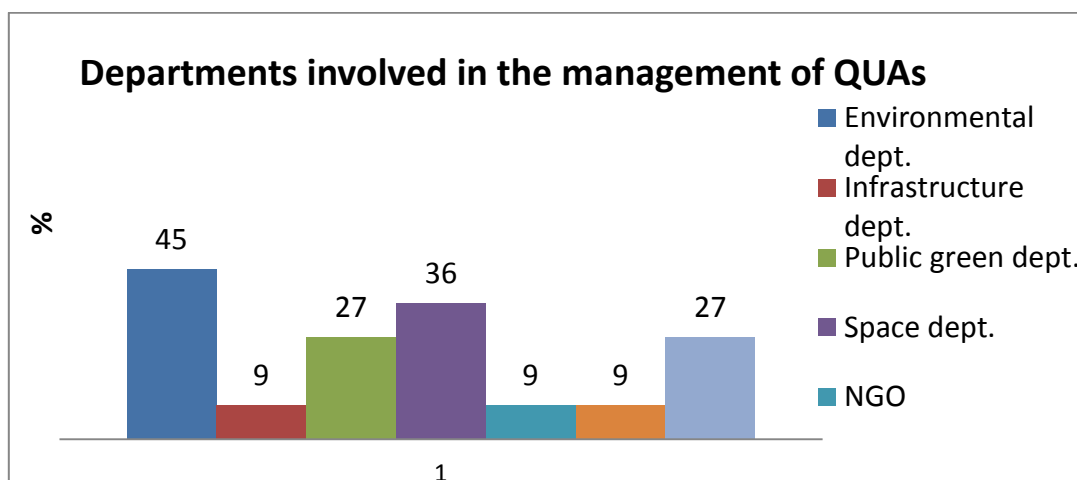


The most part of the agglomerations doesn't have a procedure for monitoring the degree of compliance of the policy objectives.

Seven agglomerations on nine answered that the development of new Quiet Areas is not in the municipal proposal, neither in the development of new areas but all of them plan to consider QUAs assessment in the second round of the 2002/49/EC Directive at the same way of the first round, except for the cities of Augsburg and Düsseldorf that want to experiment a new methodology.

Concerning Stakeholders involved in the management of Quiet Areas, here follow the results about which department(s) are responsible or involved in the management of QUAs.





In the most of the cases there is no any coordination protocol or methodology among the different Departments or Stakeholders involved in the management of QUAs.

4.3 BRUITPARIF

4.3.1 France

Recommendations for QUAs management in Greater Lyon (greater Lyon and Acoucité)

The case of Blandan's park

Most of the urban green spaces are threatened by the urban development. When a green area is exposed on noise, it is important to protect it and to improve soundscape's quality, taking into consideration the way of use. When one urban wasteland is going to be a green area open to the public, it is the centre of interest of all of the dialogues. This dialogue with the populations is essential, and surveys representing various soundscapes are the support of this communication.

Blandan's park is an old military camp of 17 hectares enclosed with walls. It is a real oasis in the middle of the city. This park will become a large urban and public park; completing other great parks in the agglomeration. The park will have local and larger scopes through different functions: proximity green space, small or big sport and cultural events, and nature in the city. Although, it had to preserve his natural and historic temper.

Noise mapping shows low noise levels in comparison to surrounding blocks. Railroad at the east of the Park and south road have a negative impact, especially near a little medieval castle. Quiet possibilities will be preserved even though a lot of dwellings will be pulled down. Noise levels and audio recording shows different soundscapes. They shall be preserved or modified by landscaping. During public meetings, neighbors and future users consider noise as a secondary question. Sound Recordings were presented and have helped them to consider the different atmospheres and to project into the future park. They have appreciated this kind of travel and have agreed with the presence of road noise in the south of the park. They have understood. that opening view for landmark main monuments shall not agree with quiet issue. This virtual

acoustic tour is available on line <http://acoucite.org/spip.php?page=caserne>

Geographical distribution of quiet areas in the agglomeration

Beyond the local concerns, the geographic distribution of quiet areas in the agglomeration is also necessary, because everyone had to be able to reach a quiet area. Noise mapping highlights lacks, in particular when the urban settlement isn't useful as continuous obstacle to noise. In addition, near the noise black spots, it is important to set up real spaces of noise regulation, in order to decrease annoyance. All those elements are the components of a Quiet areas policy of the agglomeration. Quiet areas are basically necessary to the balance of the city and citizens compared to the noise black spots, just like green spaces are essential compared to mineral-bearing spaces. The concepts of overload and controllability of space thus constitute relevant intermediates factors in a noise pollutions context. Consequently, accessibility at a calm zone for everyone could contribute to create an environmental stress modulation source generated by the urban noisy situations.

Deal with other environment issue

From the point of view of climate change, public spaces or green areas of an agglomeration can be used more and more often. People will benefit from these spaces for a global set of criterion, like quiet or coolness. For example, during heatwaves, individual benefit will not be complete if the park is cool but very noisy. We can easily establish a parallel between calmness and coolness: one the one hand noise black spots and urban heat islands, on the other hand quiet areas and urban cool islands. Further diagnosis about urban heat islands will be carried out. Those spaces had to be considered as regulation spaces to ensure equilibrium into the agglomeration. Urban heat islands and quiet areas will meet up with a global well-being issue.

5. SUMMARY

Reports presented by QUADMAP partners demonstrate a wide national interest concerning QUAs and their management and, as a consequence, the presence in each legislation at least of a formal definition of Quiet Area. In many countries a place is elected as a Quiet Area because it respects the national definition or because it meets the qualitative established requirements (safety, cleanliness, pleasantness, green/natural area...) or the quantitative ones (especially Lden limits).

Much importance is also given to public consultation and soundscape's techniques. Some cities would prefer not a national standard methodology to be applied in every situation but a specific method designed for each pilot-case.

In Florence and Paris field-tested methods for selecting QUAs, described step by step, have been developed.

Concerning the analysis phase of QUAs many cities have adopted the same criteria also used in the selection one: noise limits established with Lden parameter and qualitative requirements.

In Rotterdam and in Greater Lyon field surveys have been made in order to check criteria used in the previous selection phase. These experiences have demonstrated the validity of mentioned criteria and the necessity of selection/analysis methods studied for each potential Quiet Area.

In Paris and Rennes new IQ indexes have been tested in order to understand the quietness level of a situ, considering different qualitative parameters.

Regarding managing techniques in many countries no methodologies have been introduced yet.

The management phase is intended to protect the quietness of these quiet areas and to avoid increases in noise.

In general, there is a common attempt to understand which is the responsibility in managing quiet areas of each national and local authority and to ensure the access to quiet areas to citizens.

In the following a review of some aspects that could be improved:

✓ QUAS definition

In its transposition into French law in 2006, "quiet areas" are defined in the article L 572-6 of the Code of the Environment as "external spaces notable by their low exposure to noise, where the authority in charge of the plan wants to control the evolution of this exposure considering the current or future human activities.". In the French transposition of the END, there is no distinction between "quiet area in agglomeration" and "quiet area in open country" and no reference to an acoustic level.

Analyzing also other definitions of QUA provided by all partners it's clear that a definitive reference to an acoustic level it's not really necessary if a complete procedure of

selection/analysis/management is already defined. If a new common definition of Quiet Area has to be given it seems that most implemented adjectives are: open, silent, quiet, recreational, with reduced noise levels space. In this way a new definition should respect the indications given by 2002/49/EC Directive, eventually integrated/reviewed.

✓ Selection procedure - Lde parameter

In describing the “relative method” it’s used, as an acoustic parameter, the Lde indicator whereas all partners except France has adopted the most common Lden one. The introduction of a different parameter would be likely to imply the rewriting of acoustics maps by most countries and other inconvenient. Perhaps it would be better to consider the possibility of using Lden parameter instead of Lde, maintaining the application procedure.

✓ Added filters

French method considers, in addition to the absolute and relative procedure, two other criteria to be respected by an area to merit the definition of Quiet: to be a public space and to be not influenced by the nuisances related to air traffic. Perhaps other or different filters could be taken into consideration: in this phase it would be possible to reintroduce qualitative criteria suggested by many cities for the QUAs’ definition and analysis phase. According to the index developed by Paris-Bruitparif, such criteria, as accessibility and safety, have to be respected by an area to become a potential QUA.